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Date Received 5-26-2017

Permit Number 18693

Project Manager Bobbi Coleman

Name of Contractor ch2m

UST Certification Number

Docket Number 199 AST

Scanned

CAP Add. Revision 1

A D D E N D U M   R E V I S I O N 1

Corrective Action Plan Addendum
Lewis Drive Remediation Site
Belton, South Carolina

Site ID Number 18693
("Kinder Morgan Belton Pipeline Release")

Prepared for

Plantation Pipe Line Company

March 1, 2017 and revised May 25, 2017

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PREPARED FOR

PLANTATION PIPE LINE COMPANY

PREPARED BY

ch2m

ATLANTA, GEORGIA

March 1, 2017 and revised May 25, 2017

I affirm that this plan addendum was prepared under my direct supervision.

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 32547 SCOTT POWELL

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Scott Powell, P.E. Date

South Carolina Registered Professional Engineer #32547

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Acronyms and Abbreviations

1,2-DCA	1,2-dichloroethane
BTEX	benzene, toluene, ethylbenzene, and xylenes
CAP	corrective action plan
CH2M	CH2M HILL Engineers, Inc. (a CH2M HILL company)
DO	dissolved oxygen
ISCO	in situ chemical oxidation
ISTT	in situ thermal treatment
LEL	lower explosive limit
LNAPL	light non-aqueous phase liquid
MNA	monitored natural attenuation
MPE	multi-phase extraction
MTBE	methyl tertiary butyl ether
NSZD	natural source zone depletion
PAB	permeable adsorptive barrier
Plantation	Plantation Pipe Line Company
PRB	permeable reactive barrier
QAPP	Quality Assurance Project Plan
RCM	reactive core mat
SCDHEC	South Carolina Department of Health and Environmental Control
SVE	soil vapor extraction

Introduction

CH2M HILL Engineers, Inc. (a CH2M HILL company, herein referred to as CH2M) has prepared this revision to the Corrective Action Plan (CAP) Addendum on behalf of Plantation Pipe Line Company (Plantation) for the remediation of a pipeline release discovered December 8, 2014, at Lewis Drive in Belton, Anderson County, South Carolina. This site has been designated by the South Carolina Department of Health and Environmental Control (SCDHEC) as Site Number 18693 ("Kinder Morgan Belton Pipeline Release"). The objective of this CAP Addendum Revision 1 is to present aspects requested by SCDHEC in their comments on the original CAP Addendum presented in SCDHEC's letter stamped April 26, 2017. There is also a response to comments letter, prepared by CH2M and submitted under separate cover, that responds to the SCDHEC's comments on the CAP Addendum. This CAP Addendum Revision 1 replaces the CAP Addendum entirely, and in effect supersedes the pertinent elements of the original CAP submittal.

The original CAP was submitted on September 1, 2016 (CH2M, 2016a) in accordance with correspondence from SCDHEC stamped January 26, 2015, March 21, 2016, June 13, 2016, and June 29, 2016. After the CAP was submitted, it underwent a 47-day public review period. SCDHEC issued a letter dated January 27, 2017, (with an errata letter dated January 31, 2017) presenting comments on the CAP and requesting a CAP Addendum be submitted within 30 days. Based on subsequent discussions with SCDHEC after submittal of the CAP and during the public comment period, including a meeting held in Columbia, South Carolina on November 4, 2016, the CAP Addendum was submitted on March 1, 2017.

In addition to revising the surface water and groundwater monitoring plan, this CAP Addendum Revision 1 also provides supplemental rationale for the selection of the proposed remedy, including a detailed case history of success with the technology in remediating light non-aqueous phase liquid (LNAPL) in South and North Carolina. Finally, this CAP Addendum also documents the plan to mitigate impacts from two localized groundwater seeps that have been observed in the Brown's Creek area of the site.

This CAP Addendum is organized as follows:

- **Section 1, Introduction** – Provides an overview of the purpose and organization of this CAP Addendum.
- **Section 2, Remedial Technology Selection** – Provides justification for the selection of air/biosparging as the remedial technology, including several case histories of success with this technology at similar sites in the region.
- **Section 3, Revised Monitoring and Reporting Plan** – Revises the original proposed monitoring program that will be implemented to monitor remedial performance.
- **Section 4, Focused Seep Abatement** – Documents the plan to address two groundwater seeps that have been observed in the Brown's Creek area of the site.
- **Section 5, References** – Provides a list of references cited in this report.
- **Table and Figures** – Supporting tables and figures are provided in sections following the text.
- **Appendix A, Remedial Successes in Sparging LNAPL** – Presents case studies and specific examples of sparging performance at LNAPL sites.
- **Appendix B, Startup Plan for Surface Water Protection Measures - Revision 2** – Includes a copy of the *Startup Plan for Surface Water Protection Measures – Revision 2*, submitted to SCDHEC on February 23, 2017 (CH2M, 2017b).

- **Appendix C, Request for Authorization to Initiate Remediation in the Hayfield Zone -** Includes a copy of the *Request for Authorization to Initiate Remediation in the Hayfield Zone*, submitted to SCDHEC on April 11, 2017 (CH2M, 2017c).
- **Appendix D, Shallow Bedrock Zone – Biosparging Pilot Study Plan -** Includes a copy of the *Shallow Bedrock Zone – Biosparging Pilot Study Plan*, submitted to SCDHEC on May 8, 2017 (CH2M, 2017d).
- **Appendix E, Surface Water Protection Plan Addendum and Approval Letter** – Provides a copy of the *Surface Water Protection Plan Addendum* (CH2M, 2017a), submitted to SCDHEC on January 20, 2017, as well as the SCDHEC approval letter dated February 10, 2017.

Remedial Technology Selection

This section summarizes the evaluation and selection of remedial technologies for the Lewis Drive Remediation Site in Belton, South Carolina.

2.1 Corrective Action Objectives

The corrective action objectives for the site, as presented in the original CAP (CH2M, 2016a), are as follows:

1. Remove product to the maximum extent practicable.
2. Abate surface water impacts to maintain surface water criteria.
3. Reduce concentrations of dissolved hydrocarbons in groundwater to be protective of surface water quality.

These objectives are described in more detail in the CAP. Note that for the purposes of evaluating applicable technologies, "product" is referred to as LNAPL. At Lewis Drive, LNAPL consists primarily of gasoline with a minor amount of diesel.

Interim goals for the proposed corrective action objectives are:

1. No surface water quality exceedances within 6 months following startup of the sparging system in the Brown's Creek and Cupboard Creek Protection Zones.
2. Transition from free-phase LNAPL recovery to *in situ* destruction of LNAPL by the end of September 2017 (approximately 6 months after starting the sparging system).
3. Complete a bedrock sparging pilot test in the Shallow Bedrock Zone by the end of September 2017 so that full-scale bedrock sparging can be implemented in 2018.
4. Have an established treatment zone with stable air flows in the Brown's Creek and Cupboard Creek Protection Zones by the end of September 2017.
5. Have an established treatment zone with stable air flows in the Hayfield Zone horizontal sparging wells by the end of December 2017.

Once the system has reached a steady state of operation and some performance data have been collected, other interim goals may be established in consultation with SCDHEC.

2.2 Technology Screening

The following nine technology alternatives were evaluated using the screening methodology presented in the Interstate Technology & Regulatory Council (ITRC) guidance on *Evaluating LNAPL Remedial Technologies for Achieving Project Goals* (ITRC, 2009):

1. Risk reduction, monitored natural attenuation (MNA), and natural source zone depletion (NSZD)
2. Air/biosparging
3. In situ chemical oxidation (ISCO)
4. In situ thermal treatment (ISTT)
5. Excavation and product removal
6. Physical or hydraulic containment (barrier wall, French drain, slurry wall)

7. Permeable reactive barrier (PRB) or permeable adsorptive barrier (PAB)
8. Soil vapor extraction (SVE)
9. Multi-phase extraction (MPE)

Each technology is described and evaluated for its effectiveness, implementability, and cost in Table 1. Of those evaluated, the following technologies were retained as components of the remedy:

- **Risk reduction, MNA, and NSZD:** These natural processes form a component of any overall remedy, and will be retained as a polishing step after active remediation has sufficiently reduced source zone impacts.
- **Air/biosparging:** Biosparging has been implemented effectively with rapid results at similar sites in the region and is retained as the primary active remedy.
- **Physical or hydraulic containment:** This technology must be paired with an alternative that addresses the source and the dissolved plume. During the emergency phase of the response, Plantation installed a recovery trench along impacts leading to Brown's Creek. This trench will continue to be used for vacuum product recovery until the biosparging curtain is established to mitigate impacted groundwater adversely affecting surface water.
- **MPE:** As a stand-alone remedy, MPE has a tendency for longer remediation times than technologies that rely on biological degradation or volatilization. Therefore, a permanent MPE system is rejected. Surfactant enhancements are rejected due to their potential to mobilize product near receptors. However, mobile MPE and vacuum recovery can be implemented as contingency measures in areas of highly recoverable product and/or high risk areas, such as those adjacent to Brown's Creek and Cupboard Creek.

A combination of air/biosparging supplemented with vacuum recovery in extraction wells and the interception trenches will form the basis of the remedy. MNA and NSZD will also be considered later in the remediation process to determine an endpoint to active remediation. The endpoint to active remediation is the point at which natural processes surpass active biosparging in effectively degrading residual LNAPL and dissolved concentrations, and is protective of surface water quality.

2.3 Technology Selection

In addition to the hydraulic containment and vacuum recovery already in progress at the site, biosparging was selected as the primary active approach to achieve the remedial objectives for the following reasons:

- Numerous case studies show that sparging effectively reduces product levels and concentrations of petroleum-related hydrocarbons in soil and groundwater. Additionally, Plantation has successfully used sparging in numerous nearly identical geologic settings to remove residual product and reduce hydrocarbon concentrations in soil and groundwater.
- Sparging equipment (air compressors and associated controls) is fairly simple, relatively low maintenance, and reliable. Typically, runtime efficiency for a sparging system exceeds 90 percent.
- Sparging eliminates the need for removal, treatment, storage, or discharge of recovered liquids. Minimal volumes of (treated) condensate from the air compressors will be generated.
- During the initial stages of operation, sparging will be conducted at low flow rates to limit volatilization of hydrocarbons. As biodegradation and mass removal proceeds, flow rates will be gradually increased while monitoring ambient vapor concentrations.

2.4 Sparging Performance in Reducing LNAPL

A misconception has been that sparging does not abate LNAPL. There are also concerns that sparging may spread LNAPL by inducing an undesired subsurface gradient. However, industry, CH2M, and Plantation have extensive experience using sparging to reduce LNAPL at a variety of sites and spreading has been shown to be minimal or nonexistent. The following studies include specific examples; detailed reports for these studies are provided in Appendix A:

- *Application of Air Sparging Using Directionally Drilled Wells for Petroleum Hydrocarbon Remediation* (CH2M, 2012) - Case study at a fuel farm in Mississippi. During the first year of operation, the air sparge and SVE system removed an estimated 4,500 pounds of Jet Propellant 8 from the subsurface via biodegradation and volatilization (approximately four times that of skimming) and LNAPL thicknesses in wells decreased from a maximum of 2.5 feet to a maximum of about 0.5 foot. During the second year of operation, LNAPL thicknesses in 23 monitoring wells continued to decrease to less than 0.1 foot. Observations of bubbling in monitoring wells screened in the saturated zone indicated a sparge influence zone radius of approximately 40 feet. There was no evidence that LNAPL was displaced. During the third and fourth years of operation, no measurable free product was detected in any of the monitoring wells. After system shutdown, rebound occurred in one monitoring well outside the zone of influence of the sparge wells, which was addressed using sorbent media (“socks”). Additional rebound did not occur, and no further action was required by the state. As stated in the study, data from field sites suggested spreading is limited or nonexistent.
- *Successful LNAPL Removal Using Air Sparge/Soil Vapour Extraction Technology* (Natusch and Smithard, 2005). According to this study, “Under suitable site conditions and design provisions, accurate LNAPL plume control and associated risk-management can be achieved to enable a high-impact approach towards contaminant mass removal and site remediation... The primary remedial objective, LNAPL source removal, was completed over a very short (9-month) time period in the context of the volume of product recovered (40,000L). At the same time, primary AS/SVE system design limitations, control and management of LNAPL plume migration and containment of generated vapour, were also successfully managed throughout the project.”
- *A Case Study of Aquifer Air Sparging for Remediation of LNAPL* (Palaia et al., 2007). As stated in this study, the weight of evidence collected indicates that LNAPL has not spread, and that the LNAPL is being remediated.
- *Biosparging Using Horizontal Wells at Columbus AFB, MS* (Strong et al., 2008). This study reported that LNAPL thicknesses in monitoring wells decreased from a maximum of 2.5 feet to a maximum of about 0.5 foot after the first year, and less than 0.2 foot after 2 years of operation.
- *The Use of Biosparging to Remove LNAPL at Selma 3 (Lunardini, 2017) and Advancements in Horizontal Directional Drilling in the Kinder Morgan Remediation Program* (URS, 2014). LNAPL thicknesses were reduced from 4 feet to zero in 12 months of sparging operation without accompanying SVE at the Selma Terminal in Selma, North Carolina. There is no evidence that biosparging spread LNAPL outward. Dissolved hydrocarbons were no longer detected in the source area after 6 years of sparging.
- *Annual Remediation Report for 2015, Peairs Road Site, Zachary, Louisiana* (URS, 2016). Air sparging was conducted from 2007 to 2015. LNAPL thicknesses were reduced from over a foot to zero in 15 months. No LNAPL was detected and no benzene, toluene, ethylbenzene, and xylenes (BTEX) or methyl tertiary butyl ether (MTBE) constituents were detected above their regulatory levels in any monitoring wells in 2015.

- *Monthly Sampling Report – January 2017 Results, Plantation Pipe Line Company Anderson TOR Release, Anderson, South Carolina* (AECOM, 2017). LNAPL thicknesses were reduced from over a foot to 0.02 foot after less than a month of operation.

These studies illustrate that LNAPL reduction can be expected through sparging technology and that spreading is minimal to nonexistent. Therefore, biosparging is a suitable technology to meet the three remedial action objectives at the Lewis Drive site: remove product to the maximum extent practicable, abate surface water impacts, and reduce concentrations of dissolved hydrocarbons in groundwater to be protective of surface water quality.

Revised Monitoring and Reporting Plan

This section revises the proposed groundwater and surface water monitoring program for the site following construction and startup of the remedial system. This section replaces Section 8 of the original CAP (CH2M, 2016a).

Please note that these proposed monitoring and reporting components are based on an assumed set of conditions that may change after system startup. Monitoring frequencies may need to be increased or decreased based on the response observed in the aquifer. Similarly, monitoring wells may be added or removed from the monitoring network depending on the changes observed in the hydrocarbon plume. Any adjustments will be made in consultation with SCDHEC, and will be documented and reported accordingly.

3.1 Groundwater Monitoring

To provide clarity, the groundwater monitoring plan has been subdivided into four zones with unique geologic and hydrogeological characteristics that were described in the CAP:

1. **Brown's Creek Protection Zone** – This zone encompasses the distinct lowland area that is adjacent to Brown's Creek.
2. **Cupboard Creek Protection Zone** – This zone encompasses the distinct lowland area that is adjacent to Cupboard Creek.
3. **Hayfield Zone** – The Hayfield Zone encompasses the upland hayfield north of Lewis Drive.
4. **Shallow Bedrock Zone** – The Shallow Bedrock Zone encompasses the upland area south of Lewis Drive generally between the Brown's Creek and Cupboard Creek Protection Zones.

Figure 1 shows the area of each zone described above. Weekly analytical groundwater monitoring will be performed during the startup period as described in the *Startup Plan for Surface Water Protection Measures – Revision 2,* submitted to SCDHEC on February 23, 2017 (CH2M, 2017b); a copy of the plan is included in Appendix B. Beyond the startup period, groundwater monitoring will be conducted on the schedule presented in Table 2. Table 2 is subdivided into each of the above zones, and larger-scale maps have been developed to highlight key monitoring locations and frequency within each zone (Figures 2 through 5).

The startup plan for the horizontal wells in the Hayfield Zone is detailed in the *Request for Authorization to Initiate Remediation in the Hayfield Zone,* submitted to SCDHEC on April 11, 2017 (CH2M, 2017c). A copy of this request is provided in Appendix C.

The plan to pilot-test biosparging in the Shallow Bedrock Zone is detailed in the letter, *Shallow Bedrock Zone – Biosparging Pilot Study Plan,* submitted to SCDHEC on May 8, 2017 (CH2M, 2017d). A copy of this plan is provided in Appendix D.

For each of the four zones, performance monitoring will be conducted by groundwater sampling in the existing monitoring well network at the site. A baseline monitoring event was performed in December 2016. The data collected during this baseline event will be compared to sampling results collected following system startup to evaluate the effectiveness of sparging. Samples will be collected using no-purge HydraSleeve™ samplers. However, if there is not sufficient depth of water column in the well for HydraSleeve™ sampling (16 inches of water column is typically required), the groundwater must be sampled using low-flow purge sampling. The field parameters dissolved oxygen (DO,) oxidation-reduction potential, pH, temperature, specific conductance, and turbidity will be measured at all sample locations. The sparging system will not be shut off prior to sampling.

Groundwater samples will be collected in accordance with the Quality Assurance Project Plan (QAPP) Revision 3 (CH2M, 2017e). Samples will be analyzed for key site contaminants as listed in Table 2: BTEX, naphthalene, MTBE, and 1,2-dichloroethane (1,2-DCA) by EPA Method 8260B (ethylene dibromide is not proposed in this sampling list because it has not been detected at the site in previous sampling events [CH2M, 2015, 2016b]).

3.1.1 Brown's Creek Protection Zone

Performance monitoring for contaminant reduction within the Brown's Creek Protection Zone will be conducted as follows:

- Weekly sampling will be conducted during startup activities as described in the Startup Plan (CH2M, 2017b; Appendix B).
- As a precautionary measure, during Year 1, monthly sampling will be performed in the 9 wells listed in Table 2 and shown on Figure 2. These wells are positioned around the perimeter of the hydrocarbon plume and directly upgradient and downgradient of the sparging curtain. These wells will be sampled at this high frequency to evaluate potential outward migration of the plume and contaminant reduction across the sparging curtain.
- During Year 1, quarterly sampling will be performed in the 19 wells listed in Table 2 and shown on Figure 2 (this is inclusive of the 9 wells mentioned above).
- As needed, any recommended alterations to the monitoring frequency after the first year will be proposed to SCDHEC and will be summarized in the Annual Report.

3.1.2 Cupboard Creek Protection Zone

Performance monitoring for contaminant reduction within the Cupboard Creek Protection Zone will be conducted as follows:

- Weekly sampling will be conducted during startup activities as described in the Startup Plan (CH2M, 2017b; Appendix B).
- As a precautionary measure, during Year 1, monthly sampling will be performed in the 4 wells listed in Table 2 and shown on Figure 2. These wells are positioned around the perimeter of the hydrocarbon plume and directly upgradient and downgradient of the sparging curtain. These wells will be sampled at this high frequency to evaluate potential outward migration of the plume and contaminant reduction across the sparging curtain.
- During Year 1, quarterly sampling will be performed in the 7 wells listed in Table 2 and shown on Figure 2 (this is inclusive of the 4 wells mentioned above).
- As needed, any recommended alterations to the monitoring frequency after the first year will be proposed to SCDHEC and will be summarized in the Annual Report.

3.1.3 Hayfield Zone

Performance monitoring for contaminant reduction within the Hayfield Zone will be conducted as follows:

- As a precautionary measure, during Year 1, monthly sampling will be performed in the 5 wells listed in Table 2 and shown on Figure 2. These wells are positioned around the perimeter of the hydrocarbon plume and directly upgradient and downgradient of the sparging curtain. These wells will be sampled at this high frequency to evaluate potential outward migration of the plume and contaminant reduction across the sparging curtain.

- During Year 1, quarterly sampling will be performed in the 26 wells listed in Table 2 and shown on Figure 2 (this is inclusive of the 5 wells mentioned above).
- As needed, any recommended alterations to the monitoring frequency after the first year will be proposed to SCDHEC and will be summarized in the Annual Report.

3.1.4 Shallow Bedrock Zone

Performance monitoring for contaminant reduction within the Shallow Bedrock Zone will be conducted as follows:

- As a precautionary measure, during Year 1, monthly sampling will be performed in MW-22 to evaluate potential outward migration of the plume and contaminant reduction across the sparging curtain.
- During Year 1, quarterly sampling will be performed in the 8 wells listed in Table 2 and shown on Figure 2 (this is inclusive of MW-22 mentioned above).
- As needed, any recommended alterations to the monitoring frequency after the first year will be proposed to SCDHEC and will be summarized in the Annual Report.

3.2 Water Table Monitoring

Potential mounding of the water table will be monitored during the startup period, in part by four water level data loggers (In Situ Rugged TROLL 100) installed in MW-12 and MW-15 near Brown's Creek, at MW-20 near Cupboard Creek, and at MW-2 in the hayfield (the logger in MW-2 will be used when operation of the horizontal biosparge wells is initiated). Baseline gauging using an oil-water interface probe will be performed before startup to establish baseline conditions. Then, gauging will be performed twice on the first day of operation, daily during Week 1, and weekly for the remainder of Month 1, as detailed in Table 3. DO will be measured at the end of Month 1 with an optical DO probe.

3.3 Zone of Influence Monitoring

DO concentrations will be measured in the 32 wells listed in Table 2 using an optical DO probe to assess the zone of influence from sparging. These measurements will be conducted while the system remains operational to evaluate the maximum potential zone of influence from injection air. These measurements will be conducted in the select group of monitoring wells monthly during the first year of operations. After the first year, these measurements will be conducted quarterly for a year. As needed, any recommended alterations to the monitoring frequency after the first year will be proposed to SCDHEC and will be summarized in the Annual Report. This type of monitoring will be conducted following flow adjustments to portions of the system. After the flow rates are adjusted, DO will be measured monthly to ensure that conditions return to steady-state conditions similar to the previous flow rates. Monitoring frequencies outside of those outlined above will be adjusted as needed in consultation with SCDHEC.

3.4 Biodegradation Evaluation Monitoring

Natural attenuation parameters will be analyzed periodically to evaluate the progress of biodegradation. Groundwater samples will be collected prior to startup and annually thereafter from the 21 wells listed in Table 2. These samples will be analyzed for nitrate by EPA Method SM2320B, sulfate by EPA Method

D516-9002, ferrous iron by EPA Method SM3500 FE D, carbon dioxide and methane by EPA Method RSK-175, and alkalinity by Method SM2320B.

3.5 Surface Water Monitoring

Surface water samples will be collected weekly during startup, monthly for the first 6 months of operations, and quarterly for the following year of operations from each of the 17 locations indicated on Figure 6. As needed, any recommended alterations to the monitoring frequency after the first year will be proposed to SCDHEC and will be summarized in the Annual Report. Since the purpose of the remedial action and the related sampling is to monitor the performance of the measures being implemented, the diffusion aerators in Brown's Creek will not be shut off prior to sampling. Samples will be analyzed for BTEX and naphthalene using EPA Method 8260B. Samples will be collected in accordance with the QAPP Revision 3 (CH2M, 2017e) and EPA Region 4 protocol.

During these same surface water sampling events, DO measurements will also be taken to evaluate the performance of the Brown's Creek diffusion aerators. DO measurements will be taken upstream and downstream of the diffusion aerators at surface water sampling locations SW-03 (upstream) and SW-01, SW-12, and SW-13 (downstream). DO will be measured using a Hach LDO Probe, Model 2 or equivalent.

3.6 Visual Observations

During visits to the site (monthly after the startup period), visual inspections will be performed for evidence of a petroleum sheen on surface waters, odors in the area, and/or distressed vegetation or biota on all areas of the site, including along Brown's Creek and Cupboard Creek. Comprehensive visual inspections of the full site will be conducted prior to startup, weekly during startup operations, and monthly thereafter within the area of the site and additionally along a 3,000-foot section of Brown's Creek and a 600-foot section of Cupboard Creek. The route of inspection is indicated on Figure 6.

If a sheen is observed, it will first be tested to determine whether it is a biological or petroleum sheen using one or both of the following methods:

- Use a stick to try to break up the sheen. A bacterial sheen will typically break into small platelets. A petroleum sheen will quickly try to reform after any disturbance.
- Place a petroleum-absorbent pad on the sheen. The pad will only absorb liquid if petroleum product is present.

If any of the following abnormal conditions are observed, the observer will immediately notify the CH2M project manager by phone: petroleum sheen, seeps, dead and/or distressed vegetation, dead and/or distressed biota, or out-of-the-ordinary odors. A description of the observation, the time it occurred, its location, and any response actions taken will be communicated to SCDHEC via telephone and will be included in regular reports to SCDHEC according to the reporting schedule described below.

3.7 Air Monitoring

Air monitoring during startup will be performed as described in the Air Monitoring Plan provided with the Startup Plan (CH2M, 2017b; Appendix B). Prior to starting the sparging system or adjusting the airflow rates, air monitoring will be conducted to screen for potential exceedances of the lower explosive limit (LEL) and for volatile organic compounds. LEL monitoring will be conducted with an LEL detector at the City of Belton water branch line valve to the former residence at 112 Lewis Drive. Ambient air monitoring will also be conducted in the breathing zone with a photoionization detector at MW-19 near Cupboard Creek, at MW-40 near Brown's Creek, and at MW-09 in the Hayfield Zone.

3.8 Boom Monitoring

Petroleum-absorbent booms are currently in place at different points along Brown's Creek as a contingency measure in case an additional seep manifests at the site. These booms will be inspected on a monthly basis and replaced quarterly at a minimum, or sooner if any boom(s) show evidence of deterioration, yellowing, or vegetative growth, or if it has been damaged or obstructed by trash or debris. When hydrocarbons are no longer detected in surface water samples for three consecutive events, the booms will be removed.

3.9 Reporting

Site reporting will be conducted as follows:

- During the startup period, data transmittals consisting of field data sheets (including observations out of the norm), laboratory reports (including chain-of-custody documents), summary tables, and figures will be provided to SCDHEC on a weekly basis as soon as analytical data are received and evaluated. Data transmittals will be provided by electronic mail and followed up with hard copies.
- Quarterly data transmittals noting key performance observations and a comprehensive annual report will be prepared for the first year of operations. The fourth quarterly data transmittal will be incorporated into a comprehensive annual report.
- Semiannual data transmittals and a comprehensive annual report will be prepared during the second and subsequent year(s) of operation.

The comprehensive annual reports will include a summary of sparging system operations, monitoring results, groundwater contour maps, isoconcentration contour maps, and analytical laboratory reports.

Quarterly data transmittals will be submitted within 60 days following the end of the quarter. The comprehensive annual report for the first year of operations will be provided 90 days following the end of the quarter. Semiannual data transmittals will be provided 60 days following the monitoring event, and the annual report will be provided within 90 days following the end of the calendar year. Plantation will also continue to hold quarterly meetings with SCDHEC for at least one year after startup to review the remediation progress.

Focused Seep Abatement

Two seeps have been identified in the vicinity of Brown's Creek in the eastern portion of the site as follows:

- Seep 1 measures 30 feet long by 12 feet wide and is located approximately 20 feet up the slope from Brown's Creek. This seep is actually a depression from the recovery trench constructed, which occasionally accumulates water and during high groundwater levels can allow groundwater to surface in the depression. A berm stands between Seep 1 and the creek.
- Seep 2 measures 12 feet by 12 feet and is located adjacent to Brown's Creek.

The seep locations are shown on Figure 1.

To abate these seeps, reactive core mat (RCM) will be installed in layers over each seep as described in the *Surface Water Protection Plan Addendum* (CH2M, 2017a) submitted to SCDHEC on January 20, 2017, and approved by SCDHEC on February 10, 2017 (both documents are included in Appendix E). The total footprint of the mitigation effort is approximately 500 square feet (0.01 acre); the total length that is parallel to Brown's Creek is approximately 42 linear feet.

The RCM contains granular activated carbon and is designed to passively control embankment seepage. The carbon is integrated in the RCM between sheets of geotextile that are needle-punched together to keep the carbon contained, regardless of how the material is cut to shape for the application. The conceptual design includes a minimum of four layers of RCM interbedded with 3-inch layers of sand. An erosion-control blanket will be installed at the surface for both seeps. The RCM is to be overlaid on the existing ground with no earthwork cut. The edges of the system will be tapered to tie into existing grade. The RCM and erosion-control mat will be anchored with pins according to the manufacturer's recommendation. Vegetation will not need to be removed to apply the RCM to the seeps.

This activity will be implemented under the U.S. Army Corps of Engineers Nationwide Permit 3, Part (c), which authorizes the use of temporary fill for site maintenance. In accordance with the requirement of the permit, the proposed temporary measure will consist of materials that are placed in a manner that will not be eroded by expected high flows. After concentrations in Brown's Creek have abated, indicating that the seep is no longer impacting the creek, this temporary fill will be removed in its entirety and the affected areas will be regraded to preconstruction elevations and revegetated. The proposed temporary activities covered under Part (c) of Nationwide Permit 3 do not require preconstruction notification.

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Tables

Table 1. Remedial Technology Screening
Corrective Action Plan Addendum Revision 1
Lewis Drive Remediation Site, Belton, South Carolina
Site ID #18693 "Kinder Morgan Belton Pipeline Release"

Technology	Description	Corrective Action Objective[a] 1	2	3	Effectiveness	Implementability	Cost[b]	Screening Status
Risk reduction, monitored natural attenuation (MNA), and natural source zone depletion (NSZD)	*Objective:* Rely on natural processes to attenuate hydrocarbons in soil and groundwater and mitigate site risks. Would require long-term monitoring of sitewide groundwater monitoring well network (up to 63 wells) for analysis of VOCs and natural attenuation parameters like carbon dioxide, methane, ferrous iron, etc. Risk reduction would entail the implementation of institutional controls to mitigate ongoing risks to exposure of contaminated groundwater.	Does not meet	Does not meet	Does not meet	• MNA can be a slow process and may take years to decades for contaminants to reach target levels, particularly if sorbed-phase mass is present and acting as a long-term source to groundwater. • MNA and institutional controls are routinely paired with other remedies to mitigate overall site risks. • Does not address immediate exposure risks. • NSZD can potentially treat up to 700 gallons of LNAPL per acre per year based on studies. • Must be paired with other technologies to meet corrective action objectives; can be used as a polishing tool for other LNAPL removal techniques once threats to the creeks have been addressed.	• Requires robust long-term groundwater sampling and reporting, but is readily implementable. Monitoring well network is already in place at the site and monitoring is currently routinely performed for dissolved-phase hydrocarbons, though not attenuation parameters. • Would require a comprehensive and recurrent evaluation of these data to evaluate whether natural attenuation is occurring, and whether the rate of natural attenuation will result in remediation timeframes that are acceptable to stakeholders. • Relevant institutional controls for the site would entail verifying that production wells in the vicinity of the site remain unimpacted by contaminated groundwater.	**Capital:** Low **Annual:** Low	**Retained as a potential component** These natural processes form a component of any overall remedy, and will be retained as a polishing step after active remediation has sufficiently reduced source zone impacts.
Air/biosparging	*Objective*: Inject air in wells screened in the saturated zone at low injection rates to promote biodegradation of the dissolved-phase constituents. Injecting air adds dissolved oxygen to the groundwater, which is utilized as an electron acceptor by indigenous microorganisms that can convert hydrocarbons into carbon dioxide and cell mass. Injected air also diffuses up through the saturated zone into the unsaturated zone and oxygenates the vadose zone, promoting aerobic biodegradation of sorbed-phase hydrocarbons as well.	Meets	Meets	Meets	• Air/biosparging has been highly effective in reducing concentrations of petroleum-related compounds in soil and groundwater at several other sites owned and operated by Plantation within the Piedmont region of North Carolina. • Monitoring of dissolved oxygen in groundwater would be required to evaluate the effectiveness of biosparging, in addition to routine performance monitoring for an assessment of VOC reductions. • Studies have shown that sparging results in little to no spreading, but the potential for spreading can be mitigated by operating the vertical sparging curtain rows in pulsing sequence from the outside in (from those closest to the creeks to those further away). • Shallow bedrock near Cupboard Creek would reduce the radius of sparging influence and necessitate tighter well spacing. • Treatment may be achieved in 2 to 5 years.	• The materials and services for this type of system installation are readily available. Typical earthwork, mechanical, and electrical contractors can perform the installation of the equipment and piping. • Aboveground treatment and disposal of groundwater is also eliminated. Drill cuttings will be generated during installation. Only minimal amounts of condensate water are anticipated to be generated during operation. • It is anticipated that both horizontal and vertical drilling techniques could be used to target the source zone contamination at the site. Horizontal drilling can be used to target the Hayfield Zone. Vertical drilling can be used to create several rows of sparging “curtains” to protect Brown’s Creek and Cupboard Creek. • Lack of human receptors in the area reduces the need for vapor control. Although emissions during startup may be elevated, flow rates can be increased incrementally to control emissions. Emissions will taper off as the hydrocarbon mass is depleted and biodegradation rates increase. • Operation flows and pressures are adjustable and the system can be readily expanded.	**Capital:** Medium **Annual:** Medium	**Retained** Biosparging has been implemented effectively with rapid results at similar sites in the region and is retained as the primary active remedy.

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Corrective Action Plan Addendum Revision 1
Lewis Drive Remediation Site, Belton, South Carolina
Site ID #18693 "Kinder Morgan Belton Pipeline Release"

Technology	Description	Corrective Action Objective[a] 1	2	3	Effectiveness	Implementability	Cost[b]	Screening Status
In situ chemical oxidation (ISCO)	*Objective:* Apply chemical oxidants to destroy COCs in soil and groundwater in the target treatment zone. Oxidants destroy the contaminants by direct contact and convert the hydrocarbons to carbon dioxide and water. Typical oxidants include hydrogen peroxide, sodium permanganate, and sodium persulfate. Oxidant selection is based on chemical compatibility, destruction efficiency, and cost, and is often evaluated during bench-scale testing.	Meets	Meets	Meets	• Does not preferentially target COCs. Additional oxidant will be required based on "oxidizable" material (inorganic and organic) present in subsurface (which may be high). • High oxidant demand due to the presence of LNAPL. • Bench-scale tests will be required to determine the injection dosage of oxidants selected. A pilot study is also likely to be required. • Can increase dissolved oxygen content and subsequent aerobic bioremediation. • Contaminants are destroyed through mineralization process, which produces no off-gases that need to be contained/destroyed. • Multiple injections would be required due to rebound of dissolved-phase concentrations that results from dissolution of sorbed mass. • Potential secondary water quality impacts and temporary geochemical changes due to the generation of residual compounds. • Distribution of oxidants can be compromised in heterogeneous environments, which can result in insufficient contact between contaminant mass and oxidant. • Concentration reductions from a single application are typically seen in months (versus years).	• Requires staging area for mixing of chemicals with water. • Subsurface features (underground utilities, pipeline corridor, etc.) would need to be considered during design and implementation due to the high number of injection borings that would be required. In addition, the chemical compatibility between the selected oxidant and the pipeline would need to be thoroughly evaluated to ensure that the reagents would not damage the site infrastructure. • Requires injection permits. • No O&M after injections. • Minimal waste generation from drill cuttings. • Would require health and safety considerations for onsite workers due to the hazards associated with the oxidant.	**Capital:** High (includes multiple injections to achieve remedial goals) **Annual:** Low	**Rejected** Injection of oxidants is rejected due to concerns with effective distribution in heterogeneous subsurface, interference and chemical incompatibility from site infrastructure, rebound of dissolved-phase contamination from sorbed-phase mass, oxidant demand from the contaminants and from natural sources, and high cost of repeated injection events.
In situ thermal treatment (ISTT)	*Objective:* Use resistance heating or conductive heating to elevate temperatures in the subsurface to enhance or facilitate COC recovery using a combination of groundwater and vapor extraction points. Fluids extracted are treated at the surface. The two most common technologies to implement ISTT are: ○ **Thermal conductive heating (TCH):** Heaters installed in a sealed well casing and spaced on a defined geometric array are connected to electrical power. ○ **Electrical resistance heating (ERH):** Electrodes spaced in defined geometric arrays and connected to electrical power. When voltage is applied, soil resistance to current flow generates heat.	Meets	Meets	Meets	• Highly effective technology for focused source area treatment. Not likely cost-effective for the 18-acre dissolved-phase plume at Lewis Drive. • Subsurface features can potentially interfere or be negatively impacted by electrical current flow. • Soil moisture is required for heat generation for ERH. Not required for TCH. • Shallow groundwater increases potential for energy loss and complicates vapor control. • Site characterization and COC delineation is key to effective implementation. • Residual heat can help facilitate some downgradient bioremediation/attenuation. • Hydraulic and pneumatic control would be required during implementation. • Expected treatment time would be approximately 3 years.	• ISTT would require direct access to treatment area to install the vertical electrode borings and vertical dual-phase extraction wells. ISTT would also require space for abovegrade power control units, vapor treatment, and groundwater treatment systems. • Compatibility with existing electrical system would need to be evaluated to determine if upgrades would be required. • ISTT on this scale would be energy-intensive. • Few contractors are capable of performing the work. • Heating of subsurface soils would have potentially adverse effects on pipeline infrastructure, such as coatings and cathodic protection.	**Capital:** High **Annual:** Low	**Rejected** ISTT is rejected due to the high cost associated with treating a widespread source zone. Additionally, it is noted that heating of subsurface soils would have potentially adverse effects on pipeline infrastructure.

Table 1. Remedial Technology Screening

Corrective Action Plan Addendum Revision 1

Lewis Drive Remediation Site, Belton, South Carolina

Site ID #18693 "Kinder Morgan Belton Pipeline Release"

		Corrective Action Objective[a]						
Technology	**Description**	**1**	**2**	**3**	**Effectiveness**	**Implementability**	**Cost[b]**	**Screening Status**
Excavation and product removal	*Objective:* Excavate and treat contaminated soils either by ex situ methods (thermal desorption) or by offsite transport and disposal. Selection of the soil treatment method is largely based on cost-effectiveness.	Meets	Meets	Meets	• Excavation is effective at permanently removing contaminated soil from the site and is limited only by direct access to the soil and cost considerations. • Would not address impacts below bedrock interface. • High certainty of removal of impacted soil and product above bedrock. • Offsite disposal would not destroy the hydrocarbon mass; only relocate it to a landfill. • Likely fastest to achieve goals.	• Requires direct access to all contaminated soil, which would require excessive devegetation adjacent to the Cupboard Creek and Brown's Creek wetlands. • Due to smear zone impacts, contaminated soil is present just above the water table, which is as deep as 30 feet belowgrade at the site. Excavation to this depth would require extensive benching and layback, or shoring to protect the excavation sidewalls (for example, sheet piling). • Requires extensive waste handling and disposal on the order of 1,000,000 cubic yards of material. • Heavy impact to community from truck traffic to and from the site. • Excavation would be challenging in and around the pipeline corridor itself. • The materials and services for this type of system installation are readily available. Typical earthwork contractors can perform this work.	**Capital:** High **Annual:** Low	**Rejected** Excavation depths would be significant and require extensive sheet piling and/or benching. Excavation would carry a heavy environmental impact and result in excessive disturbance to the local community. Treatment and disposal of contaminated soil is also considered cost-prohibitive.
Physical or hydraulic containment (barrier wall, French drain, slurry wall)	*Objective:* Use engineered barriers to either control horizontal migration of LNAPL, isolate LNAPL as a vapor or dissolved source, block physical access to the LNAPL body, or prevent recharge infiltration through the LNAPL body (vertical barrier).	Does not meet	Meets	Does not meet	• Extensive groundwater modeling and further investigation pertaining to the groundwater-surface water interface would be required during the design process. • Does not address source. • Does not treat dissolved plume. • Since this alternative does not directly address the source, the time to achieve goals may be in the range of 30+ years. • Requires the installation of groundwater recovery system for groundwater and LNAPL that accumulates behind the barrier; COCs can be effectively treated with aboveground treatment systems. Without source treatment, groundwater recovery would be required over a long term. • The bottom of the barrier could be effectively keyed into bedrock to prevent underflow.	• Construction is simpler due to the moderate depth of installation in the Brown's Creek and Cupboard Creek Protection Zones. • Construction in the hayfield is complicated due to bedrock depth up to 50 feet in some areas. • The materials and services for this type of system installation are readily available. Typical earthwork, mechanical, and electrical contractors can perform the installation of the equipment and piping. • Excavating and installing would require earthwork and vegetation removal in sensitive wetland areas. U.S. Army Corps of Engineers permitting would be required for construction close to and within wetland areas. • A French drain system could be installed relatively quickly. • A barrier wall would not be a flexible remedy nor readily expandable. • Requires continual monitoring to ensure that groundwater is not mounding behind the barrier or short-circuiting around. • Additional soil waste would be generated relative to other alternatives.	**Capital:** Medium **Annual:** Medium	**Retained as a component** This technology must be paired with an alternative that addresses the source and the dissolved plume. During the emergency phase of the response, Plantation installed a recovery trench along impacts leading to Brown's Creek. This trench will continue to be used for vacuum product recovery until the biosparging curtain is established to mitigate impacted groundwater adversely affecting surface water.

Table 1. Remedial Technology Screening
Corrective Action Plan Addendum Revision 1
Lewis Drive Remediation Site, Belton, South Carolina
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Technology	Description	Corrective Action Objective[a] 1	2	3	Effectiveness	Implementability	Cost[b]	Screening Status
Permeable reactive barrier (PRB) or permeable adsorptive barrier (PAB)	*Objective:* Treat impacted groundwater by digging trenches at the edge of the dissolved plume and filling with reactive/adsorptive media to destroy or adsorb organic compounds as groundwater passes through. A typical media for adsorption consists of 25% organoclay, which is hydrophobic and organophilic, and 75% granular backfill.	Does not meet	Meets	Meets	• Extensive groundwater modeling and further investigation pertaining to the groundwater-surface water interface would be required during the design process. • Does not address source. • Only treats that portion of the dissolved plume that passes through the barrier. • Since this alternative does not directly address the source, the time to achieve goals may be in the range of 30+ years. • The bottom of the barrier could be effectively keyed into bedrock to prevent underflow. • Must be paired with other technologies to meet corrective action objectives. • Treatment media may require replacement.	• Passive system allows for minimal impact on community after installation. • Construction is simpler due to the moderate depth of installation in the Brown's Creek and Cupboard Creek Protection Zones. • Construction in the hayfield is complicated due to bedrock depth up to 50 feet in some areas. • The materials and services for this type of system installation are readily available. Typical earthwork contractors can perform this work. • Excavating and installing would require earthwork and vegetation removal in sensitive wetland areas. U.S. Army Corps of Engineers permitting would be required for construction close to and within wetland areas. • Can be installed rapidly. • Not a flexible remedy or readily expandable. • Requires continual monitoring to ensure that groundwater is not short-circuiting around the barrier. • Additional soil waste would be generated relative to other alternatives.	**Capital:** High **Annual:** Medium	**Rejected** This technology must be paired with an alternative that addresses the source and the dissolved plume. Because groundwater interception trenches have already been constructed near the creeks, this technology would be redundant.
Soil vapor extraction (SVE)	*Objective:* Treat contaminated soils by drilling wells screened within the vadose zone and applying a vacuum to the wellhead, thereby inducing the flow of soil vapor into the well for treatment above grade. Typical vapor treatment methods would include activated carbon or thermal oxidation. Selection of the soil vapor treatment method is largely based on cost-effectiveness.	Meets	Does not meet	Does not meet	• High vapor pressures of hydrocarbon compounds make them amenable to vapor extraction. • SVE is a well-established technology for remediating hydrocarbon impacts to soil. • SVE would have minimal effect on dissolved-phase impacts and must be paired with a groundwater recovery/treatment technology. • Mass removal can be tracked with SVE. • Desorption from soil/attenuation of LNAPL are both slow processes, and may result in treatment times of 5 to 10 years. • The vadose zone is only 5 to 15 feet thick in the Cupboard Creek and Brown's Creek Protection Zones and 5 to 10 feet thick in the Shallow Bedrock Zone, which results in a low radius of influence and the requirement for more SVE wells.	• Would likely require horizontal and vertical drilling technologies to access to all contaminated soil. • SVE technology is conventional and readily available, and typically includes a blower, piping and instrumentation, and controls. Typical earthwork, mechanical, and electrical contractors can perform the installation of the equipment and piping. • Requires air permitting for vapor treatment. Recovered soil vapor must be treated by adsorption or oxidation. • Drill cuttings will be generated during installation. Waste treatment media will be generated during operation. • Operation is flexible and the system can be readily expanded.	**Capital:** Medium **Annual:** High	**Rejected** The relatively thin vadose zone adjacent to the surface water areas diminishes the effectiveness of SVE. SVE also does not address groundwater impacts and provides no protection for surface water. Lastly, SVE is unnecessary as an emissions control mechanism at Lewis Drive due to the lack of receptors in the vicinity.

Table 1. Remedial Technology Screening
Corrective Action Plan Addendum Revision 1
Lewis Drive Remediation Site, Belton, South Carolina
Site ID #18693 "Kinder Morgan Belton Pipeline Release"

Technology	Description	Corrective Action Objective[a] 1	2	3	Effectiveness	Implementability	Cost[b]	Screening Status
Multi-phase extraction (MPE)	*Objective:* Reduce LNAPL saturations in subsurface through an applied vacuum in conjunction with groundwater extraction. LNAPL is primarily removed as a liquid, but bioslurping and enhanced fluid recovery also remove LNAPL through volatilization and aerobic degradation. This could be deployed as a permanent system or a mobile system to enhance other technologies. Could also be employed as a contingency measure. Treated groundwater may be reinjected into the subsurface upgradient or discharged to surface water (as in a pump and treat system). Surfactant solutions can also be injected to enhance recoverable product.	Meets	Does not meet	Does not meet	• LNAPL sorbed to soil could persist as a long-term source and may not be recoverable without surfactant enhancements. • Surfactant enhancements may mobilize LNAPL into creeks if hydraulic control is not maintained. Treatability studies would be required to evaluate this potential. • The amount of mobile product will diminish over time. Baildown testing will be required to determine the effective frequency for extraction events. • MPE has a tendency for longer remediation times than technologies that rely on biological degradation or volatilization.	• Recovered liquid and condensed vapors would require treatment or offsite disposal. Onsite treatment would require an injection or NPDES permit for the treated effluent. • Contactors are readily available to implement. Mobile systems are quick to implement, but permanent systems require installation time. • Mobile units are highly flexible. Permanent units can be expanded and adapted to variable site conditions. • Recovery wells are susceptible to fouling and will likely require frequent maintenance. • Potentially requires full-time O&M. • High regulator acceptance relative to other remedies.	**Capital:** High (for permanent installations) or low (for mobile units) **Annual:** High	**Retained as potential component** As a stand-alone remedy, MPE has a tendency for longer remediation times than technologies that rely on biological degradation or volatilization. Therefore, a permanent MPE system is rejected. Surfactant enhancements are rejected due to their potential to mobilize product near receptors. However, mobile MPE and vacuum recovery can be implemented as contingency measures in areas of highly recoverable product and/or high risk areas, such as those adjacent to Brown's Creek and Cupboard Creek.

Notes:

[a] Corrective action objectives are the following:

1. Remove product to the maximum extent practicable.
2. Abate surface water impacts to maintain surface water criteria.
3. Reduce concentrations of dissolved hydrocarbons in groundwater to be protective of surface water quality.

[b] Cost estimates correlate to the following rough orders of magnitude:

- **Capital:** High: >$2 million; Medium: >$1 million; Low: <$1 million
- **Annual:** High: >$200,000; Medium: >$100,000; Low: <$100,000

COC = chemical of concern
ERH = electrical resistance heating
ISCO = in situ chemical oxidation
ISTT = in situ thermal treatment
LNAPL= light non-aqueous phase liquid
MNA = monitored natural attenuation
MPE = multi-phase extraction
NPDES = National Pollutant Discharge Elimination System
NSZD = natural source zone depletion
O&M = operations and maintenance
Plantation = Plantation Pipe Line Company
SVE = soil vapor extraction
TCH = thermal conductive heating
VOC = volatile organic compound

Table 2. Revised Groundwater Monitoring Plan

Corrective Action Plan Addendum Revision 1

Lewis Drive Remediation Site, Belton, South Carolina

Site ID #18693 "Kinder Morgan Belton Pipeline Release"

Frequency:[a]	Contaminant Reduction Evaluation			Biodegradation Evaluation		Zone of Influence[b]	Notes
	Baseline	Monthly (Year 1)	Quarterly (Year 1)	Baseline	Annual	Monthly (Year 1)	
Analytes: / Well ID	BTEX, Naphthalene, MTBE, and 1,2-DCA[c]			Nitrate, Sulfate, Ferrous Iron, Carbon Dioxide, Methane, and Alkalinity[d]		Dissolved Oxygen	
Brown's Creek Protection Zone							
MW-12	Y		Y	Y	Y	Y	Typically contains product
MW-12B	Y		Y			Y	
MW-15	Y		Y	Y	Y	Y	
MW-15B	Y		Y			Y	
MW-24	Y		Y				
MW-24B	Y		Y				
MW-25	Y	Y	Y	Y	Y	Y	
MW-25B	Y		Y			Y	
MW-28	Y	Y	Y	Y	Y	Y	
MW-34		Y	Y				
MW-35	Y	Y	Y	Y	Y		
MW-37	Y		Y				
MW-38	Y	Y	Y				
MW-39	Y	Y	Y				
MW-40	Y	Y	Y	Y	Y		
MW-41	Y	Y	Y				
MW-42	Y		Y	Y	Y		
MW-43		Y	Y				To be installed
MW-43B			Y				To be installed
Brown's Creek Subtotal:	16	9	19	7	7	7	
Cupboard Creek Protection Zone							
MW-19	Y		Y	Y	Y	Y	
MW-20	Y	Y	Y	Y	Y	Y	Typically contains product
MW-23	Y	Y	Y				
MW-23B	Y		Y				
MW-26	Y	Y	Y				
MW-26B	Y		Y				
MW-29	Y	Y	Y			Y	
Cupboard Creek Subtotal:	7	4	7	2	2	3	

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Corrective Action Plan Addendum Revision 1

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Frequency:[a]	Contaminant Reduction Evaluation			Biodegradation Evaluation		Zone of Influence[b]	Notes
	Baseline	Monthly (Year 1)	Quarterly (Year 1)	Baseline	Annual	Monthly (Year 1)	
Analytes: / Well ID	BTEX, Naphthalene, MTBE, and 1,2-DCA[c]			Nitrate, Sulfate, Ferrous Iron, Carbon Dioxide, Methane, and Alkalinity[d]		Dissolved Oxygen	
Hayfield Zone							
MW-02	Y		Y	Y	Y	Y	Typically contains product
MW-02B	Y		Y			Y	
MW-03	Y		Y	Y	Y	Y	
MW-04	Y		Y	Y	Y	Y	
MW-05	Y	Y	Y				
MW-06	Y		Y				
MW-07	Y		Y				
MW-08	Y		Y	Y	Y	Y	
MW-09	Y		Y	Y	Y	Y	Typically contains product
MW-10	Y	Y	Y	Y	Y	Y	
MW-13	Y		Y				
MW-13B	Y		Y				
MW-14	Y		Y				
MW-14B	Y		Y				
MW-16	Y		Y	Y	Y	Y	Typically contains product
MW-17	Y		Y				
MW-17B	Y		Y				
MW-18	Y		Y	Y	Y	Y	Typically contains product
MW-21	Y		Y				
MW-30	Y	Y	Y			Y	
MW-31	Y	Y	Y				
MW-31B							
MW-32	Y		Y	Y	Y		
MW-33							
MW-33T							
MW-36	Y		Y				
MW-36B	Y		Y				
MW-45	Y	Y	Y				
MW-45B	Y		Y				
TW-55						Y	
TW-59						Y	
TW-60						Y	
TW-64						Y	
TW-66						Y	
TW-67						Y	
TW-73						Y	
TW-96						Y	
Hayfield Subtotal:	26	5	26	9	9	18	

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Corrective Action Plan Addendum Revision 1

Lewis Drive Remediation Site, Belton, South Carolina

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Frequency:[a]	Contaminant Reduction Evaluation			Biodegradation Evaluation		Zone of Influence[b]	Notes
	Baseline	Monthly (Year 1)	Quarterly (Year 1)	Baseline	Annual	Monthly (Year 1)	
Analytes:	BTEX, Naphthalene, MTBE, and 1,2-DCA[c]			Nitrate, Sulfate, Ferrous Iron, Carbon Dioxide, Methane, and Alkalinity[d]		Dissolved Oxygen	
Well ID							
Shallow Bedrock Zone							
MW-01	Y		Y	Y	Y	Y	
MW-01B	Y		Y			Y	
MW-11	Y		Y	Y	Y	Y	Typically contains product
MW-22	Y	Y	Y	Y	Y	Y	
MW-27	Y		Y				
MW-27B	Y		Y				
MW-44	Y		Y				
MW-44B	Y		Y				
Shallow Bedrock Subtotal:	8	1	8	3	3	4	
Grand Totals:	57	19	60	21	21	32	

Notes:

[a] Any alterations to the monitoring frequency after the first year will be proposed to the South Carolina Department of Health and Environmental Control as needed and will be summarized in the Annual Report.

[b] Zone of influence monitoring for dissolved oxygen will be performed monthly for Year 1 and as-needed thereafter as air sparge flow rates are adjusted.

[c] Contaminant Reduction Evaluation: BTEX, naphthalene, MTBE, and 1,2-DCA by EPA Method 8260B

[d] Biodegradation Evaluation: Nitrate by EPA Method SM2320B, sulfate by EPA Method D516-9002, ferrous iron by EPA Method SM3500 FE D, carbon dioxide and methane by EPA Method RSK-175, and alkalinity by Method SM2320B

1,2-DCA = 1,2-dichloroethane

BTEX = benzene, toluene, ethylbenzene, and xylenes

EPA = U.S. Environmental Protection Agency

MTBE = methyl tertiary butyl ether

Table 3. Water Table and Product Monitoring Schedule
Corrective Action Plan Addendum
Lewis Drive Remediation Site, Belton, South Carolina
Site ID #18693 "Kinder Morgan Belton Pipeline Release"

Location	Baseline	Twice/Day on Day 1	Daily for Week 1	Weekly for Month 1	End of Month 1
Cupboard Creek					
MW-19	WL	WL	WL	WL	WL, DO
MW-20 [a]	WL	WL	WL	WL	WL, DO
MW-29	WL	WL	WL	WL	WL, DO
TW-67	WL	WL	WL	WL	WL, DO
TW-73	WL	WL	WL	WL	WL, DO
Brown's Creek					
MW-12 [a]	WL	WL	WL	WL	WL, DO
MW-12B	WL	--	--	--	WL, DO
MW-15 [a]	WL	WL	WL	WL	WL, DO
MW-15B	WL	--	--	--	WL, DO
MW-25	WL	WL	WL	WL	WL, DO
MW-25B	WL	--	--	--	WL, DO
MW-28	WL	WL	WL	WL	WL, DO
MW-35	WL	WL	WL [b]	WL	WL, DO
MW-39	WL	WL	WL [b]	WL	WL, DO
MW-41	WL	WL	WL [b]	WL	WL, DO
TW-59	WL	WL	WL	WL	WL, DO
TW-60	WL	WL	WL	WL	WL, DO
TW-66	WL	WL	WL	WL	WL, DO

Notes:

[a] Monitoring wells MW-02, MW-12, MW-15, and MW-20 will have dedicated loggers (TROLL 100) for continuous water level logging.

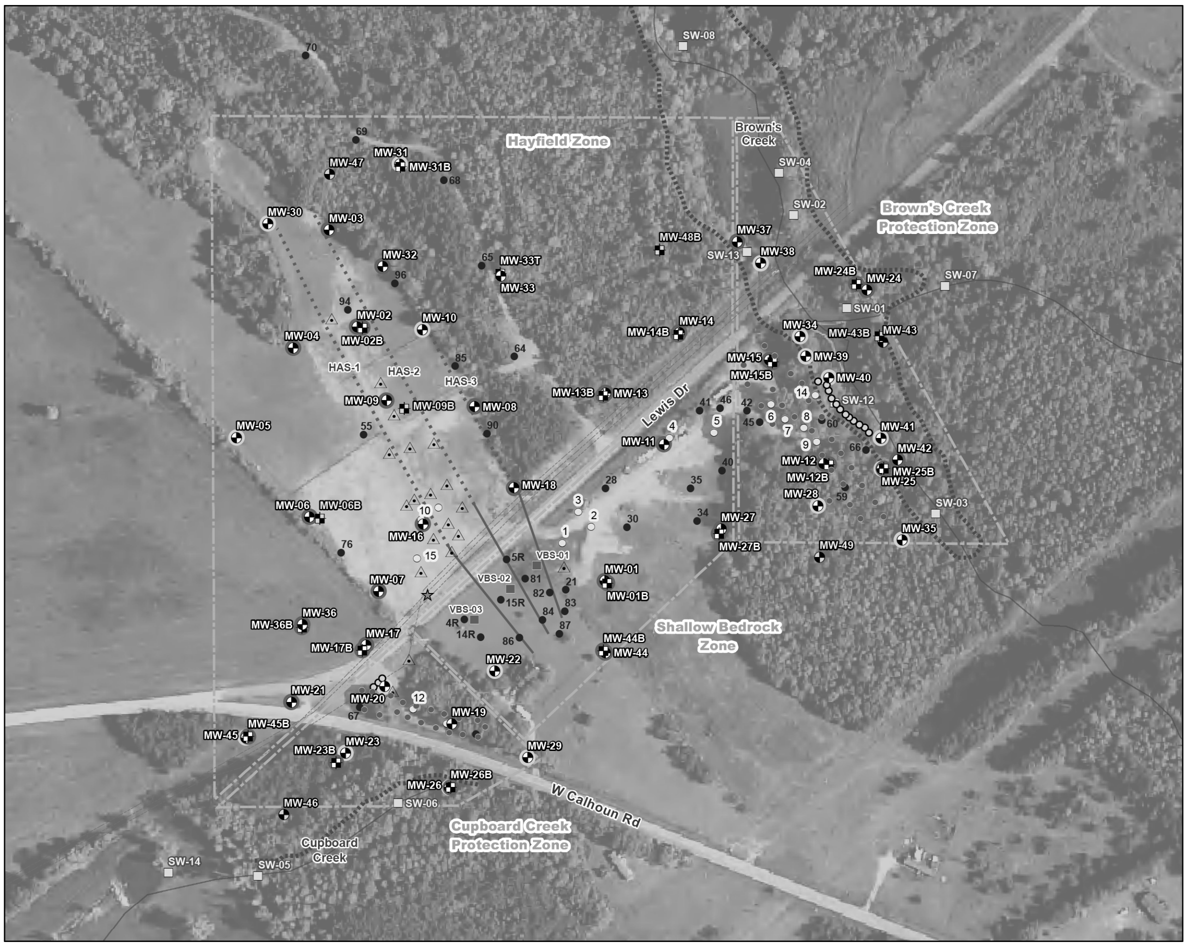
[b] Monitoring wells MW-35, MW-39, and MW-41 will be gauged daily for 2 weeks, after which the gauging frequency will be reevaluated.

-- = not applicable

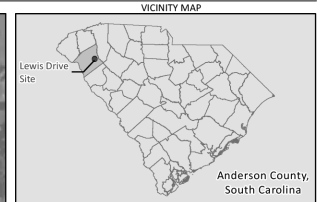
DO = dissolved oxygen

WL = water level and product gauging

Figures



VICINITY MAP



LEGEND

- Release Point
- Residuum Monitoring Well
- Bedrock Monitoring Well
- Proposed Shallow Monitoring Well
- Proposed Bedrock Monitoring Well
- Piezometer
- Recovery Sump
- Recovery Trench Point
- Recovery Well (4" diameter)
- Surface Water Sampling Location
- Well to be sampled quarterly for Year 1
- Well to be sampled monthly for Year 1
- Pipeline
- Horizontal Air Sparging Well Riser
- Horizontal Air Sparging Well Screen
- Stream (NHD)
- Inspection Route for Sheen or Distressed Vegetation
- Remediation Zone

Source Data:
United States Department of Agriculture (USDA), Farm Service Agency (FSA), National Agriculture Imagery Program (NAIP), Published 8/19/2015
United States Geological Survey (USGS) National Hydrography Dataset (NHD)

N

0 200 400
Scale in feet

Figure 1. Monitoring Plan - Site Overview
Corrective Action Plan Addendum Revision 1
Lewis Drive Release, Belton, South Carolina
Site ID #18693 "Kinder Morgan Belton Pipeline Release"

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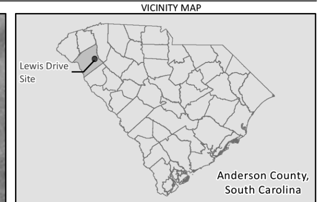
VICINITY MAP



LEGEND

- Release Point
- Residuum Monitoring Well
- Bedrock Monitoring Well
- Proposed Shallow Monitoring Well
- Proposed Bedrock Monitoring Well
- Piezometer
- Recovery Sump
- Recovery Trench Point
- Recovery Well (4" diameter)
- Surface Water Sampling Location
- Seep Location
- Vertical Saprolite Sparging Well
- Vertical Bedrock Sparging Well
- Well to be sampled quarterly for Year 1
- Well to be sampled monthly for Year 1
- Pipeline
- Stream (NHD)
- Inspection Route for Sheen or Distressed Vegetation
- Remediation Zone

Source Data:
United States Department of Agriculture (USDA), Farm Service Agency (FSA), National Agriculture Imagery Program (NAIP), Published 8/19/2015
United States Geological Survey (USGS) National Hydrography Dataset (NHD)

N

0 100 200
Scale in feet

Figure 2. Monitoring Plan - Brown's Creek Protection Zone
Corrective Action Plan Addendum Revision 1
Lewis Drive Release, Belton, South Carolina
Site ID #18693 "Kinder Morgan Belton Pipeline Release"

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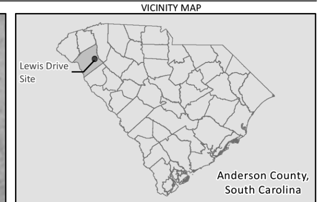


LEGEND

- Release Point
- Residuum Monitoring Well
- Bedrock Monitoring Well
- Proposed Shallow Monitoring Well
- Piezometer ("R" indicates Replacement)
- Recovery Sump
- Recovery Trench Point
- Recovery Well (4" diameter)
- Surface Water Sampling Location
- Vertical Saprolite Sparging Well
- Vertical Bedrock Sparging Well
- Well to be sampled quarterly for Year 1
- Well to be sampled monthly for Year 1
- Horizontal Sparging Well Riser
- Pipeline
- Stream (NHD)
- Inspection Route for Sheen or Distressed Vegetation
- Remediation Zone

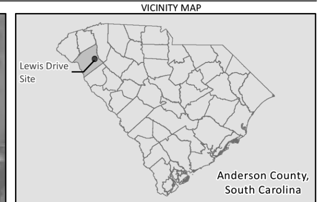
Source Data:
United States Department of Agriculture (USDA), Farm Service Agency (FSA), National Agriculture Imagery Program (NAIP), Published 8/19/2015
United States Geological Survey (USGS) National Hydrography Dataset (NHD)

N

0 75 150
Scale in feet

Figure 3. Monitoring Plan - Cupboard Creek Protection Zone
Corrective Action Plan Addendum Revision 1
Lewis Drive Release, Belton, South Carolina
Site ID #18693 "Kinder Morgan Belton Pipeline Release"

VICINITY MAP



LEGEND

- Release Point
- Residuum Monitoring Well
- Bedrock Monitoring Well
- Piezometer
- Recovery Sump
- Recovery Well (4" diameter)
- Proposed Shallow Monitoring Well
- Proposed Bedrock Monitoring Well
- Vertical Saprolite Sparging Well
- Vertical Bedrock Sparging Well
- Well to be sampled quarterly for Year 1
- Well to be sampled monthly for Year 1
- Horizontal Sparging Well Riser
- Horizontal Sparging Well Screen
- Pipeline
- Stream (NHD)
- Inspection Route for Sheen or Distressed Vegetation
- Remediation Zone

Source Data:
United States Department of Agriculture (USDA), Farm Service Agency (FSA), National Agriculture Imagery Program (NAIP), Published 8/19/2015
United States Geological Survey (USGS) National Hydrography Dataset (NHD)

N

0 150 300
Scale in feet

Figure 4. Monitoring Plan - Hayfield Zone
Corrective Action Plan Addendum Revision 1
Lewis Drive Release, Belton, South Carolina
Site ID #18693 "Kinder Morgan Belton Pipeline Release"

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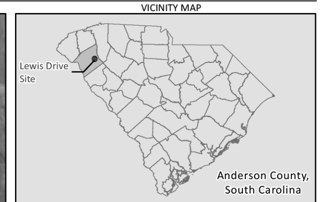

LEGEND

- Release Point
- Residuum Monitoring Well
- Bedrock Monitoring Well
- Proposed Shallow Monitoring Well
- Proposed Bedrock Monitoring Well
- Piezometer ("R" indicates Replacement)
- Recovery Sump
- Recovery Trench Point
- Recovery Well (4" diameter)
- Surface Water Sampling Location
- Vertical Saprolite Sparging Well
- Vertical Bedrock Sparging Well
- Well to be sampled quarterly for Year 1
- Well to be sampled monthly for Year 1
- Horizontal Air Sparging Well Riser
- Horizontal Air Sparging Well Screen
- Pipeline
- Stream (NHD)
- Inspection Route for Sheen or Distressed Vegetation
- Remediation Zone

Source Data:
United States Department of Agriculture (USDA), Farm Service Agency (FSA), National Agriculture Imagery Program (NAIP), Published 8/19/2015
United States Geological Survey (USGS) National Hydrography Dataset (NHD)

N

0 100 200
Scale in feet

Figure 5. Monitoring Plan - Shallow Bedrock Zone
Corrective Action Plan Addendum Revision 1
Lewis Drive Release, Belton, South Carolina
Site ID #18693 "Kinder Morgan Belton Pipeline Release"

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LEGEND

- Release Point
- Surface Water Sampling Location
- Fish Pond Surface Water Sampling Location
- Pipeline
- Inspection Route for Sheen or Distressed Vegetation
- Flow Direction of Creek
- Topographic Contour (5-foot Interval)
- National Hydrography Dataset Stream
- Delineated Wetland
- Beaver Dam

N

0 250 500
Scale in Feet

Base Map Source:
*Environmental Systems Research Institute (ESRI) ArcMap World Imagery, 2015
*United States Geological Survey (USGS) National Hydrography Dataset (NHD)

Figure 6. Surface Water Sampling Plan
Corrective Action Plan Revision 1
Lewis Drive Release, Belton, South Carolina
Site ID #18693
"Kinder Morgan Belton Pipeline Release"

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Appendix A
Remedial Successes in Sparging LNAPL

CH2MHILL

Application of Air Sparging Using Directionally Drilled Wells for Petroleum Hydrocarbon Remediation

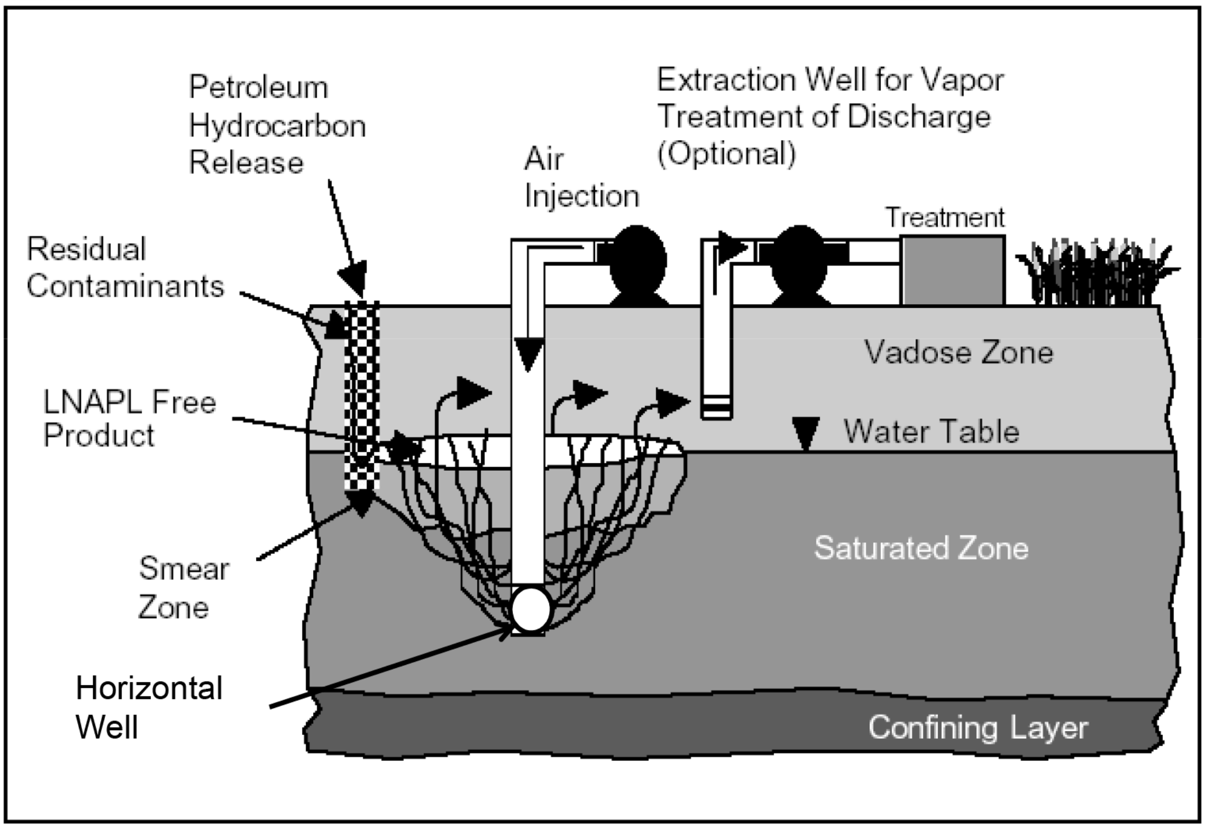
Tom Simpkin PhD, PE
Mark Strong, PE

October 31, 2012

Agenda

- Concept of air sparging with horizontal wells
- Why air sparging for petroleum
- Why horizontal wells for air sparging
- Design considerations
- Case Studies
- Conclusion

Concept of Air Sparging with Horizontal Directionally Drilled Wells

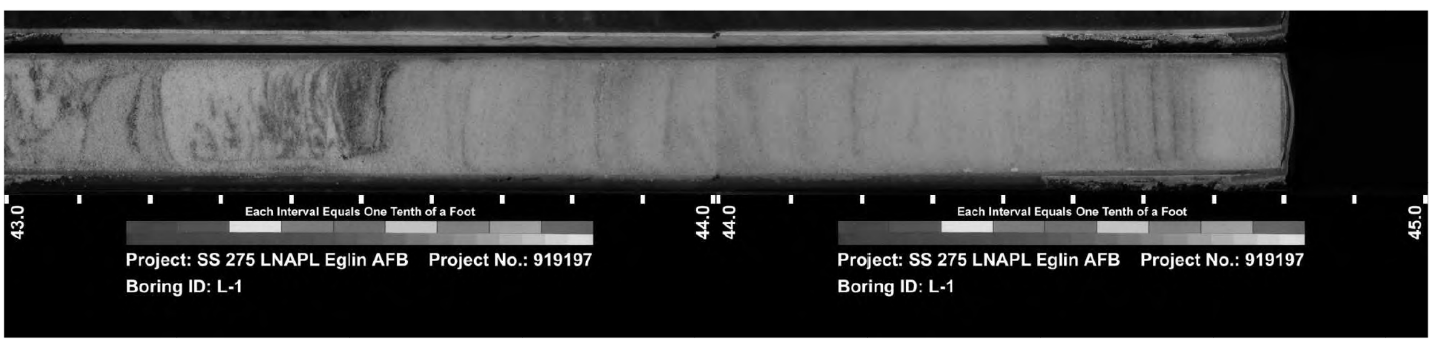


Why Air Sparging for LNAPL or Dissolved Petroleum Hydrocarbons?

- Objective is to remove the “lighter ends” such that:
  - LNAPL is less mobile
  - Benzene (and BTEX) are removed
- Mechanisms
  - Volatilization – couple with SVE
  - Biodegradation: air supplies oxygen for aerobic biodegradation
- Moderate time frames: to treat LNAPL varies based on geology and observed thickness, but generally ranges from 2-5 years

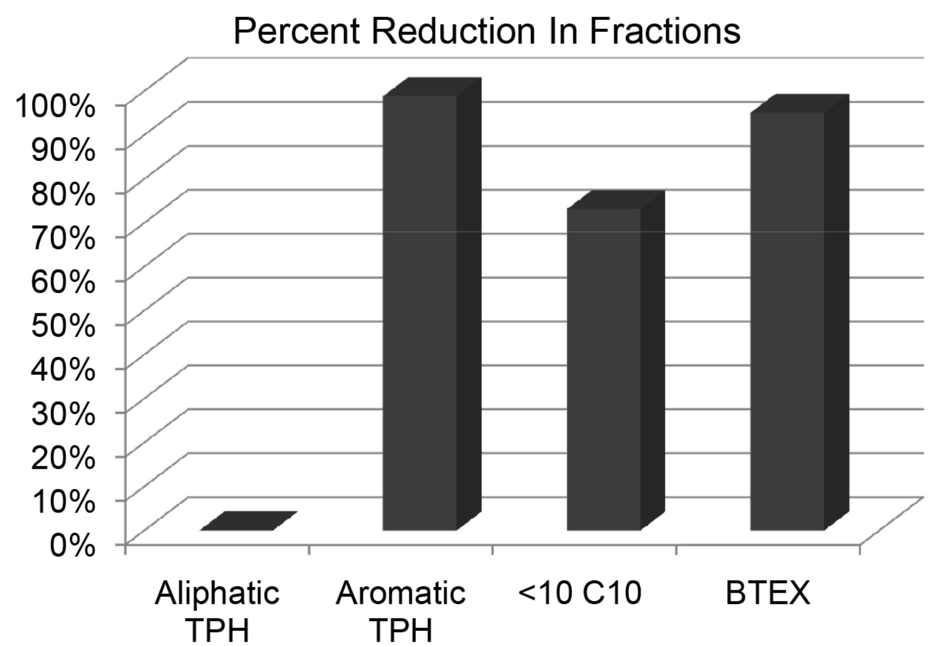
Why Sparge LNAPL?

- Palaia (et al.) evaluated LNAPL pore fluid saturation (PFS) at an air sparge site by collecting intact soil core samples before and after sparging for periods of up to 20 months
- PFS concentrations did not change significantly over this period
- The presence of measure LNAPL in wells did decrease



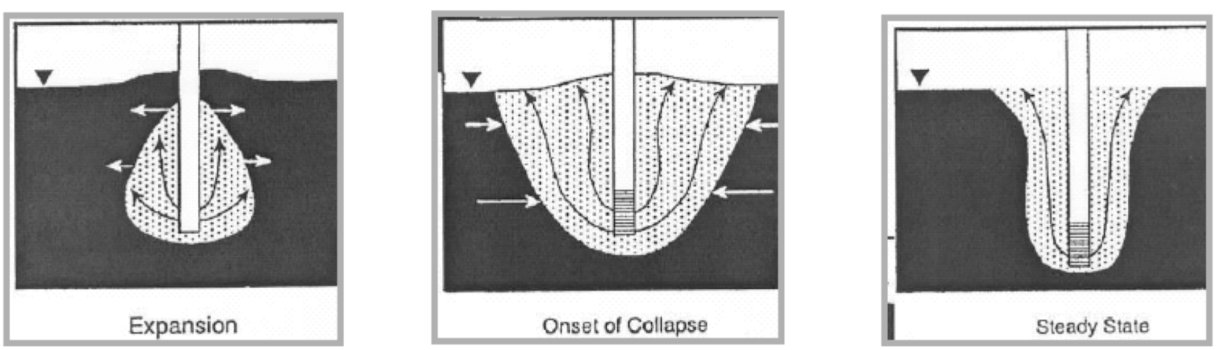
Why Sparge LNAPL?

- Significant changes in LNAPL composition were observed
  - TPH speciation confirmed removal of aromatic, small carbon number compounds (<C10), and BTEX



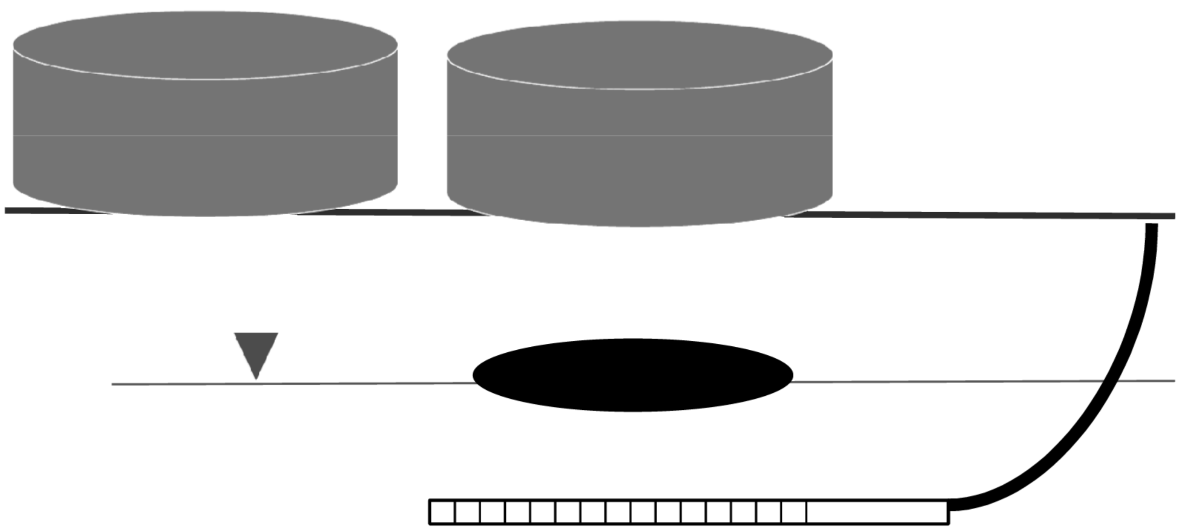
Will Sparging Spread LNAPL Due to Mounding?

- Can be a significant regulatory concern
- Mounding
  - Varies by lithology
  - Under steady state airflow is only temporary (hours) as GW returns to equilibrium
- Data from field sites suggest spreading is limited or non-existent



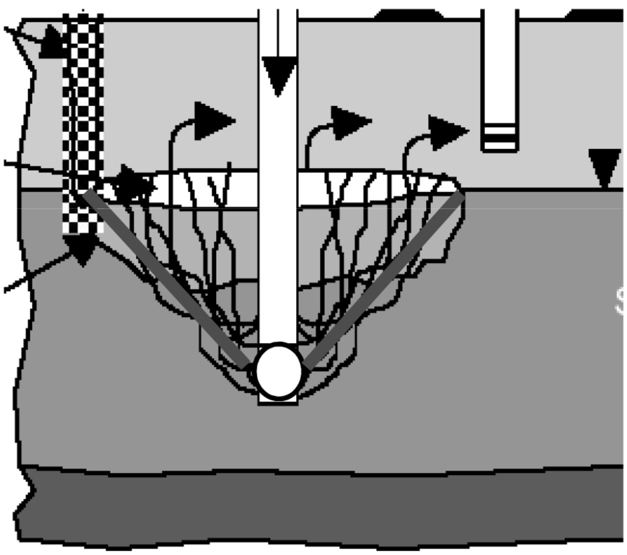
Why Horizontal Wells for Air Sparging?

- Access



Why Horizontal Wells for Air Sparging?

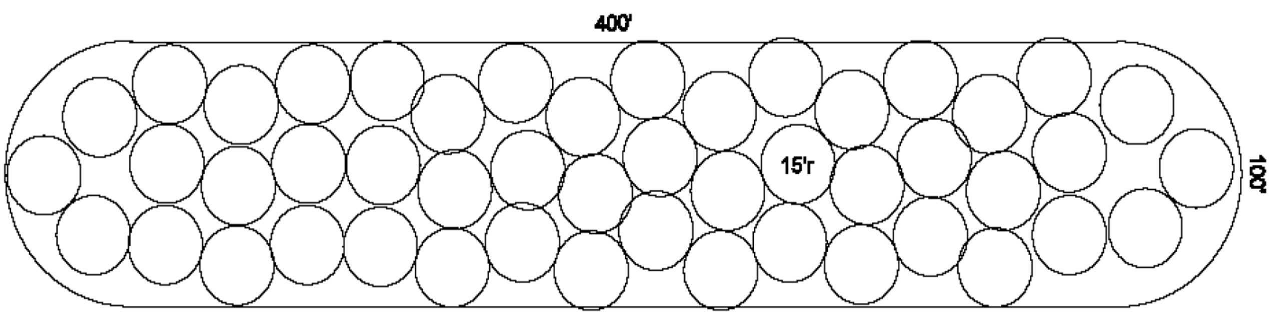
- Plume Contact Efficiency



Studies suggest "V" pattern somewhat larger for horizontal wells vs. vertical

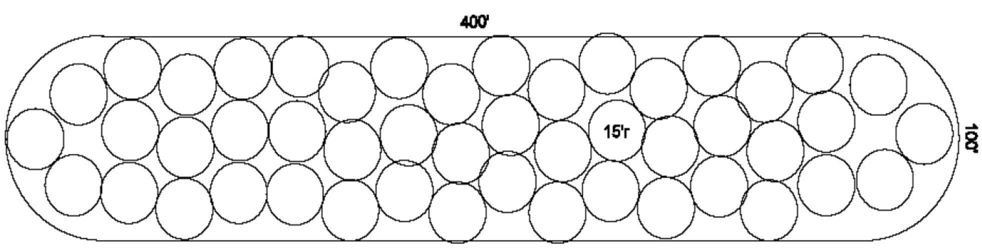
Why Horizontal Wells for Air Sparging? - Cost

- Cost Example:
  - Total area treated by a 400 ft long horizontal sparge well, installed 20 ft below the water table, would be approximately 48,000 square feet.
  - Approximately 48 vertical wells at 15 ft "ROI" would be required to treat the same area.



Why Horizontal Wells for Air Sparging? - Cost

- Cost Example
  - Total Capital for Vertical: approximately **$230,00**
  - Total Capital for Horiztonal: approximately **$170,00**
- Bottom Line: often more cost effective than vertical air sparge wells for large plumes (decreased infrastructure, streamlined I&C, conveyance piping, etc; simp



Design Considerations

- Site Geology: Impacts on air distribution
  - Fine sand and silty sand tends to produce increased lateral spreading of air, up to 50 ft on both sides of the well
  - Medium to coarse sands require higher flow rates to achieve similar distribution

- Air flow rate to achieve adequate distribution and to optimize volatilization vs biodegradation

- Pulsing/cycling has been shown to be beneficial and can optimize biodegradation

“Screen” (Slotted Pipe) Design for Air Sparging

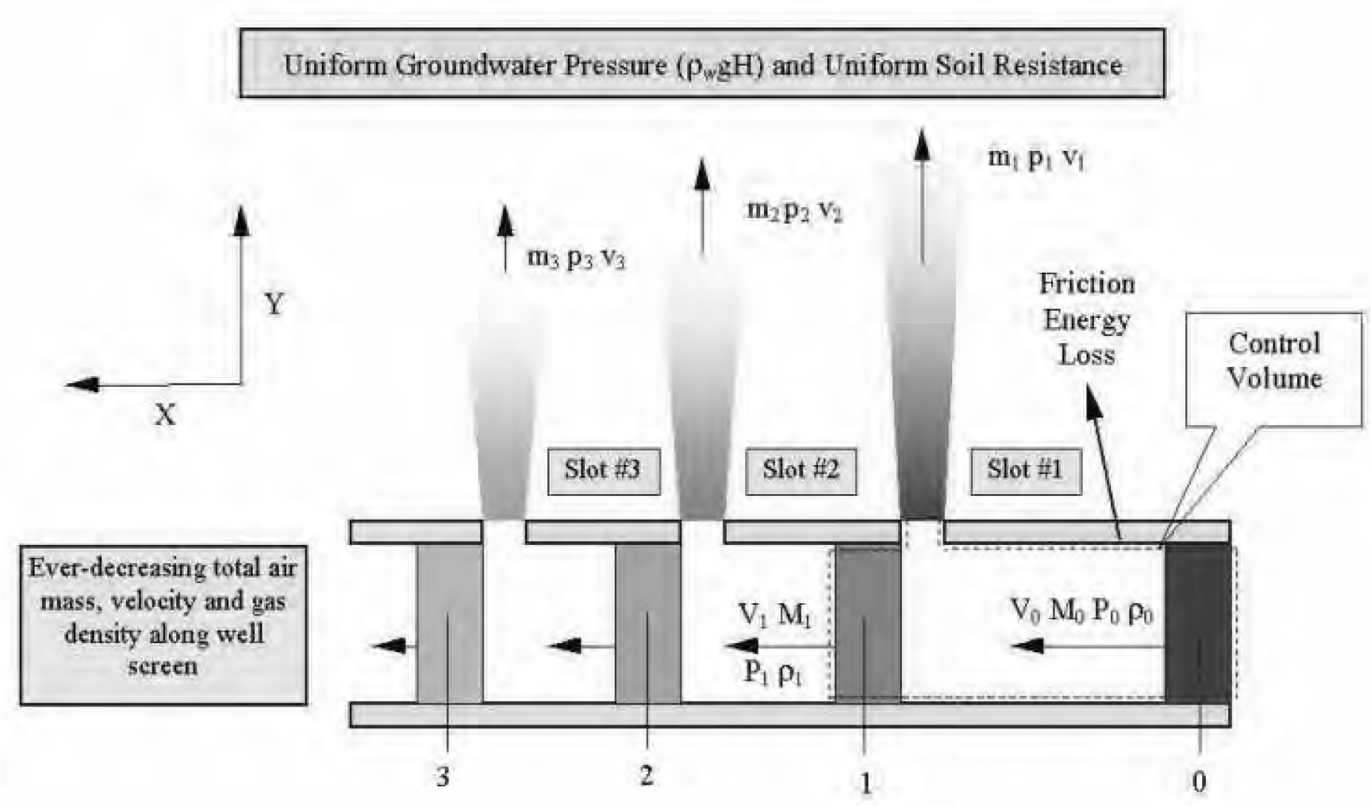
Pipe is designed to operate as a “pressure vessel” and maintain relatively uniform pressure and flow across the entire open area

Open area is generally less than 1-2% of total slotted Section

Open area must be designed for site specific conditions, or non uniform flow will result.

Typical Air Sparge “Screen” (Slotted Pipe):
4” HDPE Pipe, 400 ft Long Slotted Section
0.020 Inch Wide Slots, <0.5% Open Area

“Screen” Design: Mass and Energy Balance



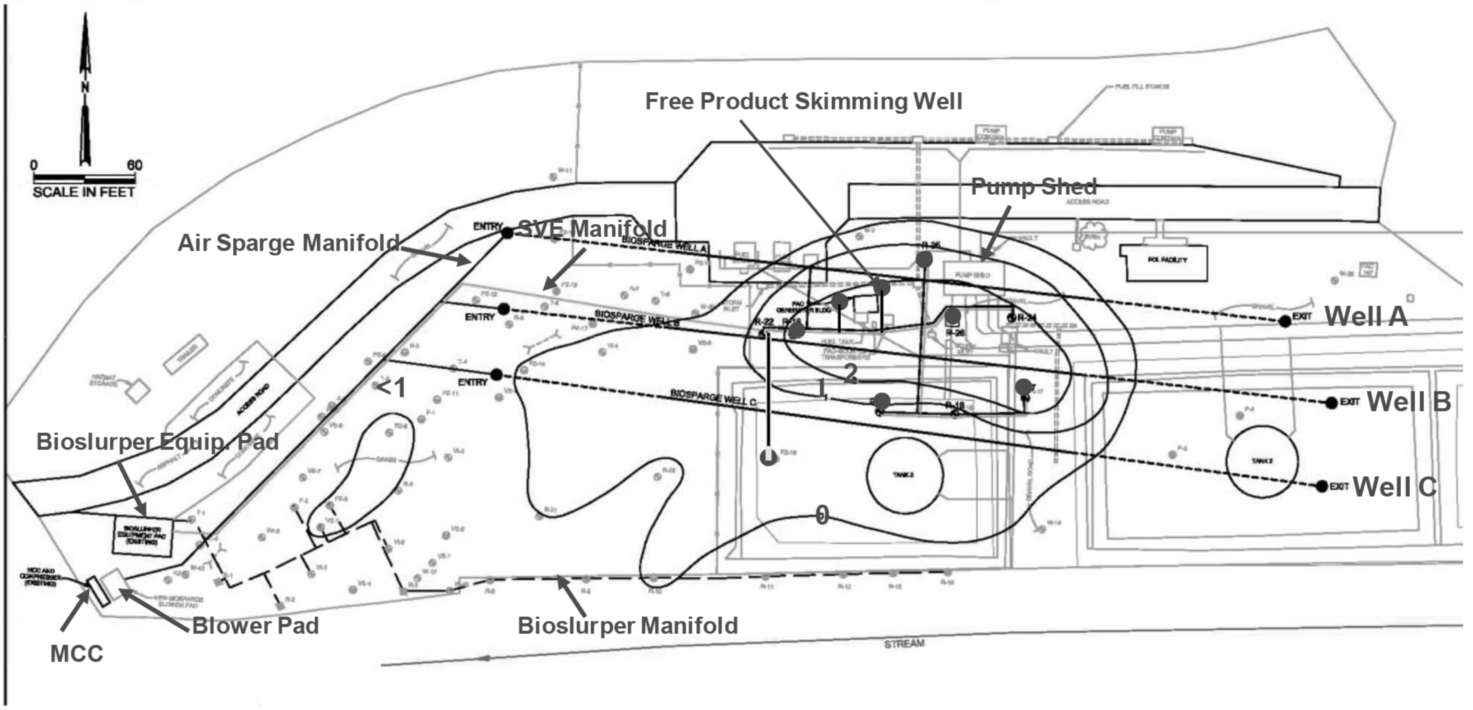
Case Study 1 - Fuel Farm, MS

- Four aboveground tanks with 210,000 - 630,000 gallon capacity.
- Used since the late 1950s for storage of diesel, JP-4, JP-8, and heating oil.

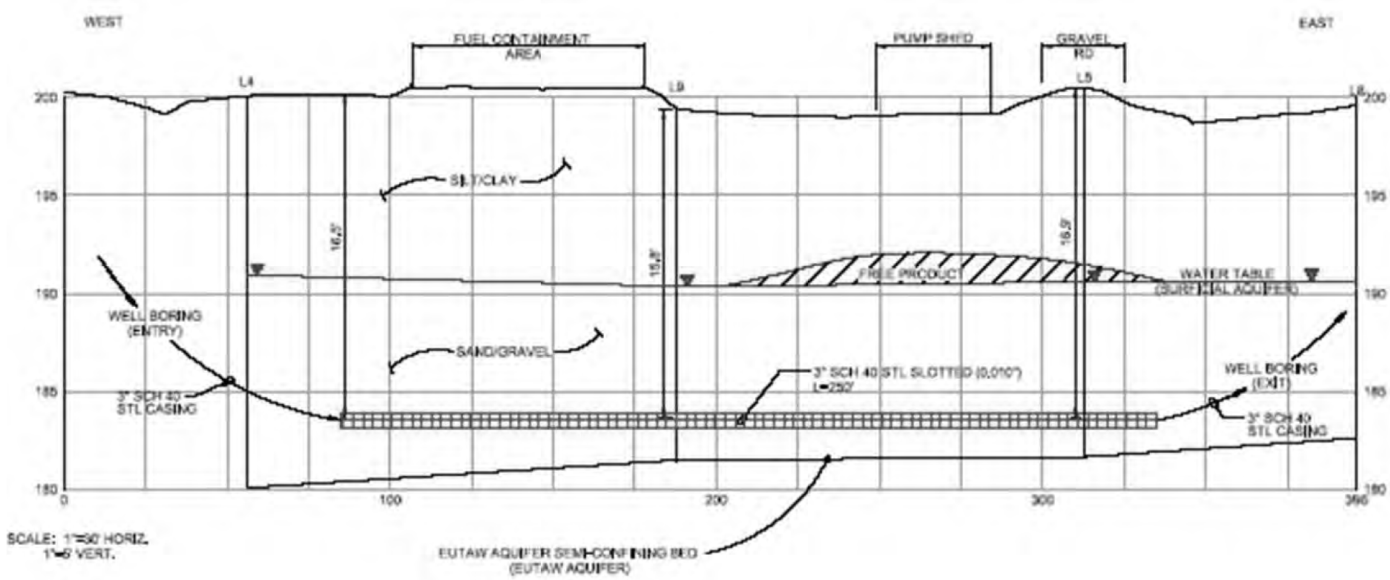
Case Study 1 - System Description

- Three horizontal sparge wells and eight vertical skimming/SVE wells were installed in late 2004.
- Free product skimming was conducted for one year, in accordance with regulator directives. Less than 30 gallons of LNAPL was recovered.

Case History 1 - System Description



Case History 1 – Cross Section



Case Study 1 – Well Screen

Three-inch diameter steel screen (0.020” inch slot) and casing for the HDD sparge wells.

First Year of Sparging (March ’06 – March ’07)

- During the first year of operation, the air sparge and SVE system removed an estimated 4,500 pounds of JP-8 from the subsurface via biodegradation and volatilization (approximately four times that of skimming).
- LNAPL thicknesses in wells decreased from maximum of 2.5 feet to a maximum of about 0.5 feet.

Second Year (March ’07 – March ’08)

- LNAPL thicknesses in monitoring wells continued to decrease to less than 0.1 ft (in 23 MWs).
- Observations of bubbling in monitoring wells screened in the saturated zone indicated a sparge influence zone of ~ 40 ft on both sides of the wells.
- No evidence LNAPL was displaced.

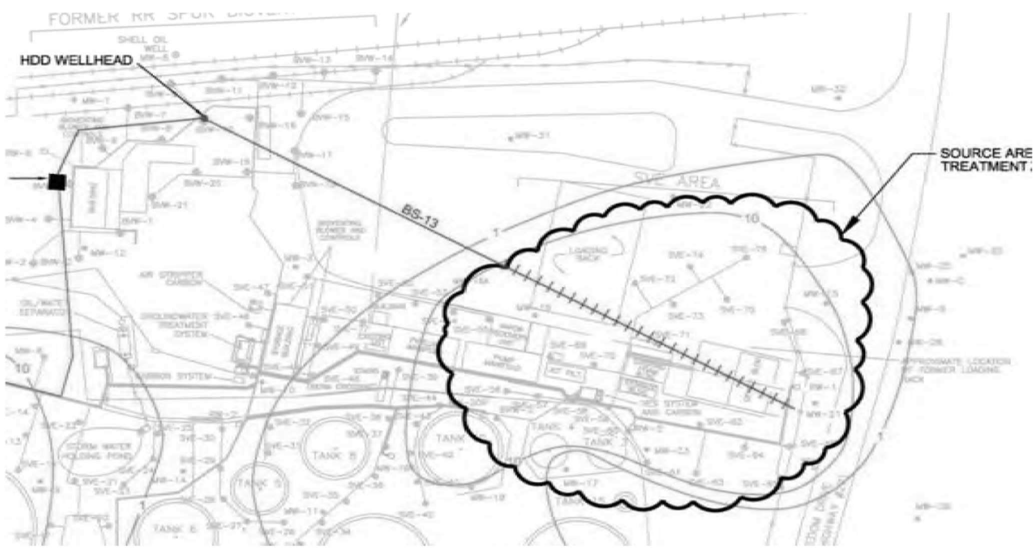
Blower Skid

Third and Fourth Year (March ’08 – March ‘10)

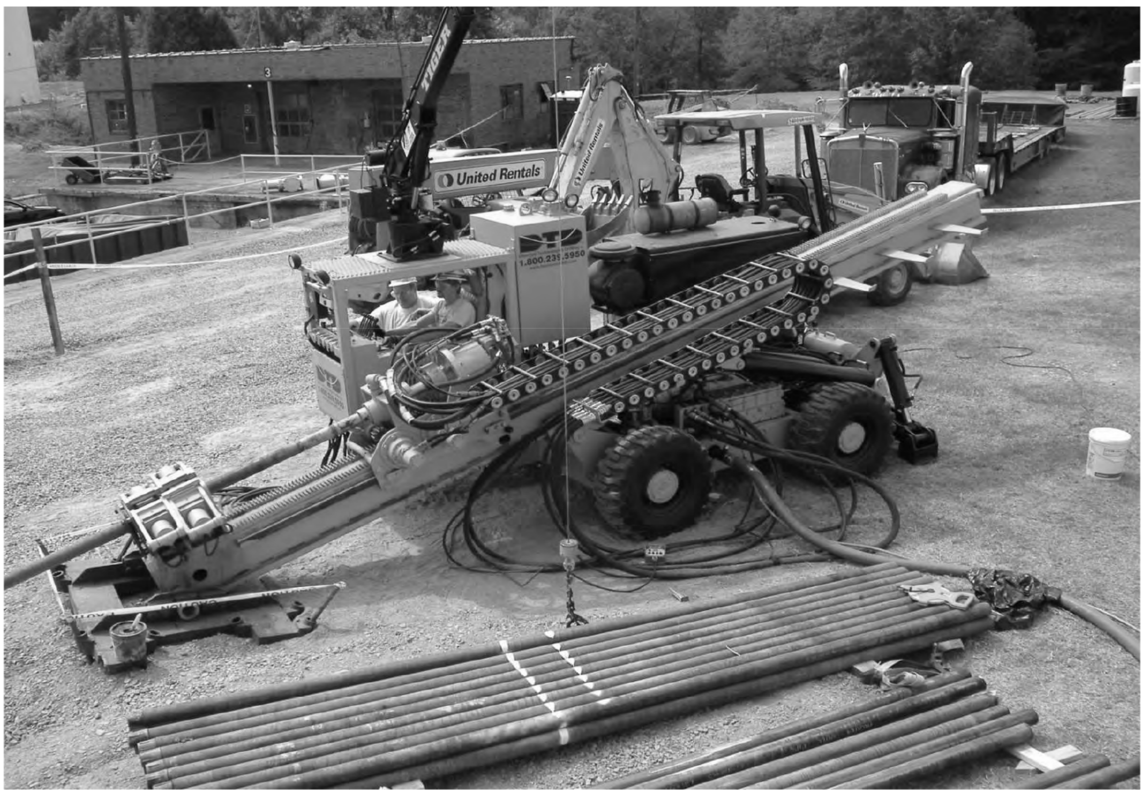
- Air sparging ceased in Spring ‘10 after no measurable free product was detected in any of the monitoring wells
- One year of passive site monitoring required by the state began in Spring of ‘10. “Rebound” occurred in one monitoring well outside the zone of influence of the sparge wells, addressed using sorbent media (“socks”). Additional rebound did not occur.
- NFA issued by the state in October 2011.

Case Study 2 - Bulk Fuel Terminal, NC

- Access to site hindered by office building, fuel loading rack, and right-of-way restrictions. Blind end drill required
- Geology: dense saprolite
- 250’ slotted schedule 40 stainless steel, 500’ total length, 35’ bgs



Case Study 2 - Installation



Case Study 2 - Installation

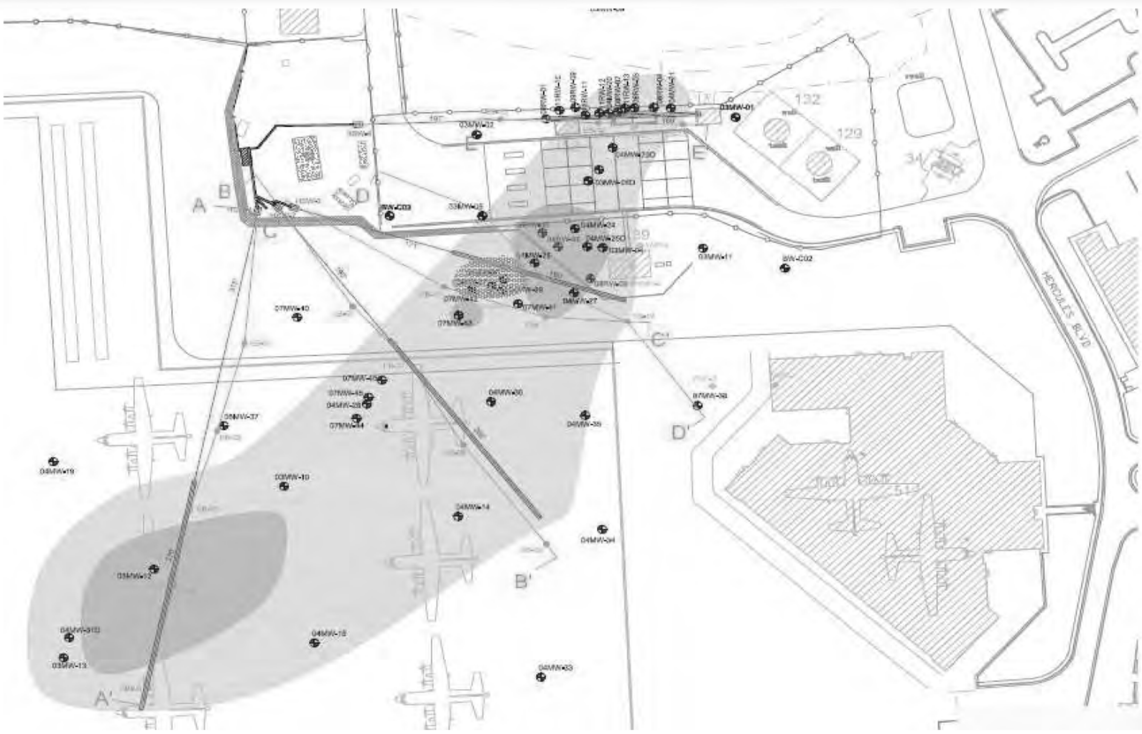
“All Soils” Spade Bit and Mud Jet

Longitudinally Slotted 304 SS Pipe

Case Study 2 - Operations

- LNAPL thicknesses in wells measured four to six inches
- System activated in 2009 and operated for 1.5 years, LNAPL was not detected after this period
- Dissolved BTEX concentrations reduced by ~70%
- Sparging underneath office resulted in VI issues
  - Former loading rack area convert to office building
  - SVE system upgraded to manage
- System restarted and continues to operate to reduce BTEX in groundwater

Case Study 3 – Large Fuel Release (2011)



Petroleum Plume. Four Blind End HDPE Sparge Wells, Each ~ 350-600’

Case Study 3 – Construction and Operations

- Limited access required blind end drilling
- Lithology: Very dense saprolite and partially weathered rock
- LNAPL thicknesses range from 1 to 1.5 foot
- System activated September 2012, operations continue

Other CH2M HILL Case Studies

CH2M HILL AIR SPARGING-HORIZONTAL DIRECTIONAL DRILLING EXPERIENCE					
Site	**No. of Wells**	**Material of Construction**	**Completion**	**Depth (Ft)**	**Slotted Pipe Length (Ft)**
Tank Farm, MS	3	3" Carbon Steel	Double Ended	18- 22	250
Tank Farm, GA	3	3" DR 11 HDPE	Double Ended	24	250
Petroleum Terminal, NC	1	3" 304 Stainless Steel	Blind	32	250
Tank Farm, MD	1	3" Fiber Reinforced Epoxy (FRE)	Double Ended	32	450
Fuel Release, FL	3	3" 304 Stainless Steel	Blind	25	150
Fuel Release, NC	4	3" DR 11 HDPE	Blind	20-28	170-270
Petroleum Terminal, MI	2	4" DR 11 HDPE	Double Ended	20-25	250/300

Conclusion

- Air sparging with horizontal wells is a viable alternative for petroleum sites
- Favorable for:
  - LNAPL or dissolved plumes
  - Difficult to access locations
  - Large Plumes
- Fear of spreading is un-warranted

Back

SUCCESSFUL LNAPL REMOVAL USING AIR SPARGE/ SOIL VAPOUR EXTRACTION TECHNOLOGY

Jamie Natusch, P.Eng., Manager Remediation Services
Lynda Smithard, P.Eng., Senior Remediation Engineer

INTRODUCTION

The application of Air Sparging (AS) technology coupled with Soil Vapour Extraction (SVE) for the recovery and remediation of Light Non-Aqueous Phase Liquid (LNAPL) hydrocarbons presents a number of challenges. AS applicability is governed mainly by geo/hydrogeologic conditions and contaminant type and distribution. It is typically not applied to mobile-LNAPL plumes where the enhanced risk of product migration is not manageable. However, under suitable site conditions and design provisions, accurate LNAPL plume control and associated risk-management can be achieved to enable a high-impact approach towards contaminant mass removal and site remediation. This paper presents the detailed design and implementation of a fast-tracked AS/SVE remediation program successfully completed during 2004-2005 at a large commercial development property in Surrey, BC. Summaries of the site conditions and URS's remedial options evaluation that supported the program are presented as background.

Although AS technology is well-established, it has been applied with varying degrees of success as the physical, chemical and microbial processes responsible for removing contaminants remain poorly understood and can be difficult to evaluate. Engineering design and implementation of these systems is dependent on empirical knowledge and experience. Successful air sparging requires continuous review and refinement of optimal system and contaminant mass transfer efficiencies. In this context, URS's paper evaluates the application of AS technology to the remediation of LNAPL hydrocarbons, with the aim of sharing lessons learned for future applications.

SITE DESCRIPTION

The site is located adjacent to a major highway with surrounding mixed commercial and residential land use. Phased site investigations identified free phase (LNAPL) gasoline product, soil and groundwater contamination across four legal lots and extending beneath the highway. The contamination originated from a gasoline retail facility that operated at the site between 1962 and 1981 (the "source site"). More recently the source site has been occupied by series of new and used car dealerships and currently forms part of a multi-site development plan that includes the other three impacted lots. A Site Plan showing the layout of the site is presented as Figure 1.

Site stratigraphy comprises surficial fill, underlain by a clay/silt layer from 1.0-3.0 m below ground surface (bgs), and sand from 3.0->11.0 m bgs. Depths to groundwater vary across the site from 8.8-11.6 m bgs, with an estimated zone of watertable fluctuation of approximately 0.5 m. The localized groundwater aquifer is present within high permeability coarse sands and gravels. The average hydraulic conductivity at the site is

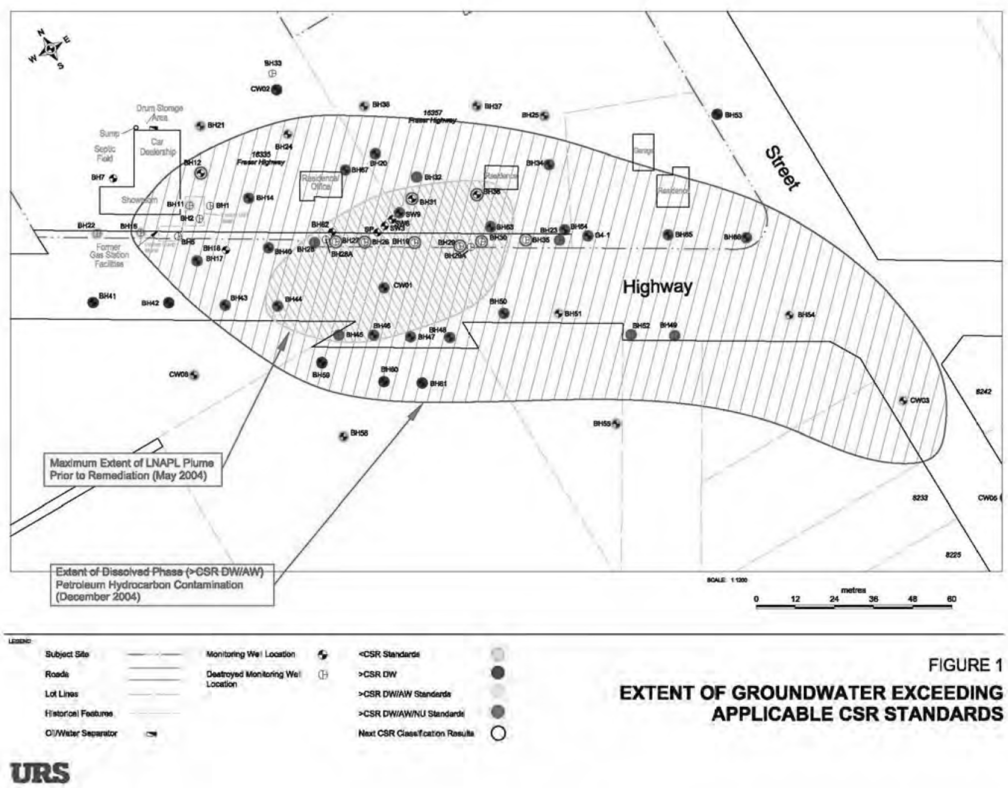


Figure 1: Site Plan showing the approximate extents of dissolved phase and LNAPL contamination identified at the site.

1.8×10^{-4} m/s, and with an effective porosity of 0.25 and an interpreted hydraulic gradient 0.0015 (m/m), groundwater flows at an approximate velocity of 34 m/year from the subject site towards the southeast for approximately 200 m before flowing south.

SITE GEOCHEMISTRY

A phased site investigation was conducted by a number of parties over a six-year period starting in 1998. URS completed the detailed site investigation in 2004 with the delineation of the LNAPL, soil and dissolved phase hydrocarbon plumes.

The site investigations identified soil contamination in the vadose zone only in the source area. Soil contamination in the saturated smear zone extended approximately 150 m hydraulically downgradient of the source area. In total, approximately 2,500 m^3 of petroleum hydrocarbon contaminated soil existed over an area of 5,000 m^2.

Dissolved phase groundwater contamination extended approximately 240 m down hydraulic gradient of the former UST basin and pump islands and covered an approximate 10,000 m^2 area.

LNAPL was present beneath portions of the site and highway. The LNAPL plume, measured prior to the initiation of remedial activities, covered an approximate 1,200 m^2 area with a maximum measured thickness of 0.347 m in 2002. The estimated volume of free phase LNAPL product in the vicinity of the site prior to remediation was approximately 30,000L.

REMEDIAL OBJECTIVES

The primary remedial objective for the site was the removal of the LNAPL source, to be supported by the adoption of risk assessment for the management of potential ecological and human health exposure risks associated with residual soil and dissolved phase groundwater contamination at the site.

REMEDIAL OPTIONS EVALUATION

Commercially, the primary factor in evaluating remediation options was an efficient timeline to completion to facilitate property development. On this basis, technical assessment and cost-benefit analyses were conducted for the preliminary evaluation of a range of *in-situ* and *ex situ* technologies incorporating free and dissolved phase product recovery and unsaturated zone residual product recovery methods. Due to the extent of the LNAPL plume beneath the highway, *ex situ* approaches based on excavation and on/off-site treatment/disposal were eliminated and the following *in situ* technologies were short-listed for more detailed evaluation.

Free Phase Product Recovery
- Product Skimming
- Pump and Treat

Free Phase *and* Residual Product Recovery
- Soil Vapour Extraction (SVE)
- Multi-Phase Extraction (MPE)

Unsaturated Zone Residual Product Recovery

- Bioventing
- Soil Vapour Extraction (SVE)

Free and Dissolved Phase Recovery

- Pump and Treat with SVE
- Air Sparging with SVE

All of these technologies, and variations/combinations of these, presented technically compatible solutions to site contamination and geo/hydrogeological conditions. However, when assessed from a time and cost-benefit perspective, AS/SVE technology presented the most expeditious approach towards fast-tracked LNAPL remediation, with high-impact recovery potential. Yet, AS/SVE application also posed several key design/implementation challenges that had to be overcome to make it viable. The challenges URS faced in the design and operation of the system, and the solutions derived to overcome them are discussed in subsequent sections.

AIR SPARGING/SVE TECHNOLOGY EVALUATION

AS technology involves the injection of air/oxygen into a contaminated aquifer. Injected air traverses horizontally and vertically in channels through the saturated soil column, creating an underground stripper that removes volatile and semivolatile organic contaminants by volatilization. The injected air helps to flush contaminants into the unsaturated zone where an SVE system is typically implemented in conjunction with AS to remove the generated vapour phase contamination.

Key factors that limit the applicability and effectiveness of AS include: 1) site geology and depth of contaminants, which can influence system installation and control accuracy; 2) soil heterogeneity which can cause non-uniformity of air flow, limiting sparging effects in the saturated zone and potentially causing dangerous vapour flow/accumulation in the unsaturated zone; 3) preferential pathways such as basements, utility conduits and confined spaces, which can also cause vapour accumulation; and 4) confined aquifers, which generally prohibit the application of AS technology because generated vapours are trapped by the confining layer and cannot be recovered from the saturated zone.

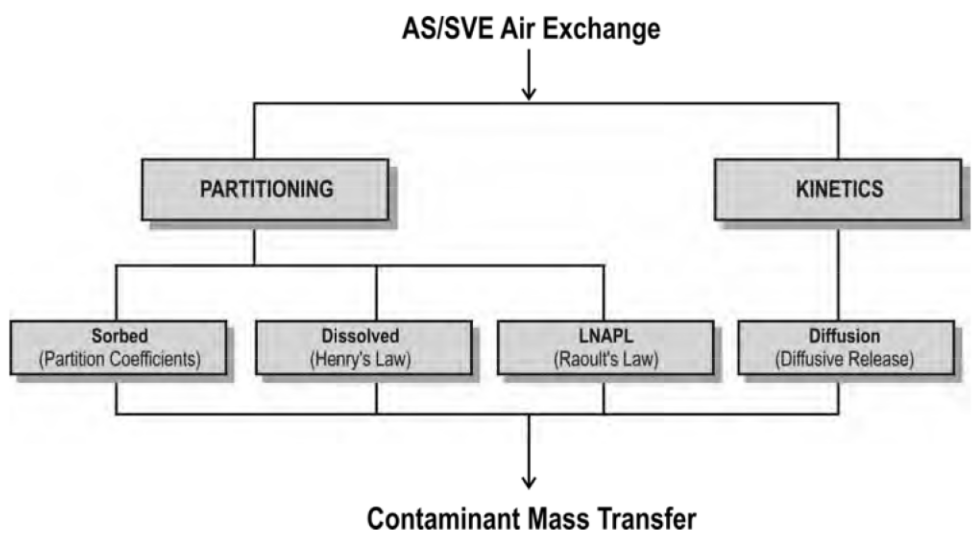
Another key factor, which is generally viewed as a rule-of-thumb reason to eliminate AS from remedial options screening matrices, is the presence of mobile LNAPL. When operated at moderate to high flowrates AS systems can cause groundwater mounding that, in turn, can cause LNAPL migration and the distribution of mobile product contamination beyond AS/SVE system control boundaries.

At the subject site, these factors were generally non-limiting with the site geo/hydrogeology providing an ideal setting for AS/SVE system operations based on the following site conditions: 1) an unconfined aquifer accessible to system operations; 2) predominantly homogenous soil stratigraphy in the saturated and unsaturated zones, with the exception of a near-surface vapour confining layer in the unsaturated zone assisting SVE recovery control; and 3) no preferential pathways located beneath the vapour confining layer. In the presence of dissolved and residual phase product recovery only, these factors presented optimal conditions for the implementation of AS/SVE system operations. In the presence of LNAPL, additional consideration of mitigation and management requirements for product migration potential and increased vapour control was required.

DESIGN CONSIDERATIONS

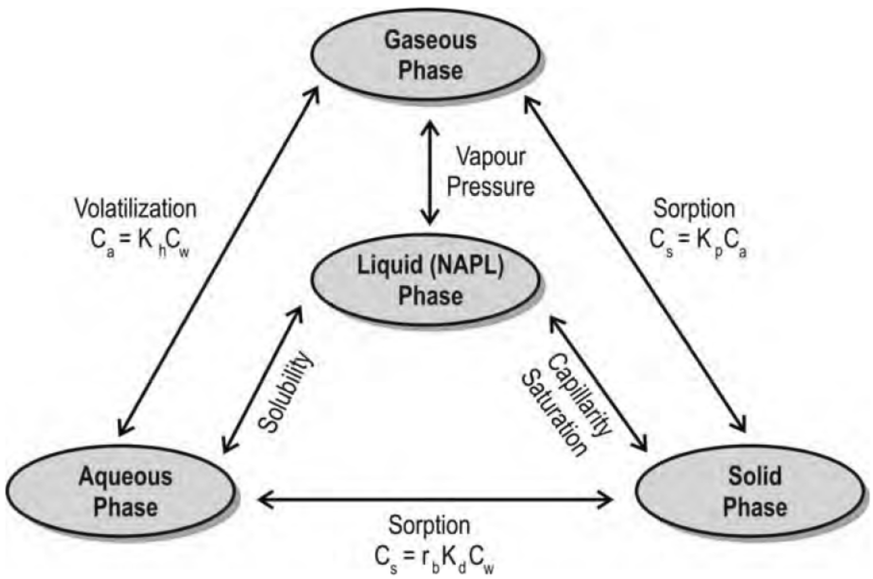
The primary design parameter applicable to AS/SVE systems is the air permeability of the soil matrix, both vertically and horizontally, which defines the zone of effective air exchange. The design strategy for SVE systems is to promote the release of volatile compounds from soil, water and NAPL to be carried advectively under the influence of an applied vacuum to the surface for collection and treatment. AS systems promote the volatilization of dissolved and NAPL phase contaminants, enhances biodegradation in the water phase, and increases unsaturated zone airflow rates. In an ideal AS/SVE design, the rate of transfer of volatile contaminants from soil/water/NAPL into the vapour phase will equal the air exchange rate, so that contaminants are as concentrated as possible in the extracted air stream. In practice, vapour concentrations generated immediately after start-up typically exceed air exchange rates, while declining concentrations occur after an extended period of system operation. On this basis, system designs require airflow controls to facilitate optimal air exchange rates at different stages of remedial operations.

Initial mass transfer rates are determined by partitioning coefficients from sorbed, dissolved and NAPL phase contaminants, while mass transfer rates after long-term system operations are typically limited by diffusion kinetics. The following processes apply:



Designing for the zone of effective air exchange should correspond to the volume of soil/water/NAPL that can be remediated within a targeted timeframe. This zone can be increased with increased airflow rates or via increased well frequency/coverage operating at lower airflow rates. AS and SVE blower selections must correspond to these requirements with added provisions for control variation throughout the project. While maximizing AS flowrates for optimal air exchange rates, and mass transfer, SVE flowrates must equal or exceed AS rates at all times to control potential vapour accumulation in the sub-surface.

Partitioning relations can be used to estimate contaminant mass removal rates as a function of time. Raoult's Law, Henry's Law and soil vapour partitioning relations can be used to evaluate partitioning from NAPL, water and soil respectively. Changes in contaminant composition and contaminant retardation also affect estimation of future mass removal rates. As air travel towards an extraction well-screen, contaminants sorb and desorb, volatilise and dissolve, in response to changing soil conditions and contaminant concentrations. Retardation typically describes sorption/desorption processes, however the same equilibrium concepts apply to partitioning from dissolved and NAPL phases. The equilibrium balance between contaminant phases is summarised as follows:



Partitioning of VOCs where:

C_a, C_w, and C_s = concentration of VOC component in air, water and solid;
K_H= Henry's constant;
K_p= partition coefficient;
K_d= distribution coefficient;
and r_b= soil bulk density (USACE, 1995)

Contaminant mass removal rates can be calculated using coupled airflow and contaminant mass transfer models (such as the Biovent Model applied at the subject site) or by extrapolation of pilot trial data. Airflow models typically provide more accurate forecasting, with the ability to incorporate detailed site geo/hydrogeological and contaminant conditions. Modeling typically supports well spacing and layout design, based partially on radii of vacuum and pressure influence, but more-so on simulated site-specific pore-gas velocities and air exchange rate analysis.

PILOT TRIAL OPERATION

The primary objective of the AS pilot trial was to confirm the compatibility of AS technology with site-specific conditions by monitoring the aquifer response and hydrocarbon mass recovery, and to obtain high quality system performance data for the detailed system design.

Although an expansive plume of LNAPL existed, site investigations had shown significantly homogeneous geo/hydrogeologic conditions within the LNAPL plume area. Accordingly, the pilot trial system configuration consisted of a single, purpose built AS well within the LNAPL plume area, with a single, purpose built SVE well located 10m up hydraulic gradient from the AS well location. The AS and SVE wells installed for the pilot trial had the same construction as those installed for the full-scale system (refer to Scale-up System Design).

A 5 horsepower (HP) blower unit was used to supply compressed air into the AS well at varying flowrates of 20-32 cubic feet per minute (cfm). A breakthrough pressure of approximately 1.8 psi was required to achieve continuous AS airflow. A 5 HP vapour extraction system capable of 200 cfm was connected to the SVE well.

Extracted off-gas from the SVE system was routed through a condensate knock-out drum and air phase activated carbon vessels with 2 x 2 vessels in series connected in parallel prior to discharge to the atmosphere. Monitoring wells were located at radial distances of 3m, 6m, 9m, 15m, 20m (and greater) cross hydraulic gradient from the AS well location.

AS-only and varying AS/SVE flowrate combinations were tested for a 1-week period while the following *in situ* and system performance data were monitored:

Pilot Trial System Monitoring
- Blower injection pressure (psi)
- Injection flowrate (cfm)
- SVE vacuum pressure (mmHg)

Soil Vapour Monitoring
- Vacuum (mm Hg, inches H_20)
- Flammable vapour concentration (%LEL)
- Volatile petroleum hydrocarbons (mg/m^3 VPH)
- Benzene, Toluene, Ethyl benzene, Xylene (mg/m^3 BTEX)
- Methane (ppm)
- Carbon dioxide (ppm CO_2)
- Oxygen (ppm O_2)

Groundwater Monitoring
- Water level mounding (m)
- Water level recovery times (sec.)
- Bubble flux (Lpm air)
- Temperature (^oC)
- pH
- Dissolved oxygen (mg/L)
- Oxygen reducing potential (mV)
- Conductivity (mS/cm)
- Extractable petroleum hydrocarbons (µg/L EPH)
- Volatile petroleum hydrocarbons (µg/L VPH)
  Benzene, Toluene, Ethyl benzene, Xylene (µg/L BTEX)

Pilot trial data was compiled and evaluated to provide the following summary information:

- Significant petroleum hydrocarbon mass removal rates were achieved, with peak mass transfer rates demonstrated during maximized AS and SVE flow operations;
- Decreased BTEX/VPH/EPH concentrations in groundwater were measured after AS operations;

- Groundwater mounding was detectable within a 9m radius of influence from the sparge point, with maximum mounding elevations of 0.2m measured at a 3m radius, and 0.037m at a 9m radius from the sparge point, respectively;

- A lesser mounding effect was also measurable within a 5m radius of the SVE point;

- Increased dissolved oxygen (DO) concentrations in groundwater were detectable up to 20m from the AS well, with DO increases of up to 1.0 mg/L measured at a radial distance of 15m from the sparge point;

- Positive pressure and vacuum radii of influence were measured up to 50m from AS/SVE wells during different modes of operation; and

- Recovered hydrocarbon mass was high and indicated a thermal catalytic oxidizer would be required in lieu of air phase GAC for air effluent treatment.

The pilot trial results demonstrated a high degree of applicability of AS/SVE technology to site specific conditions, with significant observable radii of vacuum/pressure and groundwater chemistry influence, uniform distribution of AS air/oxygen to the saturated zone, and high rates of contaminant mass transfer for SVE recovery. The stripping effects observed in the dissolved phase and the total mass transfer data collected were supportive of an aggressive approach towards scaled-up AS/SVE operations.

At the same time, the magnitude and extent of groundwater mounding around AS injection and SVE extraction points demonstrated significant potential to affect LNAPL migration. The degree of LNAPL movement within the central plume area as a result of pilot trial operations was not accurately quantified, with predictable 'thinning' or decreases in product thickness over zones of watertable mounding and a return to equilibrium recovery thicknesses within statistical margins of error to the original plume distribution. However, increased product plume distribution around surrounding wells was apparent, indicating the LNAPL plume had been mobilized by AS/SVE pilot trial operations. URS estimated that the one-week pilot trial shifted the LNAPL plume approximately 10m in a cross/upgradient direction. This impact, resulting from single injection/extraction wells, demonstrated a clear design requirement for the management of LNAPL movement in scale-up system design.

BIOVENT MODELING

The Biovent Model, developed by Environmental Systems and Technologies Inc., was used to evaluate and optimize pilot trial system performance data for scale-up design purposes. The model evaluated effectiveness and costs for soil and groundwater remediation using soil vapour extraction and air sparging designs. The model considers processes that govern the practical effectiveness of *in situ* airflow technologies and their optimal design, including horizontal and vertical airflow; multi-component, multiphase chemical partitioning; velocity-dependent vapour stripping efficiency; oxygen-limited, nutrient-limited, and mass transfer-limited biodecay; vacuum enhanced free product recovery and cost. The model was used to determine the optimum number of wells and operating specifications to minimize net present value cost, based on specified unit capital and operating costs.

Specifically, the combined components of the model included:

- Airflow Model
  - Unsaturated Zone Extraction and Injection Wells;
  - Air Permeability and Anisotropy
  - Saturated Zone air Sparging Wells
  - Air Sparging flow Parameters
- Mass Recovery Calculations
  - Mass Balance Reactions
  - Vapour Recovery and Flow Efficiency
  - Removal due to Biodecay
  - Removal of Free Product
  - Dissolved Phase Mass Transfer
- Remediation Time and Cost
  - Cleanup Criteria and Remediation Time
  - Cost Model

Cost modeling based on measured site conditions and pilot trial data indicated a balance between capital investment costs and ongoing operating and maintenance (O&M) costs. High capital expenditure associated with high density well-coverage and increased AS/SVE equipment sizing reduces forecasted remediation times and associated O&M costs, and vice versa. On this basis, the cost-benefit model identified an optimal number of 20 sparge points distributed across the NAPL plume area. This level of system well coverage/frequency represented over-design in terms of overlapping radii sparge/vacuum influence, but provided the optimum balance of up-front capital investment vs ongoing system O&M costs.

SCALE-UP SYSTEM DESIGN

In addition to optimizing petroleum hydrocarbon mass transfer rates through sparge and vapour extraction system design, the primary objectives of the AS/SVE system well layout design were two-fold: 1) To ensure adequate control and management of LNAPL plume migration within the remedial system coverage area; and 2) To ensure 100% capture of all petroleum hydrocarbon vapours generated by remedial system operations.

The well network design comprised 20 nested AS/SVE wells and 15 discrete SVE wells, constructed as follows:

- Nested AS wells were constructed with 1 inch diameter PVC piezometers comprising 3 ft well-screens located with the top of the well-screen was positioned 5 ft below the estimated low seasonal watertable elevation.

- Nested SVE wells were constructed with 2 inch PVC piezometers comprising 3 ft well-screens located with the bottom of the well-screen positioned 5 ft above the estimated low seasonal watertable elevation.

- Discrete SVE wells were constructed with 2 inch piezometers comprising 15 ft well-screens located with the bottom of the well-screen positioned 5 ft below the estimated low seasonal watertable elevation.

The well network on site was interconnected with 4 and 6-inch diameter buried header lines. These header lines connected to AS and SVE manifolds erected within the fenced compound surrounding the equipment shed. Dedicated AS and SVE lines running to wells on the highway were plumbed together to form the manifolds.

Photograph 1: AS & SVE manifolds under construction.

The AS manifolds and AS header line connected at an automated valve and to a 150 cfm sparge compressor. Similarly, the SVE manifolds and SVE header connected at a second automated valve and to a 500 cfm SVE blower and a 500 cfm thermal catalytic oxidizer unit. All system wells, including nested AS wells, nested SVE wells and discrete SVE wells, were designed to be controlled in groups via the automated valves, or individually at the manifolds or at the wellheads by manually turning well-dedicated valves. System wells/wellheads north of the highway remained accessible via 24-inch gasketed, bolt down steel road boxes, while those beneath and south of the highway were buried following connection to the pipeworks.

The system well layout was based on an internal zone of nested AS/SVE wells located across the approximate area of the LNAPL plume, surrounded by a perimeter capture ring of discrete SVE wells. The internal zone of nested wells represented the focus area for mass transfer operations. The perimeter capture ring facilitated both boundary containment of vapour migration from the central operating zone, and the maintenance of a perimeter watertable mound or barrier to mitigate against LNAPL migration.

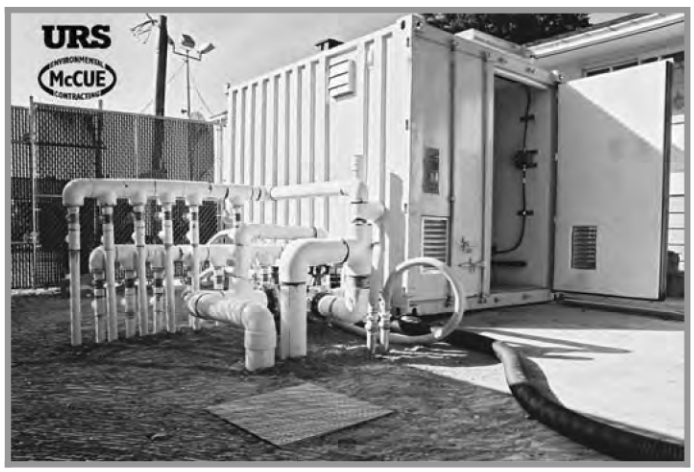
Both the AS and SVE well networks consisted of two groups of wells for automated control. Nested SVE wells covering the LNAPL plume formed one SVE group, and the outer capture ring of discrete SVE wells formed the second SVE group (Figure 2). The AS well groups had a similar assembly in that a ring of nested AS wells formed one group and surrounded the second group, which comprised nested AS wells covering the inside of the ring (Figure 3).

Experience with this system emphasized the following practical design considerations:

- PVC pipe is not rated for compressed air conveyance. As a safety precaution, URS elected to have aboveground (and near surface) sections and the AS manifold constructed of galvanized steel, while wellhead connections and associated buried pipeworks were constructed of Schedule 40 PVC.

- Installing AS and SVE wells as nested pairs saved considerable time and cost during drilling.

- The manifolds permitted system performance monitoring and operation control of wells situated on the highway from a single location within a safe and secure area.



Photograph 2: Compound including equipment enclosure, SVE manifold, automated valve and piping, header connections and well roadbox.

- Selection of a thermal catalytic oxidizer unit proved beneficial from an operations standpoint as well as from a cost perspective. A thermal catalytic oxidizer provided a cost advantage by allowing unit operations to eventually be switched from thermal to catalytic mode as influent hydrocarbon vapours decreased with ongoing system operation, thus reducing extraneous fuel costs. The oxidizer selected for the case study site was equipped with a heat exchanger, which further reduced the unit's fuel consumption. Commissioning an oxidizer at the site offered an additional advantage as the local municipal government required neither an air discharge permit nor treated air effluent monitoring as an oxidizer had been commissioned. The absence of a permit and associated requirements simplified system monitoring and saved both time and money.

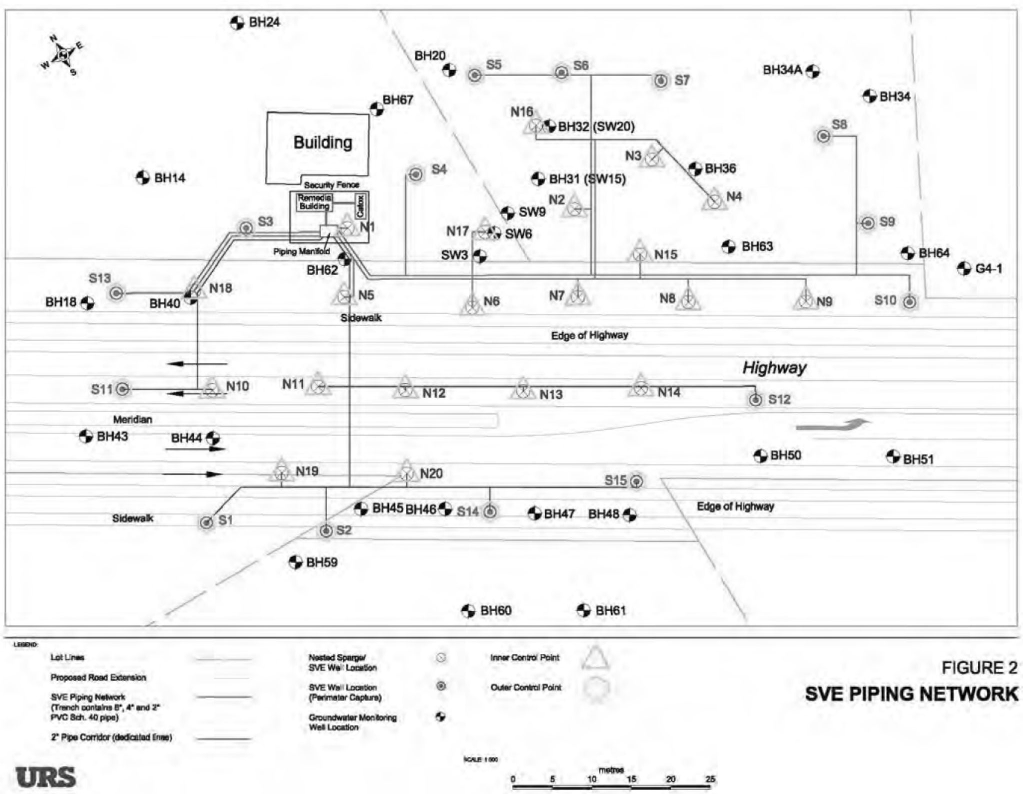


Figure 2: SVE system well layout, associated pipeworks and automated control options.

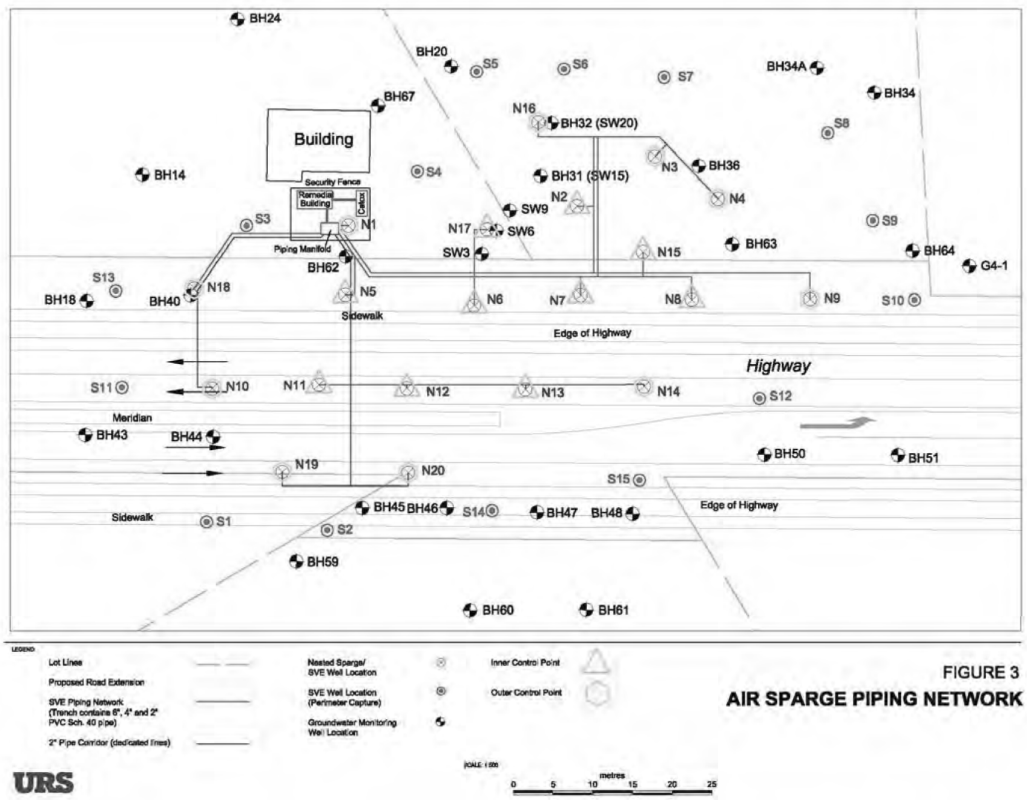


Figure 3: AS system well layout, associated pipeworks and automated control options

SYSTEM OPERATIONS – MODE, OPERATING AND PERFORMANCE DATA

System monitoring was conducted on a minimum bi-weekly frequency over a nine-month remedial timeframe. Site monitoring was also performed in order to track changes in the LNAPL plume thickness and extent. Over this period system operation was continually monitored and optimized in response to measured performance and changing site conditions to maintain high hydrocarbon mass removal efficiency without losing control of the LNAPL plume.

Remedial operations were initiated in the central plume area on May 6, 2004. High initial hydrocarbon mass transfer rates in the central zone dictated the need for phased addition of individual SVE wells by systematically opening new wells as vapour recovery concentrations reduced and equilibrated. Initially two SVE wells at the plume centre were opened and after a period of approximately 4 weeks, all 20 nested SVE wells were operational. The inlet vacuum ranged from 1-2.5"Hg during this period, resulting in extracted vapour flowrates ranging from 240-267cfm, containing vapour phase hydrocarbons at concentrations ranging from 28-36% of the lower explosive limit (LEL). During the first month of operation the average hydrocarbon recovery rate was approximately 185 litres (L)/day.

At this point, the vacuum blower output was approaching the unit's capacity, which posed a challenge as still none of the discrete SVE or nested AS wells had been brought online. In response, the vacuum blower was modified to increase its capacity. By the end of the fifth week of operation, all 35 nested and discrete SVE wells were operational.

A second challenge was encountered when the discrete SVE wells were opened. The discrete SVE wells intersected the watertable in order to contain LNAPL and prevent fugitive vapours from escaping the system. However, at high vacuum, enough groundwater was entrained in the extracted vapour that condensate knock-out accumulation was shutting down the system. In response, URS installed a bleed valve in the line connected to discrete SVE wells to control the vacuum applied to discrete SVE wells at the system network perimeter so that water vapour was not entrained in the recovered contaminated vapour stream.

The mode of operation then remained unchanged over the next month. During this period, extracted vapour flowrates ranged from 436-459cfm, and recovered vapour phase hydrocarbon concentrations slowly dropped off, reducing to 22%LEL from 31%LEL. During this period of operation the average hydrocarbon recovery rate equated to approximately 247L/day.

After the initial two-month period, the AS wells were brought online to increase the hydrocarbon recovery potential. Activating the AS system resulted in extracted hydrocarbon concentrations as high as 40%LEL, equating to a hydrocarbon recovery rate of over 400L/day. High vapour phase hydrocarbon concentrations shut down the oxidizer unit and consequently the system. To remedy this situation, AS system wells were periodically pulsed to maximize contaminant mass transfer and reduce the occurrence of breakthrough[1]. URS's design team concluded that spikes in vapour phase concentrations when breakthrough occurred were causing high temperature shutdown. Well pulsing was conducted via automated control to provide alternating operation between AS well-groups or operation zones. With pulsed operation, URS was able to maintain hydrocarbon recovery rates between 200-300L/day based on extracted vapour phase hydrocarbon concentrations between 20-33%LEL, which the system could process.

This mode of operation continued for the majority of remedial operations for a period of approximately five months, during which time LNAPL and vapour migration patterns were monitored both within and outside the remediation system coverage area. Predicting and controlling LNAPL movement posed a third challenge in the successful completion of the program, and required intense system monitoring and performance data evaluation over the final stages of the project.

During the final two-month period of system operations, the majority of the LNAPL plume had been removed and only a small isolated area of persisting gasoline product was detectable via the internal monitoring well network. This area was aggressively targeted for remediation via high airflow operation of select AS/SVE wells in the immediate vicinity of the impacted area.

When LNAPL detection via all monitoring/system wells indicated the absence of LNAPL, a one-month operational shut-down period was implemented to monitor for rebound effects associated with LNAPL entrainment in capillary fringe and vadose zone soil profiles, and the re-distribution of LNAPL potentially located in voids between operational AS/SVE wells. No rebound in LNAPL occurrence was observed. Following the shutdown period, wide-area coverage operations were re-introduced across the site for a final one-month period prior to terminating system operations.

LNAPL RECOVERY AND REMEDIATION CLOSURE

Post-remediation drilling, confirmation testing and soil, groundwater and vapour monitoring to support remediation closure reporting demonstrated the successful completion of remedial objectives. The overall system operating time was nine months, during which time a total mass removal of the order of 40,000L of gasoline product was achieved.

SUMMARY AND CONCLUSIONS

Remedial options evaluation and time/cost-benefit analyses identified AS/SVE technology as an expeditious approach towards fast-tracked LNAPL remediation, with high-impact recovery potential. At the same time, AS/SVE application also posed several key design/implementation challenges that had to be overcome to make it viable. Foremost of these was the requirement for safe management of LNAPL migration and vapour containment within system control boundaries.

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[1] Accumulated air breaks through to the vadose zone to the point where the region of airflow in the saturated zone begins to collapse/shrink.

Pilot system testing facilitated the collection of high quality subsurface response and system performance data to support accurate scale-up design. The Biovent Model was used to evaluate and optimize pilot trial system performance data for scale-up design purposes. The model evaluated effectiveness and costs for soil and groundwater remediation using soil vapour extraction and air sparging designs to determine the optimum number of wells and operating specifications to minimize net present value cost, based on specified unit capital and operating costs.

Following system commissioning, continuous review and refinement of system operations optimized contaminant mass transfer efficiencies and ensured perimeter control. Close evaluation of site monitoring and system performance data permitted URS to respond to changing conditions or system inefficiencies as they arose. URS attributes the success of the project to this review and corrective action process. Although not typically applied for LNAPL removal, URS's design and aggressive operation of a large-scale air sparge/SVE system permitted site closure within a short remedial timeframe.

The primary remedial objective, LNAPL source removal, was completed over a very short (9-month) time period in the context of the volume of product recovered (40,000L). At the same time, primary AS/SVE system design limitations, control and management of LNAPL plume migration and containment of generated vapour, were also successfully managed throughout the project.

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ACKNOWLEDGEMENTS

Technology information courtesy of T. Peargin, Chevron Energy Technology Co., all rights reserved.

McCue Environmental Contracting: Remediation system installation, operation and maintenance.

A Case Study of Aquifer Air Sparging for Remediation of LNAPL

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Abstract

Aquifer air sparging is a well established and cost-effective remediation technology for dissolved-phase contamination. However, it has historically been discouraged for remediation of large amounts of light non-aqueous phase liquids (LNAPL) due to the potential for mobilization and spreading of contamination during pressurized air injection. To challenge the precautions stated in the literature, a systematic approach of intact soil core sampling, lateral LNAPL mobility analysis, pilot testing, full-scale operation, and laser-induced fluorescence (LIF) survey was performed. This study was performed at a large JP-4 and JP-8 jet fuel release site for which air sparging and soil vapor extraction (SVE) was identified as the most cost-effective option for remediation.

The site lithology consists of fine- to medium-grained sand throughout the target treatment zone which extends to a depth of 72 feet below ground surface. The water table has historically fluctuated between 32 to 50 feet below grade, in response to hurricane and drought cycles and has created an extensive LNAPL smear zone. The LNAPL smear zone submergence and in-well LNAPL thicknesses (up to 3 feet) are highly variable depending upon the local drought conditions.

Intact soil core samples were collected to assess the range of potential lateral LNAPL mobility under air sparge induced conditions prior to pilot testing. The results showed extremely small mobility and low risk for LNAPL spreading. Subsequently, an air sparging/SVE pilot test was successfully performed and full-scale construction followed shortly thereafter. A second round of post-full-scale startup intact soil core sampling and a LIF survey were conducted. The weight of evidence collected indicates that LNAPL has not spread and, in fact, indicates that the LNAPL is being remediated. This presentation will present data illustrating the effectiveness of air sparging/SVE alone for treatment of the LNAPL.

Introduction

Historically, remediation practitioners have been discouraged from in situ remediation of large amounts of light non-aqueous phase liquids (LNAPL) using aquifer air sparging due to the potential for mobilization and spreading of contamination during pressurized air injection. The authors postulate that this viewpoint is due to the lack of publicized research and successful case study data which supports the use of air sparging for LNAPL treatment.

The purpose of this paper is to fill a data gap in understanding of the effects of air sparging remediation technology on in situ LNAPL saturation and lateral mobility..

The subsurface of a large-quantity petroleum storage and distribution facility at Eglin Air Force Base, heavily contaminated by historic jet fuel releases, is being treated using air sparging and soil vapor extraction (SVE) technology. After approximately 20 months of cumulative treatment, the system has removed an estimated 246,000 pounds of hydrocarbons (accounting for volatilization and biodegradation) from the subsurface which contains up to a total of 1,200,000 pounds of petroleum contamination spread over an area of six acres. Remedial action planning for the site identified the air sparging/SVE alternative as the most cost-effective, with potential savings of up to $500,000 over the life-cycle of the project in comparison to an air sparging remedy coupled with fluid recovery. Based on this technical and economic analysis and a successful air sparging/SVE operation at a much smaller LNAPL site on the same base, it was selected as the preferred remedy.

The site lithology consists of fine- to medium-grained sand throughout the target treatment zone which extends to a depth of approximately 72 feet below ground surface. The water table has historically fluctuated between approximately 32 to 50 feet below grade, in response to hurricane and drought cycles, resulting in an extensive LNAPL smear zone. The LNAPL smear zone submergence and in-well LNAPL thicknesses (up to three feet since measurements began in 1996) are highly variable depending upon the local drought conditions.

To proceed with the recommendations of the technical and economic analysis while honoring the literature precautions against air sparging a site containing a large quantity of LNAPL, a systematic and phased approach to remediation was implemented. It consisted of a series of efforts beginning with laser-induced fluorescence (LIF) survey, intact soil core sampling, and lateral LNAPL mobility analysis and progressing to pilot testing and full-scale operation and follow-up LIF survey to assess the potential mobility. The goal of this phased approach was to collect multiple lines-of-evidence, in addition to the standard groundwater and SVE offgas monitoring program, to measure the fate and transport of the LNAPL under air sparge induced conditions. This paper summarizes the rationale, procedures, and results of the study.

Study Rationale and Hypothesis

Few, if any, published literature resources specifically address measurement of the fate and transport of in situ LNAPL under air sparge induced conditions at the field-scale. As a result, the literature that is available on the subject is purposely vague and recommends a coupling of air sparging with fluid recovery systems for LNAPL treatment. For example, the U.S. Army Corps of Engineers (USACE, 1997) In Situ Air Sparging Engineer Manual states that it is unclear whether air sparging is effective at remediating sites containing large amounts of LNAPL and considers the matter a topic of on-going research. The USACE Engineer Manual also advocates use of fluid recovery systems prior to air sparging if mobile or recoverable LNAPL is present. Like most of the literature reviewed, this recommendation is based on the assumption that if LNAPL accumulates in a monitoring well, it is mobile in situ, and may migrate in a significant and uncontrolled way when air sparging is applied. Therefore, fluid recovery is recommended in order to reduce LNAPL concentrations to residual saturation prior to application of air sparging.

Other guidance on the use and design of air sparging are also ambiguous with respect to use of air sparging for LNAPL treatment. The Air Sparging Design Paradigm (Leeson et. al., 2002) does not specifically mention the application of air sparging for LNAPL treatment. Consistent with the U.S. Army Corps of Engineers guidance, the U.S. Environmental Protection Agency (EPA) recommends the use of dual-phase extraction and SVE for sites containing LNAPL (U.S. EPA, 1997). The U.S. Department of Defense Environmental Security and Technology Certification Program (ESTCP) names air sparging as the most practiced engineered in situ remediation option when targeting the treatment of hydrocarbon-impacted aquifers at underground storage tank sites and advocates the use of air sparging for submerged source zones. However, ESTCP does not specifically address the performance of air sparging at sites with significant amounts of LNAPL.

Since it's not been until recently that researchers began investigating the effects of air sparging on LNAPL (Waduge et. al., 2007), state regulators have verbally discouraged air sparging/SVE alone for treatment of sites with potentially mobile LNAPL (CH2M HILL project file correspondence). State regulations do not typically contain provisions prohibiting the use of air sparging/SVE alone for treatment of LNAPL like Florida Administrative Code 62-770 which governs remedial activities at this study site. However, consensus technical opinion based on the published literature all-too-often drives remedy selection toward a combined or coupled approach (i.e. air sparging in conjunction with groundwater pumping or LNAPL skimming, for example).

The hypothesis being tested in this paper seeks to challenge the prevailing opinion and supports air sparging/SVE alone as a more cost-effective remedial approach for treatment of all phases of LNAPL contamination at a relatively homogeneous and permeable sandy site with a broad water table fluctuation. It presents multiple lines-of-evidence to show that the risk of lateral in situ LNAPL mobility is negligible and the added expense of a separate fluid recovery system is not justified.

Study Goals and Objectives

The goal of this study was to evaluate the hypothesis that air sparging/SVE alone can be an effective and safe remedial technology for sites with large quantities of LNAPL. To accomplish this goal, the following data objectives were established:

- Assess the baseline LNAPL conditions of the site prior to implementation of air sparging/SVE
- Perform a short-term air sparging/SVE pilot study to assess lateral in situ LNAPL mobility

- Implement a full-scale air sparging/SVE treatment system and assess the longer-term effects of the treatment system on the in situ LNAPL after a significant period of operation
- Compare and contrast LNAPL conditions before and after air sparging/SVE treatment to validate the hypothesis

In addition to the standard groundwater and SVE offgas monitoring, the following atypical measurements were used to quantify the effects of air sparging/SVE on LNAPL:

- Soil smear zone delineation using a LIF survey
- Soil sample analysis for benzene, toluene, ethylbenzene, and total xylenes (BTEX) using EPA Method SW 8021, polycyclic aromatic hydrocarbon (PAH) using EPA Method SW 8310, total recoverable petroleum hydrocarbon (TRPH) analysis using the Florida-specific method FL-PRO and speciation using the total petroleum hydrocarbon (TPH) Criteria Working Group methodology
- LNAPL saturation profiling using intact soil coring and pore fluid saturation (PFS) analysis

Study Procedure

The procedure used to achieve the data objectives of this study included the following steps:

Step 1. Initial LIF survey using the Rapid Optical Screening Tool (ROST™) to delineate and characterize the nature and extent of the LNAPL

Step 2. Initial intact soil core sampling and analysis and lateral LNAPL mobility evaluation

Step 3. Air sparging/SVE system pilot test operation (five month operation) and startup of the full-scale air sparging/SVE system (in continuous operation since May 2006)

Step 4. 1st Event, Treatment Progress Monitoring - Intact soil core sampling and laboratory analysis (eight months post-full-scale startup)

Step 5. 2nd Event, Treatment Progress Monitoring - LIF survey using the Ultraviolet Optical Screening Tool (UVOST™) (15 months post-full-scale startup)

Step 6. Comparative data analysis and air sparging effectiveness evaluation (details provided in section entitled Discussion of Results)

Step 1: Initial LIF Survey

An initial LIF survey was conducted to delineate the subsurface LNAPL and identify the areas of highest petroleum mass density. The survey was performed using ROST™ and conducted by Fugro Geosciences of Houston, Texas. Qualitative and semi-quantitative use of the LIF technology for in situ delineation of petroleum hydrocarbons is well supported by the literature (U.S. EPA, 1995). Thirty-seven ROST™ locations were probed across the approximate six-acre LNAPL plume using a cone penetrometer technology (CPT) drill rig to collect simultaneous lithologic and contaminant information. The system monitors fluorescence in terms of percent reflectance of the laser light and the reflectance values (as a percent of a reference emitter) can be used semi-quantitatively to determine the horizontal and vertical extent and to a limited extent, the magnitude of petroleum hydrocarbon saturation in the soil. The LIF information was reduced using three-dimensional kriging (Environmental Visualization System by C Tech Development Corporation, Kaneohe, Hawaii).

The results of the initial LIF survey were used to identify two primary core areas of LNAPL contamination. It showed a smear zone up to 18 feet thick, starting approximately 32 feet below ground surface (ft bgs). Figure 1 presents a cross section of the initial LIF survey findings in one area of the site. It illustrates the extent of the smear zone and relative-magnitude of the LNAPL saturation as indicated by the LIF response. At the time, the water table was near a historic low (approximately 28 ft NAVD) such that most of the LNAPL smear zone was above the phreatic surface.

Because the dramatic water table fluctuation was an important decision factor in the selection of the air sparging/SVE remedy at this site, the range of water table fluctuation is noted here based on monitoring data from 1996 to the present. Over the next two years from the initial LIF survey in December 2000, the site remained within a drought and the water table elevation remained within three feet of this low point. Commencing in late-2002, two major hurricanes occurred and water levels rebounded to their highest historic levels (approximately 32 ft bgs) in September 2005. Since that time, however, water levels have dropped precipitously and returned to historic low levels.

Step 2: Initial Intact Soil Core Sampling and Analysis and Lateral LNAPL Mobility Evaluation

Following the initial basic LNAPL characterization efforts, the LNAPL plume core areas were identified and screened for potential application of air sparging/SVE pilot test. Areas of highest contamination were preferred so that design parameters representative of the LNAPL core treatment (e.g., mass removal rates) could be obtained. Once the pilot test area was selected, in the center portion of the smear zone shown on Figure 1, soil samples were collected coincident with the pilot test well installation activities. Samples were collected using a hollow-stem auger (HSA) drill rig and standard two-foot split- spoon samplers. Sixteen soil samples were collected from within the smear zone in these LNAPL core areas, between 35 to 55 ft bgs, for laboratory analysis of BTEX, PAH, TRPH, and TPH speciation.

In addition, two intact soil core samples of a 15-foot section of the LNAPL smear zone (35 to 50 ft bgs) in this same area were collected using the split-spoon samplers fitted with acetate liners. Soil in the two-foot acetate liners was sampled and retrieved using the HSA drill rig, the sample was quickly packed, capped, labeled, and frozen on dry ice for shipment to the laboratory. In general, greater than 80-percent sample recovery was achieved and representative sampling was deemed a success. The samples were shipped to the specialty laboratory (PTS Laboratories, Santa Fe Springs, California) for analysis of PFS. In general, PFS analysis was performed every foot within the core sample (a total of 15 PFS analyses from each core). To properly select PFS subsample locations from intact soil segments, the project team used core photos (see Figure 2) taken by the laboratory upon receipt and processing of the sample.

These analytical results and others by the specialty lab were used to perform an LNAPL mobility analysis to estimate the lateral pore velocity of LNAPL under air sparge induced conditions. The results of this analysis were used to assess the feasibility of air sparging alone for LNAPL remediation and quantification of the risk of lateral LNAPL mobility during remedial operations. Presentation of the detailed methods of the mobility evaluation is outside the scope of this paper. The basic results are presented herein to simply support the selection of the air sparging/SVE remedy and set the stage for implementation of the pilot test.

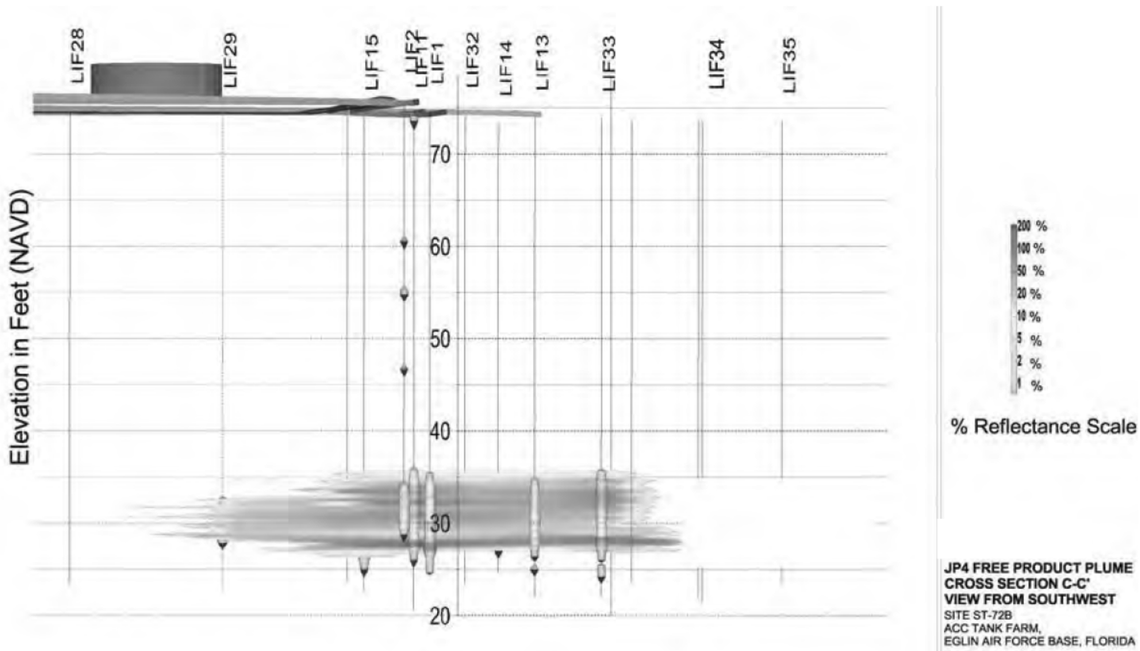

Figure 1
Illustration of Initial LIF Survey Results

Figure 2
Digital Photograph of Intact Soil Core Segment

The LNAPL saturations observed at the site were low. They ranged from less than 0.05-percent (non-detect) up to 11-percent by pore volume. The average smear zone saturations at each of the two borings were 0.7 and 0.8-percent by pore volume. In order to account for

LNAPL saturation variability over time due to the fluctuating water table, the theoretical pore velocity of the LNAPL was also calculated for minimum, average, and maximum conditions. The resultant maximum theoretical LNAPL effective conductivities ranged from 1.03 x 10^{-10} cm/sec (minimum parameters) to 1.02 x 10^{-5} cm/sec (maximum parameters) with a value of 1.14 x 10^{-6} cm/sec based on the average soil and LNAPL parameters. Using an effective LNAPL conductivity of 1.01 x 10^{-5} cm/sec, a gradient of 0.05 (air sparging mounding of 2-feet over an approximate 40-foot radius of influence), a porosity of 0.38, and an LNAPL saturation of 7.4-percent, the maximum effective LNAPL pore velocity was calculated to be 1.8 x 10^{-5} cm/sec. Using the conservative approach that the transient rise in the water table and similar response of the LNAPL is maintained for a 24-hour period, the enhanced gradient will cause the LNAPL to move approximately 0.05 feet.

Step 3: Air Sparging/SVE Pilot Testing and Full-Scale Treatment

After understanding that the theoretical maximum LNAPL pore velocity was extremely low, an air sparging/SVE pilot study was started in December 2003 to obtain field data on the lateral mobility and treatability of the LNAPL. A unique arrangement was configured to accommodate the extremes in water table fluctuations and aggressively aerate the LNAPL smear zone. Figure 3 depicts the general site conceptual model of contamination along with the general arrangement of the air sparging/SVE system. A conventional SVE well was installed with an effective extent of influence of 60-feet to treat the historic range of the smear zone from 30 to 55 ft bgs and capture fugitive vapors from the air sparging system. The air sparging system consisted of two tiers of air sparging wells, (1) one deep air sparging well (named AAS), installed with an effective extent of influence of 40-feet, and screened at the base of the dissolved-phase contamination at approximately 72 ft bgs; and (2) six air sparge "lite" wells (named ASL wells) with an effective extent of influence of 25-feet each, designed to completely surround the AAS well, were installed at a 50-foot spacing at approximately 55 ft bgs to aggressively aerate the smear zone during periods of moderate to high groundwater table. The SVE well, AAS well, and ASL well were each supplied by dedicated blower and control systems. The SVE, AAS, and ASL wells were operated at average airflow rates of 160, 35, and 15 standard cubic feet per minute (scfm), respectively.

The air sparging/SVE pilot test was operated for 2,000 hours over a period of five months (December 2003 to May 2004). During this time, a total of approximately 10,000 pounds of TPH was removed (accounting for volatilization and biodegradation) over a target treatment area of 10,000 square feet. The pilot test was operated continuously for the first half of the test period and in pulsed mode for the second half.

Following successful operation of the pilot test system, the full-scale system was approved for construction and started up in May 2006. The full-scale system was installed to treat the entire known extent of the LNAPL and built according to the same specifications as specified above for the pilot test system. The full-scale remedial system consists of 20 SVE wells, 28 AAS wells, and 62 ASL wells to cover approximately six acres of LNAPL smear zone. To enhance monitoring of the effective extent of influence of the system, nested saturated zone and nested vadose zone monitoring points were installed. The blower equipment was designed to extract/deliver air to the system in three different zones. Zone operation is routinely rotated and prioritized based on the highest SVE well offgas volatile organic compound concentrations. A monthly optimization program is used to ensure that the most productive wells are operated. AAS, ASL, and SVE wells are operated simultaneously and airflow rates are fine-tuned as best possible to maximize mass removal.

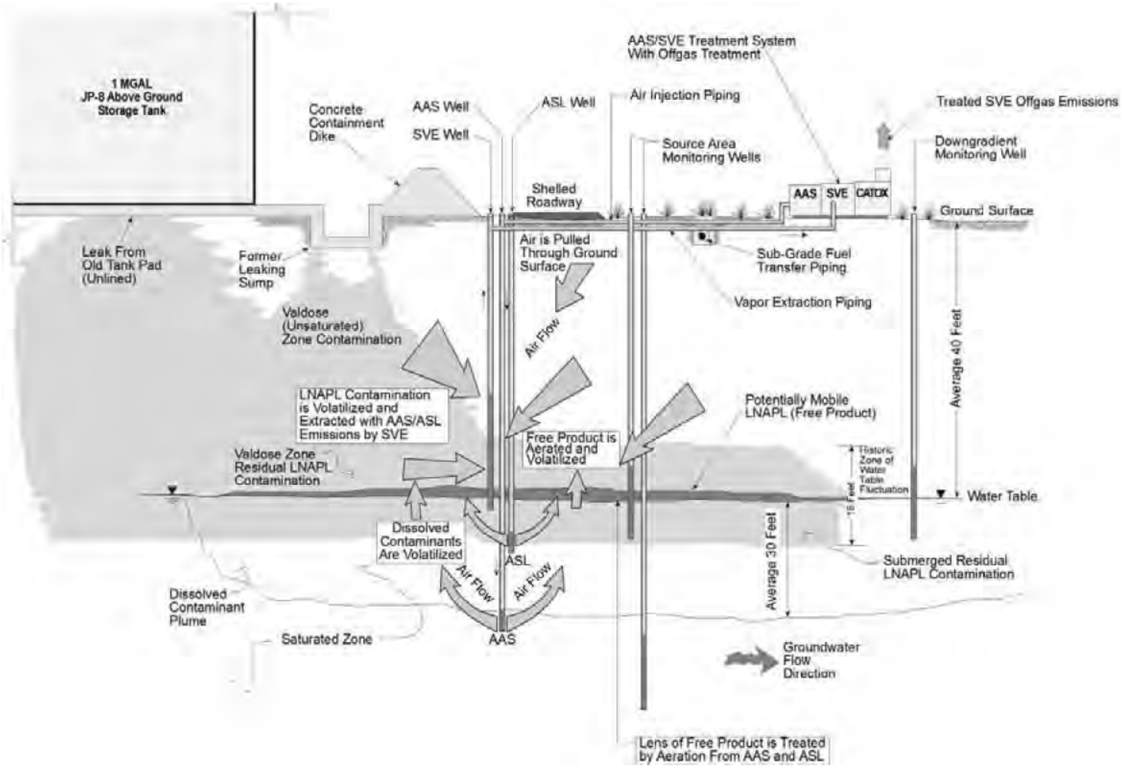

Figure 3
Conceptual Design Schematic of the air sparging/SVE System

During the period May 2006 through August 2007, the full-scale air sparging/SVE system operated for slightly over 9,000 hours and removed approximately 236,000 pounds of TPH (accounting for volatilization and biodegradation). As of the writing of this paper in October 2007, the system continues to run continuously.

Step 4: 1st Event, Treatment Progress Monitoring - Intact Soil Core Sampling and Laboratory Analysis (Eight Months and 15 Months Post-Full-Scale Startup)

After eight months and 15 months of full-scale treatment system operation, two intact soil core samples were collected from the same two intact soil core locations that were initially sampled (see Step 2). Additionally, during the eight month post-full-scale startup sampling event, four additional intact soil core samples were collected from 4-feet, 8-feet, 16-feet, and a duplicate sample at 25-feet from the adjacent ASL well. The locations are identified on Figure 4 as blue diamonds. The intact soil core samples were collected and analyzed for PFS using the same procedure specified for Step 2 by PTS Laboratories (Santa Fe Springs, California). Split-spoon samples were collected from the smear zone from all six sample locations (at 45 ft bgs) and analyzed for TPH speciation by the TPH Criteria Working Group method.

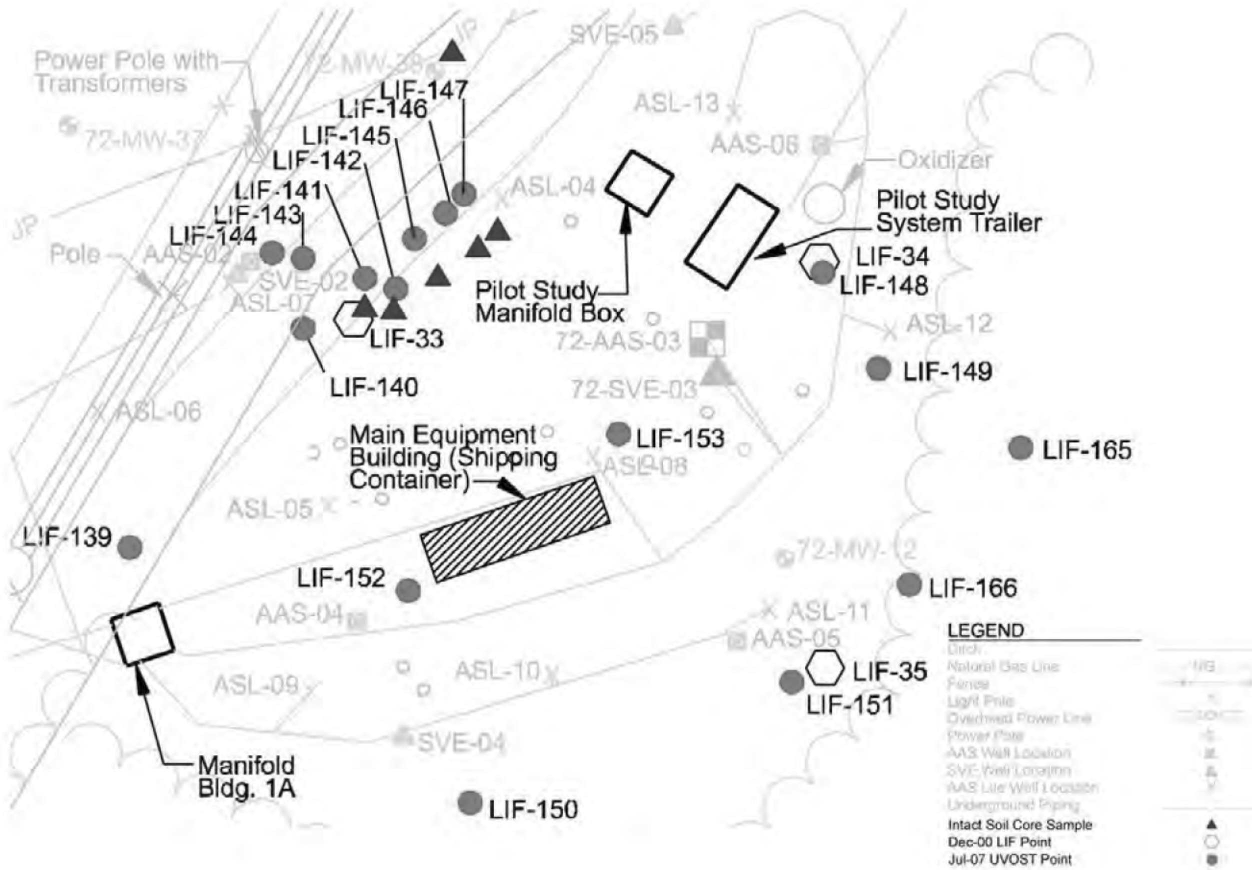

Figure 4
Location Map of Air Sparging/SVE Pilot Study and Intact Core Sample Locations

Step 5: 2nd Event, Treatment Progress Monitoring - LIF Survey (15 Months Post-Full-Scale Startup)

The 15 month post-full-scale startup LIF survey for this project was performed using a different LIF instrument, UVOST™ by Dakota Technologies of Fargo, North Dakota. UVOST™ and ROST™ were developed by Dakota Technologies and both are operated using the same laser-producing and fiber-optic sensing instrumentation tuned to the same wavelengths of light and reference emitter solutions. Therefore, at the time of work planning, the response was expected to be quantitatively comparable. Thirty-nine UVOST™ locations were probed across the approximate six-acre LNAPL plume using a direct-push technology (DPT) drill rig. All efforts were made during the probing effort to vary the distance of probing from AAS and ASL wells to attempt to derive a correlation with LNAPL saturation as measured by LIF response. In addition, in the immediate vicinity of five full-scale treatment system air sparging wells (four ASL wells and one AAS well), a radial alignment of four UVOST™ points spaced at 4-feet, 8-feet, 16-feet, and 25-feet away were advanced to assess LIF response impacts within their zone of influence.

It should be noted that comparison of the initial and final LIF surveys is not presented in this paper. This is because the LIF implementation methods were dissimilar (i.e., CPT versus DPT) and results were not directly comparable. As a best practice, it is recommended that the same LIF provider and drilling/LIF equipment be used for both the initial and final surveys to minimize any potential for error.

Discussion of Results

The effects of air sparging/SVE on LNAPL distribution were assessed using four lines of evidence:

- Distal correlation of UVOST™ results
- Temporal comparison of LNAPL saturation results
- Distal correlation of LNAPL saturation and TRPH results
- Temporal comparison of TPH speciation results

Distal Correlation of UVOST™ Results

An average smear zone UVOST™ response was calculated for each survey location by simply averaging the response results over the interval from 35 to 55 ft bgs. This depth interval encompasses the majority of the smear zone and a standardized approach normalizes the effects of dynamic vertical LNAPL distribution due to water table fluctuation. Additionally, it avoids any subjective data file interpretation that would be introduced if the smear zone interval of each UVOST™ location were to be delineated uniquely.

Figure 5 presents a site-wide correlation of UVOST™ response with distance to the nearest air sparging well. This analysis includes 39 data points throughout the full-scale target treatment zone (i.e., initially estimated to contain LNAPL) with distal measurements from a total of 23 air sparging wells and includes both AAS and ASL wells. The average background UVOST™ response was 0.6 %RE, below which no appreciable amount of LNAPL is detected. Twelve LIF survey locations were absent of appreciable LNAPL. Since the locations of these "clean" locations are not uniformly close to air sparging wells, they were assumed to be invalid for this analysis.

With respect to survey locations that contained detectable amounts of LNAPL, Figure 5 shows no apparent correlation of UVOST™ response with distance from the nearest air sparging well from four up to 45 feet away. No accumulation of LNAPL is apparent at the estimated extent of influence of the air sparging wells were it might be expected to occur; at 25- and 40-foot distances for ASL and AAS wells, respectively. The UVOST™ data indicate that neither spreading nor treatment appear to be occurring. The figure also shows that there is a large variability in the average smear zone UVOST™ response across the site. This is an important site- and/or technology-specific variable to consider since this large variability may mask observation of small changes in LNAPL saturation.

To further support the lack of correlation, Figure 6 shows the results of the close-in radial UVOST™ monitoring at two ASL wells. It shows a similar response, with no apparent consistent trend in response observed with distance from the air sparging wells. No depletion is observed near and no accumulation is observed at the 25-foot extent of influence of the ASL wells.

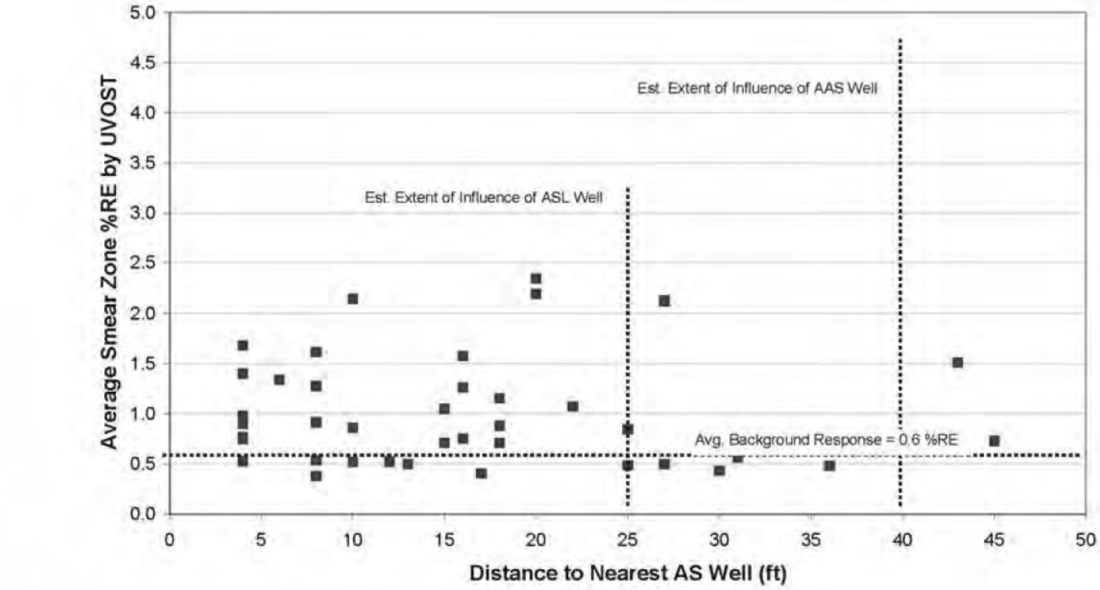

Figure 5
Correlation of UVOST™ Response with Distance to Nearest air sparging Well

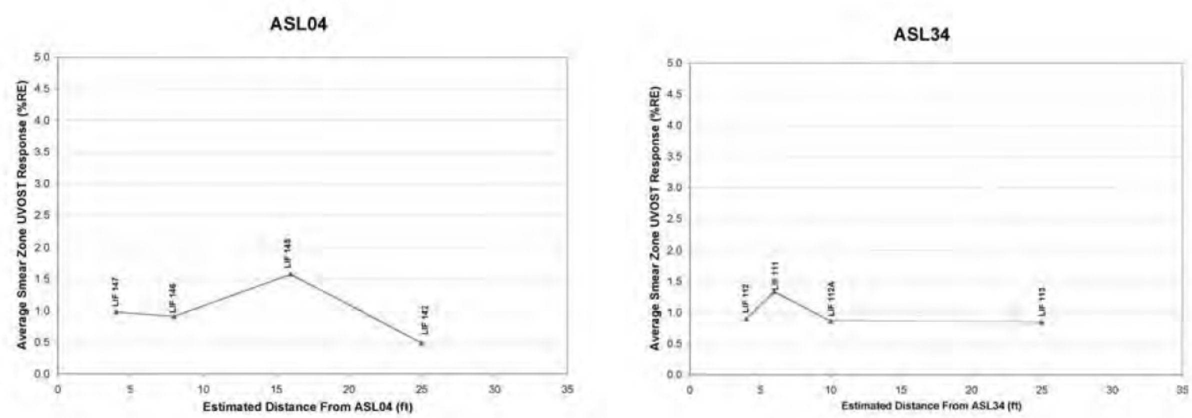

Figure 6
Close-In Radial UVOST™ Monitoring Results

Temporal Comparison of LNAPL Saturation Results

At two locations, 13- and 25-feet from an ASL well, soil sampling was performed three times during this study, before pilot test air sparging/SVE operation (September 2003), after five months of pilot test air sparging/SVE operation (July 2004), and again after a total of 20 months of combined pilot and full-scale air sparging/SVE operation (December 2006). Figure 7 presents the temporal change in the average smear zone PFS concentration during this study. The average smear zone PFS value was used to normalize the data and inherently absorb any ambient effects such as changes in water table that may have otherwise affected interpretation of the results. The figure shows little obvious effects due to the air sparging/SVE operation near MW-38, but some effects are plausible at the SZMP-01 location. The fact that the third sampling event confirmed an elevated PFS concentration may be indicative that either (1) the sampling procedures used during the initial sampling event lost LNAPL from the intact cores or (2) LNAPL was pushed into this area at the fringe of the zone of influence of two ASL wells. Since the "accumulation" is small in comparison to the peak LNAPL saturation observation of 11-percent, the former explanation for the increasing data trend is considered more likely.

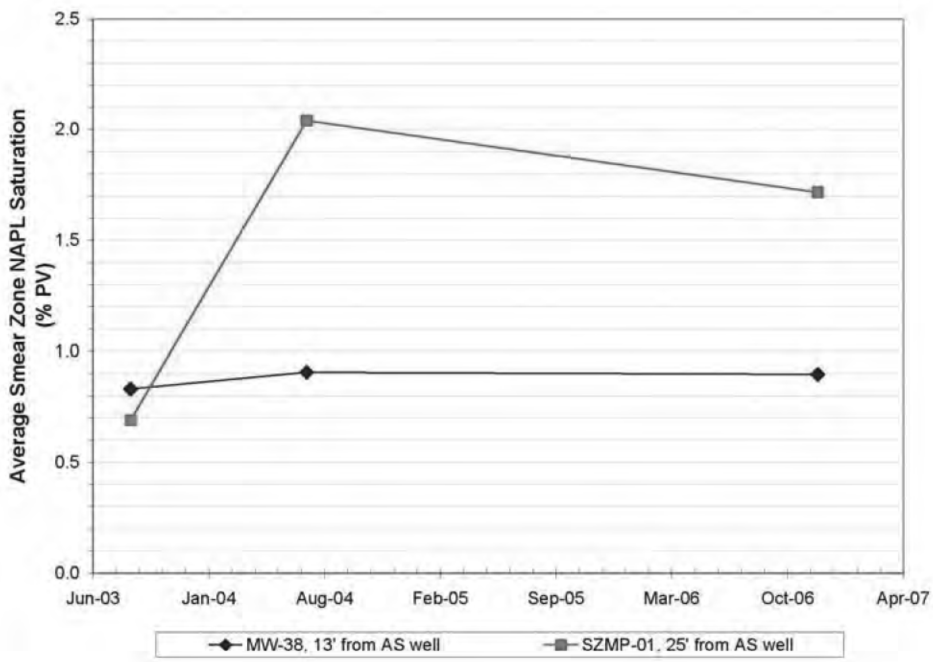

Figure 7
Temporal Change in PFS Concentration Before and After air sparging/SVE

Distal Correlation of LNAPL Saturation and TRPH Results

Figure 8 presents the UVOST™, average smear zone LNAPL saturation profile, and TRPH results with distance from an ASL well in the former pilot study area which has been treated for a combined total of 20 months. Similar to the data reduction method used for the UVOST™ data, the LNAPL saturation data was normalized to an average value for each borehole to normalize the data and screen out vertical changes in LNAPL distribution due to water table fluctuation. TRPH data are from the heart of the LNAPL smear zone in all borings at approximately 45 ft bgs. The figure shows that the UVOST™ and LNAPL saturation data show little change due to nearby air sparging. As discussed above, their values appear more related to site- and/or measurement method-specific variability than treatment system operation. The TRPH values, however, do show a distinct correlation. Nearest the air sparging well, the TRPH value of 170 mg/kg is below the Florida Department of Environmental Protection criteria for protection of groundwater of 340 mg/kg. As the distance increases, the TRPH concentration increases up to a maximum of 948 mg/kg at 25-feet away. The duplicate sample collected at this same location and depth interval was 3,700 mg/kg. Therefore, soil sampling heterogeneity is present and unsure if duplicate sampling closer to the air sparging well would have voided the correlation. However, this analytical data does provide one line-of-evidence that the air sparging/SVE system is reducing the concentration of the LNAPL. Additional insight into this observation is provided below.

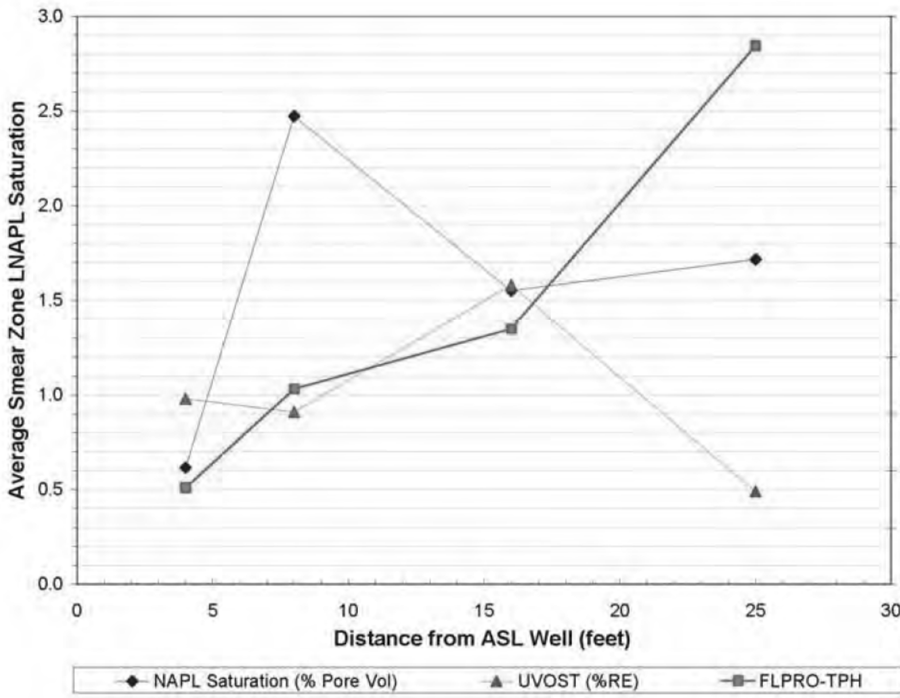

Figure 8
Close-In Radial UVOST™, LNAPL Saturation, and TRPH Results

Temporal Comparison of TPH Speciation Results

The TPH speciation results provide additional insight into the effects of air sparging on the chemical composition of the LNAPL and show that it was not displaced, but rather treated. Table 3 presents the results of the pre- and post-treatment samples analyzed for BTEX, PAHs, and the aliphatic and aromatic fractions of TPH. This comparison of samples, collected from the same vicinity of the site, shows that the air sparging/SVE system is effective at reducing the aromatic fraction of the TPH (including BTEX) and compounds with fewer than 10 carbons. This is consistent with the expectation that air sparging/SVE is initially most effective for reducing the volatile and small carbon number compounds.

Conclusions

A systematic method measuring multiple lines-of-evidence was used to test a hypothesis and assess the effects of air sparging/SVE on in situ LNAPL. The weight of evidence collected indicates that after 20 months of operation, the air sparging/SVE system has had little effect on LNAPL saturations. There was no strong evidence of LNAPL depletion near or LNAPL

Table 3

Temporal Change in TPH Speciation Before and After air sparging/SVE Operation

	Smear Zone at 45 ft bgs Soil Sample Average Values	
Parameter	Pre-Treatment (Oct-03)	Post-Treatment (Dec-06)
Est. Wt. Percentage Aromatic TPH	8.5%	0%
Est. Wt. Percentage Aliphatic TPH	91%	100%
Est. Wt. Percentage Less than C10	67%	18%
Est. Wt. Percentage Xylenes	1.2%	0.073%
Est. Wt. Percentage Total BTEX	1.5%	0.074%
Est. Wt. Percentage Naphthalene	0.0092%	0.0041%
% BTEX Degraded (compared to Fresh JP4)	69%	98%

accumulation at the extents of influence of the air sparging wells. Therefore, at this site, there appears to be no concern of lateral LNAPL mobility and air sparging/SVE as a stand-alone remediation technology remains viable and cost-effective.

Where LNAPL depletion was noted adjacent to air sparging wells, chemical data confirms the removal of aromatic and small carbon number compounds and attests to the effectiveness of air sparging/SVE for treatment of the chemical compounds which pose risk to human health and the environment.

The study uncovered the fact that site-specific and measurement method-specific techniques, however, contain a large degree of variability. This variability may act to mask real changes in LNAPL and the ability to measure LNAPL treatment. Therefore, it is important that this technique be applied at a time when significant mass removal has been documented. At the time of this study, only 20-percent of the mass was estimated to have been removed. It was apparently too early to expect the LIF survey and LNAPL saturation to effectively measure this reduction. Additional air sparging/SVE treatment continues and this method will be revisited mass removal nears a plateau. Additional research into the maximum potential reduction in LNAPL saturation via air sparging/SVE is needed to ascertain the value of continued use of these measurement techniques for assessing LNAPL treatment.

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Biographical Sketches

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Paper F-054, in: Bruce M. Sass (Conference Chair), *Remediation of Chlorinated and Recalcitrant Compounds—2008.* Proceedings of the Sixth International Conference on Remediation of Chlorinated and Recalcitrant Compounds (Monterey, CA; May 2008). ISBN 1-57477-163-9, published by Battelle, Columbus, OH, www.battelle.org/chlorcon.

Biosparging Using Horizontal Wells at Columbus AFB, MS

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ABSTRACT: In response to a fuel release in the vicinity of bulk storage tanks and the pump station at Site SS-26, Columbus AFB, three horizontal directionally drilled (HDD) biosparge wells were installed in late 2004. Depth to water at the site ranges from about 5 to 15 feet bgs, and subsurface lithology consists of silty clay overburden to a depth of approximately 10 feet, underlain by sand and gravel. Prior to activation of the biosparge system, LNAPL skimming operations using automatic electric pumps were conducted for about 14 months. Skimming operations recovered approximately 50 gallons of LNAPL during this period; however, this approach was only effective immediately adjacent to the recovery wells. Even while skimming, free product in wells/piezometers in the fuel release area ranged from about 0.5 feet to 2.5 feet. In early 2006, the biosparge system was activated. Soil vapor extraction was also initiated in selected recovery wells formerly used for skimming operations. Bubbling in monitoring wells screened in the saturated zone was observed at least 40 feet from the HDD wells. During the first year of operation, the biosparge and SVE system removed an estimated 4500 pounds of JP-8 from the subsurface via mass transfer ("stripping"). Additional fuel (unmeasured) was removed via in-situ aerobic biodegradation. LNAPL thicknesses in monitoring wells decreased from maximum of 2.5 feet to a maximum of about 0.5 feet, after the first year, and less than 0.2 feet after two years of operation. The system will continue to operate through the first half of 2009 in order to achieve the regulatory standard of no measurable LNAPL in monitoring wells. Monitoring will occur for at least three months after system shutdown to test for potential LNAPL rebound.

INTRODUCTION

Columbus Air Force Base (CAFB) occupies about 5,000 acres and is situated approximately six miles north of Columbus, Mississippi. Spill site SS-26 is an aboveground tank farm (bulk storage facility) located in the south-central portion of the Base. Site SS-26 began operations in the late 1950s. Surface topography at the site is generally flat, but includes a five to six foot increase in elevation near tank berms. The site is bounded on the south by an unnamed creek, which acts as a receptor for groundwater discharge.

SS-26 currently includes four tanks, ranging in size from 100,000 gallons to 630,000 gallons in capacity. There are no USTs located in the area. Three tanks (Nos. 2, 3 and 6) are currently used for fuel storage. Jet propellant (JP)-4 and JP-8, diesel fuel, coal, and other types of fuel oil have been unloaded and stored at the site since the tank farm began operation. Fuel is currently offloaded to the fill stands from tanker trucks daily. In 1994, CAFB discontinued the use of JP-4 and began using JP-8 exclusively, because of the greater stability and lower flammability of JP-8.

The impacted water bearing zone of concern at the site, the Surficial Aquifer, consists of dense silty clay from ground surface to approximately 5 to 10 feet bgs, underlain by highly transmissive coarse gravel and sand (Figure 1). The sand and gravel zone averages 10 feet thickness and overlies a sandy-silty-clay semi-confining layer of the Eutaw Aquifer, which occurs at approximately 20 ft bgs. The shallow impacted water table at SS-26 occurs within the sand and gravel zone at 5 to 15 ft bgs, depending on location relative to the tank berms. The average hydraulic conductivity of the Surficial Aquifer is 4.4×10^{-3} cm/sec.

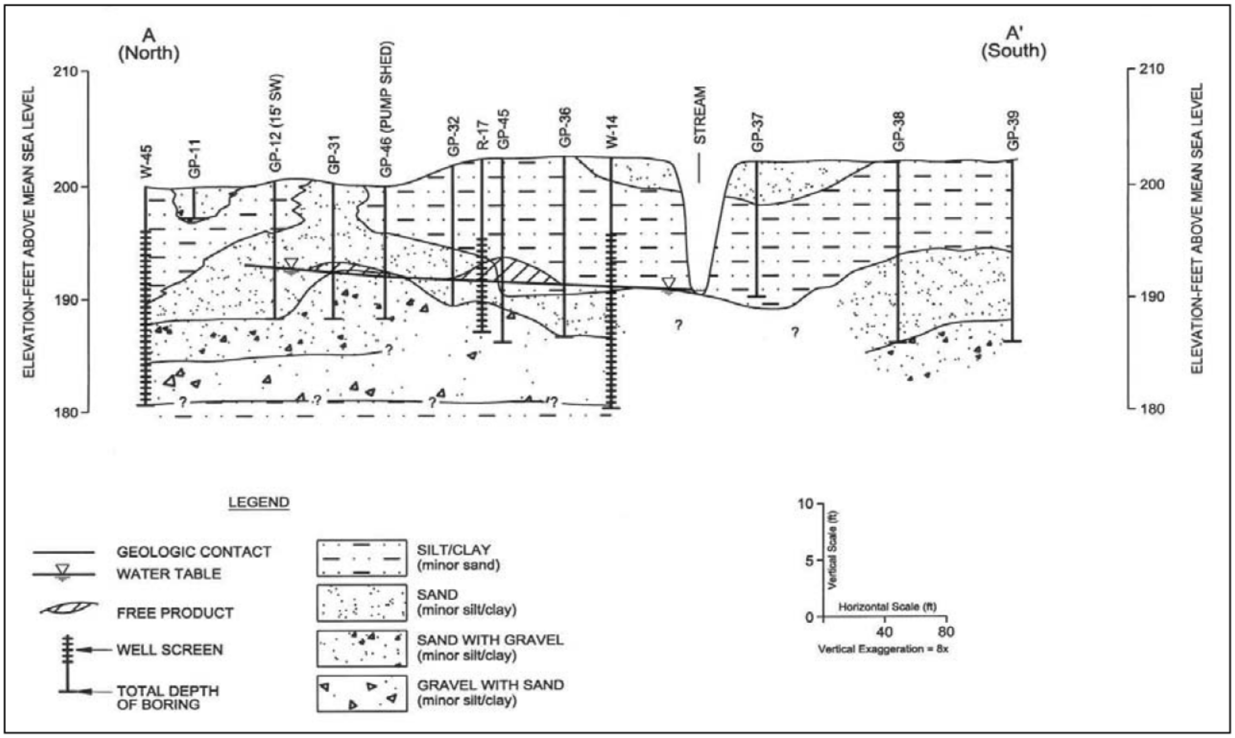

FIGURE 1. Generalized cross section.

There are no reports of leaks or spills or emergency response activity at the tank farm. It's likely that minor releases occurred from tanks, conveyance piping, and fuel transfer operations during normal operations. Base records indicate that LNAPL was initially encountered in several monitoring wells within the facility in the late 1980s, and fuel seepage was also observed from the bank of the adjacent creek.

Beginning in 1995, various remediation technologies were used to address LNAPL at Site SS-26. The original system consisted of a network of multi-phase extraction wells, submersible pumps, and air injection wells. Remediation efforts focused on the highly impacted area at the western portion of Site SS-26. The multi-phase system was subsequently converted to a bioslurping system in 1999, using suction tubes installed for vacuum extraction of total fluids. Over the next four years, that system succeeded in removing LNAPL from the western portion of the site (Figure 2 and Figure 3). A new fuel release, confirmed by pressure testing, occurred in the central portion of Site SS-26 in the 1999-2001 timeframe; LNAPL thicknesses measured in monitoring wells subsequently began increasing near the Pump Station and Bulk Storage Tank 3.

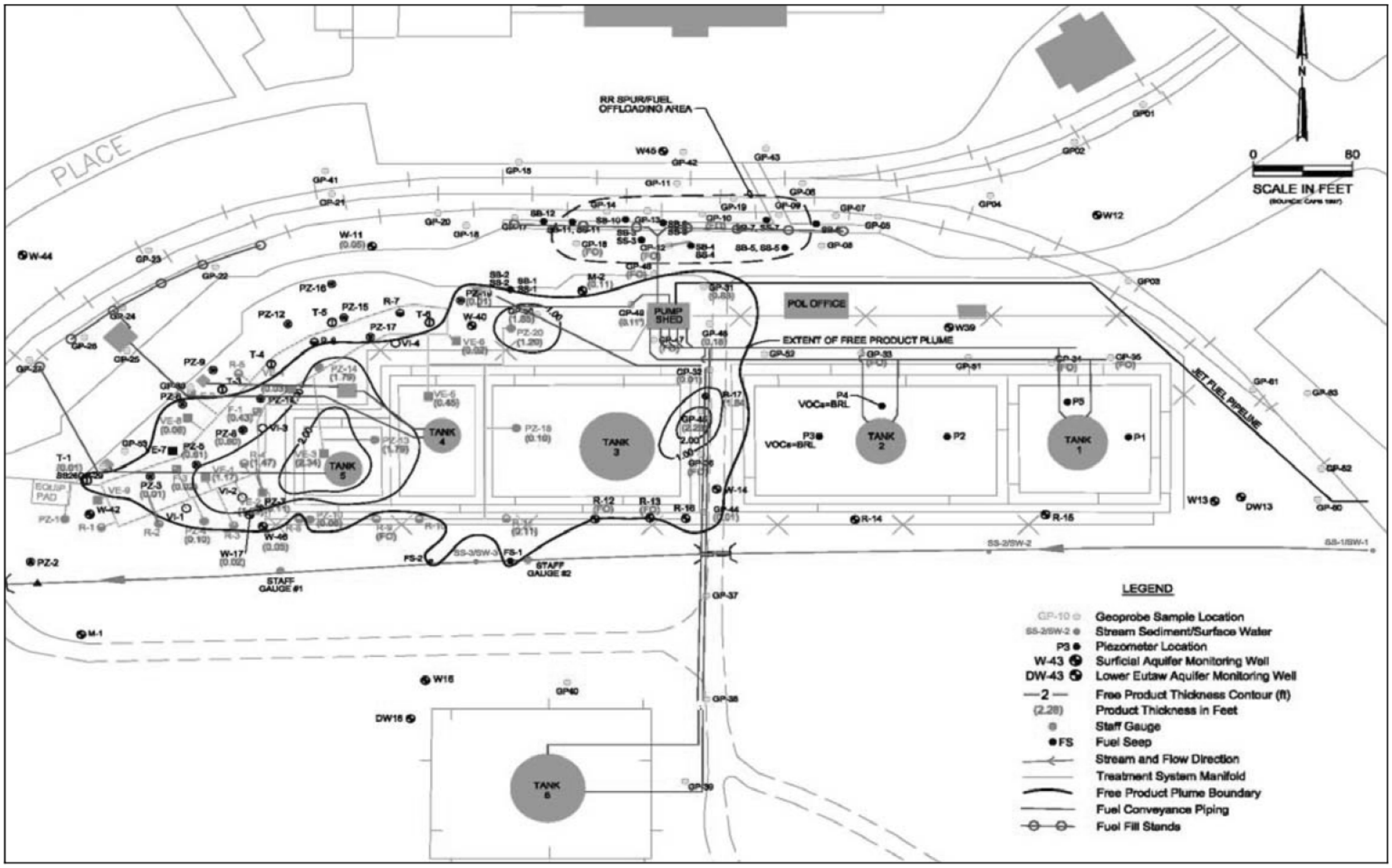

FIGURE 2. LNAPL thickness at SS-26 in March, 2000.

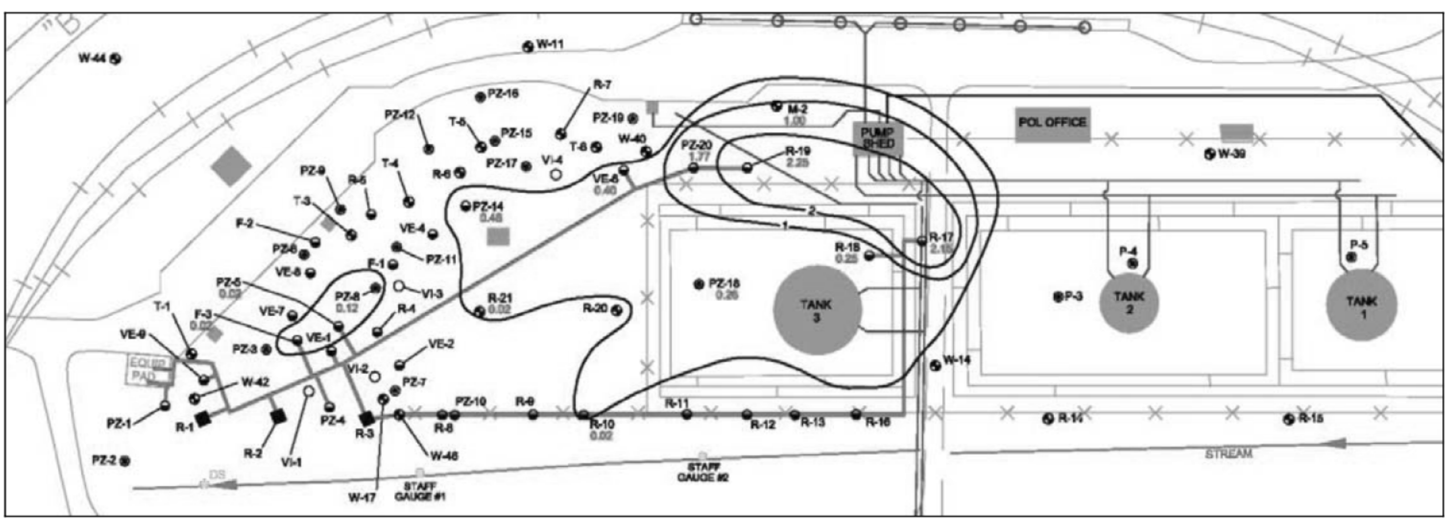

FIGURE 3. LNAPL thickness at SS-26 in January, 2004.

METHODS AND MATERIALS

As in the case of the western plume, the remedial objective for the new release was to remove measurable LNAPL in monitoring wells. However, logistical issues associated with addressing LNAPL beneath Tank no. 3, fuel conveyance lines, pump station, etc. influenced the decision to install three HDD biosparge wells in late 2004. A directional well multi-phase recovery system was also considered, but collecting and treating groundwater and LNAPL was cost prohibitive. The objective of biosparging was to remove lighter fractions of the jet and diesel fuel via in-situ mass transfer (stripping), with subsequent aerobic biodegradation of higher molecular weight hydrocarbons. The heavier fractions of jet fuel were less likely to accumulate in monitoring wells or seeps into the creek.

The HDD wells were constructed of three-inch diameter steel piping, including 250 feet of slotted pipe, installed to a depth of 18 to 22 feet bgs. The screens contained an open area of approximately 0.08% (longitudinal slots, 0.020-inch width). Total length of the continuous (double-ended) HDD wells was about 600 feet, including approximately 150 feet of entry and 200 feet of exit casing. An extended "tail" was required to avoid Tank #2 and other surface and/or near surface obstructions. The wells extend from west-northwest to east-southeast, roughly perpendicular to groundwater flow, which is south-southwest (toward the creek). Spacing between the HDD wells was 40 to 50 feet.

At the request of the state regulatory agency, LNAPL skimming was conducted for approximately 14 months using automatic electric pumps, prior to activation of the biosparge system. Although skimming operations recovered approximately 50 gallons of LNAPL, the technique was not effective at removing bulk LNAPL from the impacted area. There were negligible decreases in LNAPL thickness in wells near Tank 3 and the pump station. Subsequently, a series of thirteen, one inch piezometers were installed to improve characterization of the LNAPL plume. LNAPL in wells/piezometers located in the Tank 3/pump station area ranged in thickness from 0.5 feet to 2.5 feet. In early 2006, the biosparge system was activated, with SVE/bioslurping from the eight former recovery wells (screened from 8 to 18 feet bgs). The layout of the system is shown in Figure 4.

Compressed air for biosparging was provided by three positive displacement rotary lobe blowers, each providing 250 cfm at 11 psi, and powered by individual 30 hp electric motors. The system was operated with each of the three blowers pressurizing an individual biosparge well to minimize air "short-circuiting" to a lower pressure well(s).

RESULTS AND DISCUSSION

Biosparging commenced in March of 2006, with simultaneous bioslurping from eight recovery wells, shown in Figure 4. The HDD wells were initially designed for one cfm per foot of slotted pipe, or approximately 250 cfm per well. However, during initial operation, the injection air flow rate exceeded the capacity of the formation to transmit sparged vapor to the atmosphere and/or of the SVE/bioslurping wells to capture it. Groundwater was displaced vertically to ground surface in several areas. Displaced groundwater and air pressure also forced the expandable caps off numerous monitoring wells. Groundwater also overflowed the tops of the wells, most of which were completed as "stick-ups" at least three feet above grade. The sustained, exaggerated "mounding" phase appears to be caused by the relatively low permeability silty-clay overburden, which impeded the release of sparged air to the atmosphere. Accordingly, air flow rates to the HDD wells were throttled to approximately 0.4 cfm per foot (100 cfm). Flow throttling controlled excessive water table rise and groundwater discharge from monitoring wells. In addition, vapor "breathers," constructed of porous polyethylene, were installed on the eight SVE/bioslurp wells in June 2006 to allow trapped air to escape, further reducing groundwater surfacing and water table "mounding."

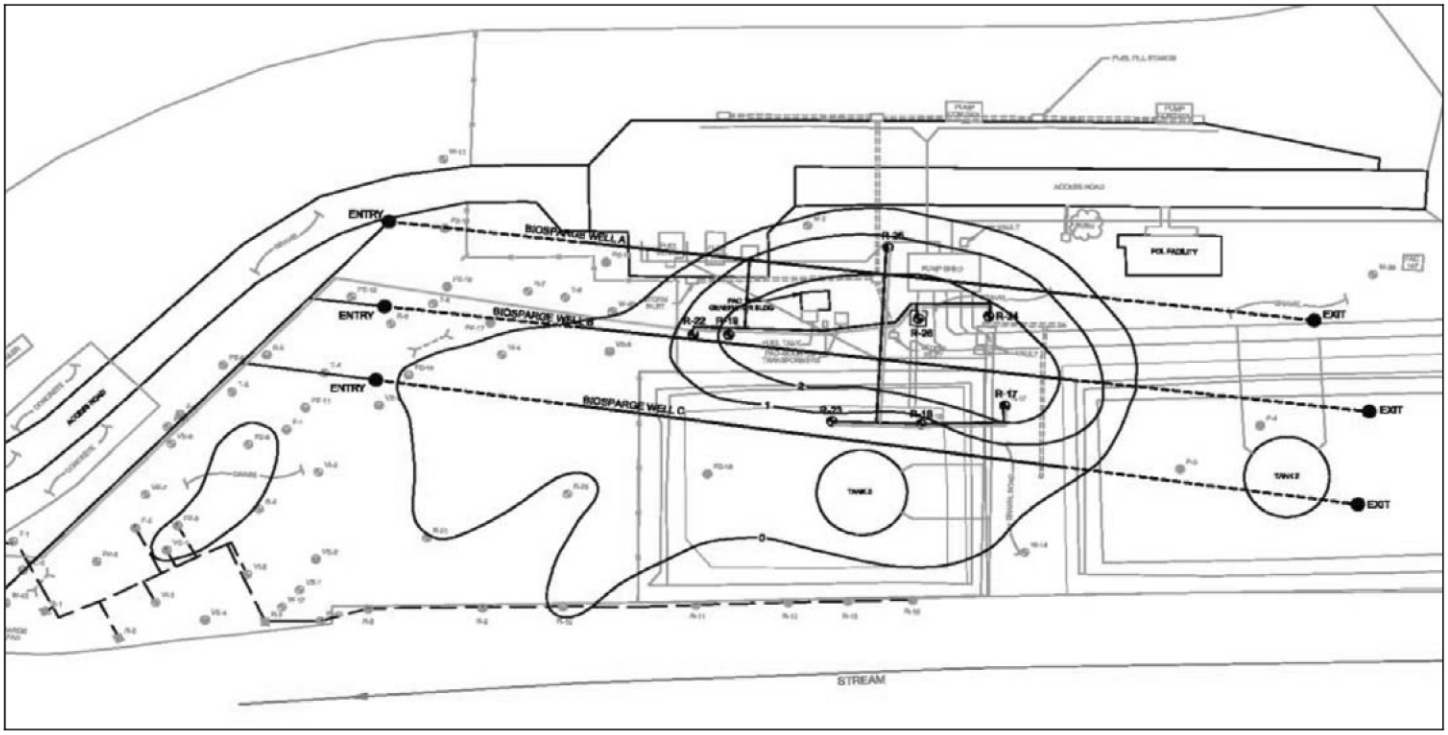

FIGURE 4. Layout of HDD wells and vertical SVE wells at Site SS-26.

During the first year of operation (March 2006 to March 2007), the biosparge and SVE system removed an estimated 4500 pounds of JP-8 from the subsurface via mass transfer ("stripping"). Additional removal of petroleum was assumed to occur via in-situ aerobic biodegradation. The rate of mass recovery using biosparging combined with SVE/bioslurping was approximately four times that of bioslurping alone (CH2M HILL, 2005). LNAPL thicknesses in wells decreased from maximum of 2.5 feet to a maximum of about 0.5 feet. Observations of bubbling in monitoring wells screened in the saturated zone indicated a sparge zone of influence of at least 40 ft on either side of the wells (verified by operating the wells individually). There was no evidence to suggest LNAPL was displaced a significant distance. However, a few monitoring wells adjacent to the creek exhibited sporadic levels of measurable LNAPL (generally 0.2 feet or less), likely associated with residual LNAPL displaced by sparging. These occurrences were addressed by targeted bioslurping from recovery wells in that area.

During the second year of operation (March 2007 to March 2008), LNAPL thicknesses in monitoring wells continued to decrease. Of the twenty-three monitoring wells and nine piezometers gauged, LNAPL was detected in only three wells, at less than 0.1 ft, and two piezometers, at less than 0.2 ft. Air sparge flow rates gradually declined during the second year of operation to approximately 0.1 cfm/foot (30 cfm), due to corrosion/scaling of the mild steel pipe. Despite the drop in flow rate, relatively uniform flow across the wells was maintained, as evidenced by pressure at the distal end of the well and bubbling in all monitoring wells within the target treatment area.

The biosparge and SVE/bioslurp systems are expected to continue operation through the first half of 2009 in order to achieve the regulatory standard of no measurable LNAPL. Post-operation monitoring will continue for at least three months to confirm that "rebound" does not occur.

CONCLUSIONS AND LESSONS LEARNED

Biosparging using HDD was shown to be an effective method for LNAPL removal via in-situ mass transfer (stripping) and inferred aerobic biodegradation. Presence of a low permeability silty-clay layer above the sparge zone resulted in exaggerated water table "mounding" (displacement), and effectively limited sparge air flow rates to less than 0.5 cfm per ft of well screen. However, because of the low open area selected for the screen design, the wells continued to achieve relatively uniform flow across the screen interval. The combination of biosparging and bioslurping proved to be highly effective, in terms of recovering vapor phase mass and controlling LNAPL seeps to the creek.

Directional drilling through the high transmissivity gravel at SS-26 with a 24,000-pound rig proved challenging. Biodegradable drilling fluid was used; however, gravel and sand rapidly collapsed around the well materials during pull-back, seizing the pipe. A larger, 60,000-pound machine (Figure 5) was subsequently mobilized to the site, which was able to pull the well materials through, and complete the work. Commonly used material, such as HDPE, would have likely failed during installation. Stainless steel was not used because of budget constraints, although the corrosion resistance of stainless steel would have reduced corrosion. Progressive decreases in sparge air flow over time, with corresponding increases in wellhead pressure, were attributed to corrosion of the slots, later verified with a video survey and brushing/jetting of the wells. Physical treatment (wire brushing) increased air flow, but did not significantly reduce wellhead pressure or restore original performance. Chemical treatments had little effect on air flow or wellhead pressure. A more aggressive phase of physical well cleaning using a small HDD drill rig is being considered.

Use of positive displacement blowers was originally considered appropriate for this application, because of the relatively low hydrostatic head (approximately 10 feet of water). As previously indicated, corrosion of the well slots caused wellhead pressures to increase, from approximately 11 psi to over 14 psi, which is the practical limit of the blowers. Exhaust gas temperatures also exceeded 320ºF during the summer months, and most of the air flow had to be vented to the atmosphere to prevent overload conditions. In hindsight, use of a rotary screw compressor would have offered greater operational flexibility.

FIGURE 5. HDD well installation (Tank No. 3 in background) at Site SS-26.

REFERENCES

CH2M HILL, 2001-2007, *Columbus AFB SS-26 Performance Monitoring Reports*

The Use of Biosparging to Remove LNAPL at Selma 3

Prepared By: Bob Lunardini, PE

February 28, 2017

In 2010, a biosparge system was installed at Kinder Morgan Southeast Terminals LLC (KMST) Selma Terminal #3 (Site) to remove light non-aqueous phase liquid (LNAPL) and treat dissolved phase petroleum contaminants in groundwater in and around the loading rack at the facility. This white paper presents background information and summarizes the results of six years of operational data.

1 Background

The remediation activities were conducted in accordance with a Corrective Action Plan (CAP) approved by the North Carolina Department of Environmental Quality (NCDEQ) in October 2008 (URS, Oct 2008). The goals defined in the CAP are to:

- Remove LNAPL;
- Prevent impacted groundwater from migrating offsite; and
- Prevent impacted groundwater from migrating to surface water.

1.1 Site Description

The Site is located at 4383 Buffalo Road in Selma, Johnston County, North Carolina. The Site operates as a bulk fuel terminal and is located immediately northwest of the intersection of Buffalo Road and River Road. Surrounding land parcels are commercial/industrial, which includes bulk fuel terminals, petroleum pumping stations, and several trucking/transport companies. A USGS location map showing the Site and surrounding area is provided as **Figure 1**. A Site map showing prominent Site features (monitoring well locations, loading rack, vehicle fueling dispenser, oil/water separator, retention pond, and former underground storage tank (UST) area) is provided as **Figure 2**. Well construction details for onsite monitoring wells are presented on **Table 1**.

1.2 Release History

Three releases are documented to have occurred at the Site (URS, June 2008). The first release was originally reported by Phibro Energy to NCDEQ on January 3, 1994 (Incident Number 13651). The report was made due to the discovery of elevated dissolved concentrations of petroleum constituents detected in groundwater near the loading rack.

The second release was reported by Valero to NCDEQ on November 5, 1999. The source of this release was a leak in a product line connecting the tank farm to the loading rack, which was detected during a pressure test performed by Valero. This release resulted in detectable LNAPL within the monitoring wells located in the vicinity of the loading rack (source area).

A third release was reported to NCDEQ on June 12, 2006 by KMST. The release was discovered due to the detection of LNAPL in monitoring well MW-B (now MW-44) in June 2006. From June 8 to 10, 2006, a pressure test was conducted and a leak was detected in a flange on an unused premium gasoline line located between the main manifold (outside the bermed area) and the tank manifold inside the bermed area. The remaining premium gasoline within the line was evacuated and impacted soils adjacent to the manifold and the premium gasoline product line were removed.

LNAPL has been collected from observation wells since 2004 by adsorbent socks, aggressive fluid/vapor recovery (AFVR) events, and hand bailing techniques. Four phases of site investigation were completed between February 2005 and November 2007. Reports submitted to NCDEQ during this period documented assessment and remedial actions at the Site that included groundwater sampling and analysis, soil excavation around the gasoline line, LNAPL gauging and recovery, and water supply well sampling. Subsequently, a CAP was developed and submitted to NCDEQ in October 2008. The CAP recommended the installation of biosparge and phytoremediation systems as well as the implementation of periodic AFVR events in remote areas of the site.

1.3 Current Status

Twenty-three (23) vertical sparge wells and five (5) horizontal sparge wells were installed in October 2009 and March 2010, respectively. The biosparge system became fully operational on May 14, 2010. The remediation system layout is shown on **Figure 3**. AFVR events were performed beginning in 2009 and stopped in 2010, after three consecutive events with low LNAPL recovery. Groundwater is collected from key monitoring wells semiannually and analyzed for benzene, toluene, ethylbenzene, and total xylenes (BTEX), methyl tert-butyl ether (MTBE), and naphthalene by USEPA Method 8260B.

1.4 Geology

Site soils consist of sand, silty sand, and gravel, and were encountered to a depth of approximately 15 – 25 feet. These deposits are underlain by light greenish-gray silt, which is weathered saprolite of Piedmont rocks.

1.5 Hydrogeology

Depth to groundwater generally ranges from 2 to 10 feet below ground surface (bgs). Groundwater flow at the site is generally south to southwest.

2 Biosparge Results

2.1 LNAPL

Historically, LNAPL has been detected in 22 wells on and surrounding the Site since February 2005 including 14 LNAPL observation wells (FP-1 through FP-14) and MW-5, MW-6, MW-24, MW-25, MW-26, MW-B/MW-44, MW-41, MW-42, and RW-3. The largest recorded LNAPL thickness measured at the Site was 4.35 feet in RW-3 in February 2005.

Prior to biosparge system startup the largest LNAPL thickness was 2.81 feet in MW-24 in March 2010. After one year of biosparging LNAPL was effectively removed from the Site monitoring wells. In observation well FP-7 LNAPL remained for three years. LNAPL was last detected in FP-7 in May 2013. LNAPL has not been detected in any site monitoring well or observation well since. The most recent gauging event occurred in November 2016. Data from the gauging events is presented in **Table 2**.

Plots of LNAPL thickness over time for four of the wells with historically high LNAPL levels (FP-7, MW-6, MW-24, and MW-26) are shown on **Figure 4**. All of these wells are located near the source area. The data indicate no LNAPL present since 2011 in the monitoring wells and since 2013 in FP-7.

There is no evidence that biosparging spread LNAPL outward. If it did one would expect to see LNAPL in the source area perimeter wells at some point after startup or see a spread in dissolved concentrations which is also not observed.

2.2 Groundwater

Historic dissolved phase concentrations in groundwater are shown in **Table 3**. Data from monitoring wells near the source area indicate dissolved phase contaminants are non-detect. Plots of historical Benzene concentrations in groundwater collected from MW-5, MW-6, MW-24, and MW-26 are shown on **Figure 5**. Benzene reductions have been observed throughout the site with the majority of wells at NCDEQ 2L standards (1ug/L benzene).

3 Conclusions

A biosparge remediation system with five horizontal wells and 23 vertical wells was installed and has operated successfully since its activation on May 14, 2010.

After one year of operation LNAPL was effectively removed from the site. After three years of operation LNAPL was completely removed from the site. LNAPL was last detected in May 2013. There is no evidence that biosparging spread LNAPL outward.

Groundwater analytical concentrations are stable or decreasing compared to historical results. Results in the source area indicate dissolved phase constituents in groundwater are non-detect.

In the source area biosparging has effectively removed LNAPL and remediated dissolved phase contaminants in groundwater.

4 References

Comprehensive Site Assessment Report Addendum, URS Corporation – North Carolina, June 26, 2008.

Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, United States Environmental Protection Agency, June 2008.

Corrective Action Plan, URS Corporation – North Carolina, October 9, 2008.

TABLES

TABLE 1
MONITORING WELL CONSTRUCTION DETAILS
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date Installed	Casing Inner Diameter (inches)	Screened Interval (feet bgs)	Total Depth (feet bgs)	TOC Elevation (feet)
MW-1	07/29/03	2	2.0 to 12.0	12.0	166.67
MW-2	07/29/03	2	1.5 to 12.0	12.0	169.28
MW-3	07/30/03	2	2.0 to 13.0	13.0	168.69
MW-4	07/30/03	2	1.5 to 12.0	12.0	170.34
MW-5	07/30/03	2	2.0 to 12.0	12.0	168.85
MW-6	04/07/94	2	2.0 to 12.0	12.0	168.46
MW-7	04/07/94	2	1.5 to 11.5	11.5	167.61
MW-8	04/07/94	2	1.5 to 11.5	11.5	165.47
MW-9	04/07/94	2	2.0 to 12.0	12.0	169.53
MW-11D	04/07/94	2	27.5 to 32.5	32.5	166.65
MW-12D	04/07/94	2	34.5 to 39.5	39.5	171.09
MW-13	12/14/94	2	2.5 to 10.0	10.0	169.32
MW-14	12/14/94	2	2.5 to 10.0	10.0	170.66
MW-15	12/14/94	2	2.5 to 10.0	10.0	169.62
MW-16	12/15/94	2	1.0 to 5.0	5.0	162.34
MW-18	--	2	--	7.0	160.74
MW-19	09/25/97	2	5.0 to 10.0	10.0	167.14
MW-20	12/11/98	2	2.0 to 10.0	10.0	165.57
MW-21	12/11/98	2	2.0 to 10.0	10.0	164.27
MW-24	--	2	--	--	173.93
MW-25	--	2	--	--	173.52
MW-26	--	2	--	--	172.99
MW-27	04/29/04	2	5.5 to 10.0	10.0	169.38
MW-28	04/29/04	2	1.0 to 11.0	11.0	169.16
MW-29	04/29/04	2	0.5 to 10.5	10.5	171.21
MW-30	04/29/04	2	4.5 to 9.5	9.5	169.23
MW-31	04/29/04	2	3.5 to 13.5	13.5	171.87
MW-32	04/29/04	2	4.0 to 9.0	9.0	167.88
MW-33	04/29/04	2	5.0 to 10.0	10.0	167.19
MW-34	03/22/06	2	3.0 to 13.0	13.0	167.87
MW-35	03/22/06	2	3.0 to 13.0	13.0	160.28
MW-36	03/22/06	2	3.0 to 13.0	13.0	160.68
MW-37	03/22/06	2	3.0 to 13.0	13.0	168.86
MW-38	03/19/07	2	3.0 to 13.0	13.0	164.61
MW-39	03/20/07	2	3.0 to 13.0	13.0	165.91
MW-39I	03/20/07	2	20.0 to 25.0	25.0	165.94
MW-39D	12/07/07	2	35.0 to 40.0	40.0	166.08
MW-40	03/19/07	2	3.0 to 13.0	13.0	168.60
MW-41	03/19/07	2	3.0 to 13.0	13.0	168.24
MW-42	03/19/07	2	3.0 to 13.0	13.0	168.90
MW-43	03/20/07	2	3.0 to 13.0	13.0	168.23
MW-43I	03/20/07	2	18.0 to 23.0	23.0	168.36
MW-43D	12/06/07	2	34.0 to 39.0	39.0	168.23
MW-44	03/21/07	2	3.0 to 13.0	13.0	169.22
MW-45	03/21/07	2	3.0 to 13.0	13.0	169.94
MW-46	03/21/07	2	3.0 to 13.0	13.0	168.65

TABLE 1
MONITORING WELL CONSTRUCTION DETAILS
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date Installed	Casing Inner Diameter (inches)	Screened Interval (feet bgs)	Total Depth (feet bgs)	TOC Elevation (feet)
MW-47	12/10/07	2	3.0 to 13.0	13.0	164.06
MW-48	12/10/07	2	3.0 to 13.0	13.0	165.06
MW-49	12/12/07	2	3.0 to 13.0	13.0	166.32
MW-50	12/12/07	2	3.0 to 13.0	13.0	165.40
MW-51	12/12/07	2	3.0 to 13.0	13.0	163.76
MW-C	08/24/04	2	3.5 to 8.5	8.5	167.36
MW-E	08/24/04	2	3.5 to 8.5	8.5	170.21
MW-F	08/24/04	2	3.5 to 8.5	8.5	170.67
RW-3	03/25/04	2	3.5 to 13.5	13.5	168.19
FP-1	04/29/04	2	2.5 to 7.5	7.5	169.57
FP-3	04/29/04	2	2.5 to 7.5	7.5	168.84
FP-7	04/29/04	2	2.5 to 7.5	7.5	169.36
FP-8	04/29/04	2	2.5 to 7.5	7.5	169.05
FP-10	04/29/04	2	2.5 to 7.5	7.5	169.11
FP-11	04/29/04	2	2.5 to 7.5	7.5	168.91
FP-13	04/29/04	2	2.5 to 7.5	7.5	167.56
FP-15	04/29/04	2	2.5 to 7.5	7.5	168.72
FP-17	04/29/04	2	2.5 to 7.5	7.5	167.47
FP-18	04/29/04	2	5.0 to 10.0	10.0	168.61
FP-19	04/29/04	2	3.0 to 8.0	8.0	167.75
PZ-1	03/20/07	2	3.0 to 13.0	13.0	161.72
PZ-2	03/20/07	2	3.0 to 13.0	13.0	162.42
PZ-3	03/20/07	2	3.0 to 13.0	13.0	161.74
PZ-4	03/20/07	2	3.0 to 13.0	13.0	162.22
PZ-5	08/05/10	2	3.0 to 13.0	13.0	164.89
PZ-6	08/05/10	2	3.0 to 13.0	13.0	163.27
PZ-7	08/05/10	2	3.0 to 13.0	13.0	163.64
PZ-8	08/05/10	2	3.0 to 13.0	13.0	163.59
PZ-9	08/05/10	2	3.0 to 13.0	13.0	162.11

Notes:
bgs - below ground surface
TOC - top of casing
-- - unknown
Elevations based on vertical datum NAVD 88 (GEOID 03)
TOC elevations were re-surveyed by Taylor Wiseman & Taylor on July 15, 2016 with the exception of FP-1, FP-3, FP-7, FP-8, FP-10, FP-11, FP-15, FP-17, FP-18, and FP-19.
Monitoring wells MW-21, MW-47, MW-48, MW-49, MW-50, and MW-51 have been abandoned.

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
AS-1	2/8/2005	NS	ND	4.95	ND	NS	NS
AS-2	2/8/2005	NS	ND	4.59	ND	NS	NS
AS-3	2/8/2005	NS	ND	4.80	ND	NS	NS
AS-4	2/8/2005	NS	ND	4.47	ND	NS	NS
FP-01	2/10/2005	169.57	4.25	4.29	0.04	165.28	165.32
FP-01	2/22/2005	169.57	4.82	4.85	0.03	164.72	164.75
FP-01	3/14/2005	169.57	4.23	4.24	0.01	165.33	165.34
FP-01	3/16/2005	169.57	4.23	4.24	0.01	165.33	165.34
FP-01	4/25/2005	169.57	ND	3.53	ND	166.04	166.04
FP-01	5/26/2005	169.57	ND	4.52	ND	165.05	165.05
FP-01	6/24/2005	169.57	5.45	5.49	0.04	164.08	164.12
FP-01	7/25/2005	169.57	5.29	5.36	0.07	164.21	164.27
FP-01	8/22/2005	169.57	ND	7.21	ND	162.36	162.36
FP-01	10/13/2005	169.57	ND	6.54	ND	163.03	163.03
FP-01	11/28/2005	169.57	ND	6.42	ND	163.15	163.15
FP-01	12/16/2005	169.57	ND	3.77	ND	165.80	165.80
FP-01	1/31/2006	169.57	ND	3.96	ND	165.61	165.61
FP-01	2/24/2006	169.57	ND	4.03	ND	165.54	165.54
FP-01	4/4/2006	169.57	ND	4.55	ND	165.02	165.02
FP-01	6/6/2006	169.57	ND	4.41	ND	165.16	165.16
FP-01	10/3/2006	169.57	ND	4.91	ND	164.66	164.66
FP-01	2/21/2007	169.57	ND	3.21	ND	166.36	166.36
FP-01	5/17/2007	169.57	ND	6.07	ND	163.50	163.50
FP-01	8/15/2007	169.57	ND	7.24	ND	162.33	162.33
FP-01	12/5/2007	169.57	ND	7.25	ND	162.32	162.32
FP-01	12/13/2007	169.57	ND	4.81	ND	164.76	164.76
FP-01	3/27/2008	169.57	ND	3.21	ND	166.36	166.36
FP-01	6/1/2008	169.57	ND	3.83	ND	165.74	165.74
FP-01	6/11/2008	169.57	ND	3.83	ND	165.74	165.74
FP-01	9/3/2008	169.57	ND	5.58	ND	163.99	163.99
FP-01	11/6/2008	169.57	4.04	4.12	0.08	165.45	165.52
FP-01	11/20/2008	169.57	2.99	3.08	0.09	166.49	166.57
FP-01	2/27/2009	169.57	4.12	4.12	0.00	165.45	165.45
FP-01	5/27/2009	169.57	ND	4.57	ND	165.00	165.00
FP-01	7/16/2009	169.57	ND	5.44	ND	164.13	164.13
FP-01	10/30/2009	169.57	ND	6.29	ND	163.28	163.28
FP-01	3/19/2010	169.57	ND	2.53	ND	167.04	167.04
FP-01	5/25/2010	169.57	ND	2.50	ND	167.07	167.07
FP-01	6/25/2010	169.57	ND	3.81	ND	165.76	165.76
FP-01	8/6/2010	169.57	ND	4.27	ND	165.30	165.30
FP-01	9/15/2010	169.57	ND	6.30	ND	163.27	163.27
FP-01	1/19/2011	169.57	ND	4.22	ND	165.35	165.35
FP-01	10/21/2011	169.57	ND	4.61	ND	164.96	164.96
FP-01	3/20/2012	169.57	ND	3.35	ND	166.22	166.22
FP-01	6/25/2012	169.57	ND	4.54	ND	165.03	165.03
FP-01	9/13/2012	169.57	ND	4.64	ND	164.93	164.93
FP-01	3/8/2013	169.57	ND	2.72	ND	166.85	166.85
FP-01	6/17/2013	169.57	ND	2.55	ND	167.02	167.02
FP-01	12/11/2013	169.57	ND	2.16	ND	167.41	167.41

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
FP-01	6/18/2014	169.57	ND	2.83	ND	166.74	166.74
FP-01	12/1/2014	169.57	ND	1.22	ND	168.35	168.35
FP-01	6/9/2015	169.57	ND	2.52	ND	167.05	167.05
FP-01	12/8/2015	169.57	ND	2.11	ND	167.46	167.46
FP-01	6/7/2016	169.57	ND	2.16	ND	167.41	167.41
FP-01	11/30/2016	169.57	ND	3.63	ND	165.94	165.94
FP-02	2/10/2005	106.95	3.91	4.78	0.87	102.17	102.87
FP-02	2/22/2005	106.95	4.50	5.42	0.92	101.53	102.27
FP-02	3/14/2005	106.95	3.94	4.24	0.30	102.71	102.95
FP-02	3/16/2005	106.95	3.94	4.24	0.30	102.71	102.95
FP-02	4/25/2005	106.95	3.40	3.64	0.24	103.31	103.50
FP-02	5/26/2005	106.95	4.62	4.88	0.26	102.07	102.28
FP-02	6/24/2005	106.95	5.21	5.52	0.31	101.43	101.68
FP-02	7/25/2005	106.95	4.88	5.02	0.14	101.93	102.04
FP-02	8/22/2005	106.95	ND	7.30	ND	99.65	99.65
FP-02	10/13/2005	106.95	7.20	7.25	0.05	99.70	99.74
FP-02	11/28/2005	106.95	5.79	5.81	0.02	101.14	101.16
FP-02	12/16/2005	106.95	ND	2.61	ND	104.34	104.34
FP-02	1/31/2006	106.95	3.82	3.84	0.02	103.11	103.13
FP-02	2/24/2006	106.95	4.37	4.42	0.05	102.53	102.57
FP-02	4/4/2006	106.95	5.12	5.14	0.02	101.81	101.83
FP-02	6/6/2006	106.95	4.80	4.88	0.08	102.07	102.13
FP-02	10/3/2006	106.95	5.26	5.32	0.06	101.63	101.68
FP-02	2/21/2007	106.95	ND	2.96	ND	103.99	103.99
FP-02	5/17/2007	106.95	ND	6.89	ND	100.06	100.06
FP-02	8/15/2007	106.95	ND	7.36	ND	99.59	99.59
FP-02	12/5/2007	106.95	ND	7.35	ND	99.60	99.60
FP-03	2/10/2005	168.84	ND	3.42	ND	165.42	165.42
FP-03	2/22/2005	168.84	ND	3.99	ND	164.85	164.85
FP-03	3/14/2005	168.84	ND	3.22	ND	165.62	165.62
FP-03	3/16/2005	168.84	ND	3.22	ND	165.62	165.62
FP-03	4/25/2005	168.84	ND	2.78	ND	166.06	166.06
FP-03	5/26/2005	168.84	ND	3.42	ND	165.42	165.42
FP-03	6/24/2005	168.84	ND	3.91	ND	164.93	164.93
FP-03	7/25/2005	168.84	ND	3.43	ND	165.41	165.41
FP-03	8/22/2005	168.84	ND	7.22	ND	161.62	161.62
FP-03	10/13/2005	168.84	ND	5.32	ND	163.52	163.52
FP-03	11/28/2005	168.84	ND	4.26	ND	164.58	164.58
FP-03	12/16/2005	168.84	ND	1.01	ND	167.83	167.83
FP-03	1/31/2006	168.84	ND	2.80	ND	166.04	166.04
FP-03	2/24/2006	168.84	ND	3.41	ND	165.43	165.43
FP-03	4/4/2006	168.84	ND	3.92	ND	164.92	164.92
FP-03	6/6/2006	168.84	ND	3.58	ND	165.26	165.26
FP-03	10/3/2006	168.84	ND	3.73	ND	165.11	165.11
FP-03	2/21/2007	168.84	ND	2.40	ND	166.44	166.44
FP-03	5/17/2007	168.84	ND	5.21	ND	163.63	163.63
FP-03	8/15/2007	168.84	ND	7.29	ND	161.55	161.55
FP-03	12/5/2007	168.84	ND	7.29	ND	161.55	161.55
FP-03	12/13/2007	168.84	ND	3.15	ND	165.69	165.69

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
FP-03	3/27/2008	168.84	ND	1.26	ND	167.58	167.58
FP-03	6/1/2008	168.84	ND	3.09	ND	165.75	165.75
FP-03	6/11/2008	168.84	ND	3.09	ND	165.75	165.75
FP-03	9/3/2008	168.84	ND	4.45	ND	164.39	164.39
FP-03	11/6/2008	168.84	ND	3.88	ND	164.96	164.96
FP-03	11/20/2008	168.84	ND	1.82	ND	167.02	167.02
FP-03	2/27/2009	168.84	ND	2.44	ND	166.40	166.40
FP-03	5/27/2009	168.84	ND	3.33	ND	165.51	165.51
FP-03	7/16/2009	168.84	ND	3.71	ND	165.13	165.13
FP-03	10/30/2009	168.84	ND	6.52	ND	162.32	162.32
FP-03	3/19/2010	168.84	ND	1.40	ND	167.44	167.44
FP-03	8/6/2010	168.84	ND	2.20	ND	166.64	166.64
FP-03	9/15/2010	168.84	ND	4.59	ND	164.25	164.25
FP-03	1/19/2011	168.84	ND	3.79	ND	165.05	165.05
FP-03	10/21/2011	168.84	ND	3.48	ND	165.36	165.36
FP-03	3/20/2012	168.84	ND	2.64	ND	166.20	166.20
FP-03	6/25/2012	168.84	ND	2.69	ND	166.15	166.15
FP-03	9/13/2012	168.84	ND	3.41	ND	165.43	165.43
FP-03	3/8/2013	168.84	ND	1.37	ND	167.47	167.47
FP-03	6/17/2013	168.84	ND	2.33	ND	166.51	166.51
FP-03	12/11/2013	168.84	ND	2.65	ND	166.19	166.19
FP-03	6/18/2014	168.84	ND	2.56	ND	166.28	166.28
FP-03	12/1/2014	168.84	ND	1.21	ND	167.63	167.63
FP-03	6/9/2015	168.84	ND	2.45	ND	166.39	166.39
FP-03	12/8/2015	168.84	ND	1.04	ND	167.80	167.80
FP-03	6/7/2016	168.84	ND	2.01	ND	166.83	166.83
FP-03	11/30/2016	168.84	ND	3.33	ND	165.51	165.51
FP-04	2/10/2005	NS	ND	3.65	ND	NS	NS
FP-04	2/22/2005	NS	ND	4.16	ND	NS	NS
FP-04	3/14/2005	NS	ND	3.57	ND	NS	NS
FP-04	3/16/2005	NS	3.57	3.57	0.00	NS	NS
FP-04	4/25/2005	NS	ND	2.89	ND	NS	NS
FP-04	5/26/2005	NS	ND	3.97	ND	NS	NS
FP-04	6/24/2005	NS	ND	4.44	ND	NS	NS
FP-04	7/25/2005	NS	ND	5.51	ND	NS	NS
FP-04	8/22/2005	NS	ND	7.23	ND	NS	NS
FP-04	10/13/2005	NS	ND	7.29	ND	NS	NS
FP-04	11/28/2005	NS	ND	5.89	ND	NS	NS
FP-04	12/16/2005	NS	ND	2.04	ND	NS	NS
FP-04	1/31/2006	NS	ND	2.91	ND	NS	NS
FP-04	2/24/2006	NS	ND	3.56	ND	NS	NS
FP-04	4/4/2006	NS	ND	4.26	ND	NS	NS
FP-04	6/6/2006	NS	ND	4.12	ND	NS	NS
FP-04	10/3/2006	NG	NG	NG	NG	NG	NG
FP-04	2/21/2007	NG	NG	NG	NG	NG	NG
FP-06	2/10/2005	106.69	ND	4.09	ND	102.60	102.60
FP-06	2/22/2005	106.69	ND	4.62	ND	102.07	102.07
FP-06	3/14/2005	106.69	4.01	4.02	0.01	102.67	102.68
FP-06	3/16/2005	106.69	4.01	4.02	0.01	102.67	102.68

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
FP-06	4/25/2005	106.69	ND	3.34	ND	103.35	103.35
FP-06	5/26/2005	106.69	ND	4.27	ND	102.42	102.42
FP-06	6/24/2005	106.69	ND	4.91	ND	101.78	101.78
FP-06	7/25/2005	106.69	ND	5.11	ND	101.58	101.58
FP-06	8/22/2005	106.69	ND	7.41	ND	99.28	99.28
FP-06	10/13/2005	106.69	ND	7.39	ND	99.30	99.30
FP-06	11/28/2005	106.69	ND	5.57	ND	101.12	101.12
FP-06	12/16/2005	106.69	ND	2.75	ND	103.94	103.94
FP-06	1/31/2006	106.69	ND	3.56	ND	103.13	103.13
FP-06	2/24/2006	106.69	ND	4.14	ND	102.55	102.55
FP-06	4/4/2006	106.69	ND	4.95	ND	101.74	101.74
FP-06	6/6/2006	106.69	ND	4.90	ND	101.79	101.79
FP-06	10/3/2006	106.69	ND	4.62	ND	102.07	102.07
FP-06	2/21/2007	106.69	NG	NG	NG	NG	NG
FP-06	5/17/2007	106.69	ND	5.96	ND	100.73	100.73
FP-06	8/15/2007	106.69	DRY	DRY	DRY	DRY	DRY
FP-06	12/5/2007	106.69	DRY	DRY	DRY	DRY	DRY
FP-07	2/10/2005	169.36	4.07	6.71	2.64	162.65	164.76
FP-07	2/22/2005	169.36	4.64	7.08	2.44	162.28	164.23
FP-07	3/14/2005	169.36	4.01	6.34	2.33	163.02	164.89
FP-07	3/16/2005	169.36	4.10	6.34	2.24	163.02	164.81
FP-07	4/25/2005	169.36	3.31	5.89	2.58	163.47	165.54
FP-07	5/26/2005	169.36	4.43	7.29	2.86	162.07	164.36
FP-07	6/24/2005	169.36	5.42	7.43	2.01	161.93	163.54
FP-07	7/25/2005	169.36	5.52	7.30	1.78	162.06	163.49
FP-07	8/22/2005	169.36	7.27	7.96	0.69	161.40	161.95
FP-07	10/13/2005	169.36	7.71	7.86	0.15	161.50	161.62
FP-07	11/28/2005	169.36	7.25	8.00	0.75	161.36	161.96
FP-07	12/16/2005	169.36	4.20	6.95	2.75	162.41	164.61
FP-07	1/31/2006	169.36	4.08	5.75	1.67	163.61	164.95
FP-07	2/24/2006	169.36	4.63	5.22	0.59	164.14	164.61
FP-07	4/4/2006	169.36	5.35	5.93	0.58	163.43	163.90
FP-07	6/6/2006	169.36	5.21	7.33	2.12	162.03	163.73
FP-07	10/3/2006	169.36	5.35	7.26	1.91	162.10	163.63
FP-07	2/21/2007	169.36	ND	2.99	ND	166.37	166.37
FP-07	5/17/2007	169.36	ND	7.42	ND	161.94	161.94
FP-07	8/15/2007	169.36	ND	7.65	ND	161.71	161.71
FP-07	12/5/2007	169.36	ND	7.69	ND	161.67	161.67
FP-07	12/13/2007	169.36	5.74	7.11	1.37	162.25	163.35
FP-07	3/27/2008	169.36	3.61	5.04	1.43	164.32	165.47
FP-07	6/1/2008	169.36	5.25	5.86	0.61	163.50	163.99
FP-07	6/11/2008	169.36	5.25	5.86	0.61	163.50	163.99
FP-07	6/30/2008	169.36	NM	NM	NM	NM	NM
FP-07	9/3/2008	169.36	6.98	7.06	0.08	162.30	162.37
FP-07	11/6/2008	169.36	6.55	7.15	0.60	162.21	162.69
FP-07	11/20/2008	169.36	3.79	4.16	0.37	165.20	165.50
FP-07	2/27/2009	169.36	3.72	4.54	0.82	164.82	165.48
FP-07	3/17/2009	169.36	ND	2.11	ND	167.25	167.25
FP-07	5/27/2009	169.36	5.02	5.19	0.17	164.17	164.31
FP-07	6/17/2009	169.36	3.60	3.82	0.22	165.54	165.54

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
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Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
FP-07	7/16/2009	169.36	6.09	6.38	0.29	162.98	162.98
FP-07	9/10/2009	169.36	6.61	7.04	0.43	162.32	162.32
FP-07	10/30/2009	169.36	7.27	7.28	0.01	162.08	162.09
FP-07	3/19/2010	169.36	ND	1.78	ND	167.58	167.58
FP-07	5/25/2010	169.36	3.04	5.12	2.08	164.24	165.91
FP-07	6/25/2010	169.36	5.12	5.14	0.02	164.22	164.24
FP-07	8/6/2010	169.36	6.02	7.21	1.19	162.15	163.10
FP-07	9/15/2010	169.36	7.41	7.45	0.04	161.91	161.94
FP-07	1/19/2011	169.36	5.54	6.65	1.11	162.71	163.60
FP-07	3/18/2011	169.36	4.34	4.85	0.51	164.51	164.92
FP-07	10/21/2011	169.36	5.94	6.52	0.58	162.84	163.31
FP-07	1/31/2012	169.36	4.72	6.94	2.22	162.42	164.20
FP-07	3/1/2012	169.36	4.36	6.64	2.28	162.72	164.55
FP-07	3/20/2012	169.36	4.34	7.08	2.74	162.28	164.47
FP-07	4/20/2012	169.36	4.08	6.54	2.46	162.82	164.79
FP-07	5/25/2012	169.36	3.81	6.01	2.20	163.35	165.11
FP-07	6/25/2012	169.36	4.65	5.75	1.10	163.61	164.49
FP-07	7/24/2012	169.36	6.38	6.51	0.13	162.85	162.96
FP-07	8/30/2012	169.36	7.35	7.58	0.23	161.78	161.97
FP-07	9/13/2012	169.36	7.10	7.26	0.16	162.10	162.23
FP-07	10/9/2012	169.36	7.48	7.52	0.04	161.84	161.87
FP-07	11/20/2012	169.36	7.51	7.53	0.02	161.83	161.85
FP-07	12/18/2012	169.36	ND	6.88	ND	162.48	162.48
FP-07	1/3/2013	169.36	ND	5.38	ND	163.98	163.98
FP-07	1/13/2013	169.36	ND	5.38	ND	163.98	163.98
FP-07	1/31/2013	169.36	5.35	5.39	0.04	163.97	164.00
FP-07	2/28/2013	169.36	ND	3.65	ND	165.71	165.71
FP-07	3/8/2013	169.36	2.81	2.99	0.18	166.37	166.52
FP-07	4/19/2013	169.36	4.18	4.62	0.44	164.74	165.09
FP-07	5/30/2013	169.36	4.12	4.24	0.12	165.12	165.22
FP-07	6/17/2013	169.36	3.13	3.13	0.00	166.23	166.23
FP-07	7/23/2013	169.36	2.29	2.29	0.00	167.07	167.07
FP-07	8/1/2013	169.36	2.43	2.43	0.00	166.93	166.93
FP-07	8/22/2013	169.36	ND	1.86	ND	167.50	167.50
FP-07	9/24/2013	169.36	ND	3.26	ND	166.10	166.10
FP-07	10/11/2013	169.36	ND	3.87	ND	165.49	165.49
FP-07	11/6/2013	169.36	ND	3.06	ND	166.30	166.30
FP-07	12/11/2013	169.36	ND	2.89	ND	166.47	166.47
FP-07	12/12/2013	169.36	ND	2.89	ND	166.47	166.47
FP-07	12/26/2013	169.36	ND	2.58	ND	166.78	166.78
FP-07	2/4/2014	169.36	ND	0.31	ND	169.05	169.05
FP-07	2/21/2014	169.36	ND	NM	ND	NM	NM
FP-07	3/21/2014	169.36	ND	NM	ND	NM	NM
FP-07	4/29/2014	169.36	ND	1.67	ND	167.69	167.69
FP-07	6/4/2014	169.36	ND	3.01	ND	166.35	166.35
FP-07	6/18/2014	169.36	ND	3.45	ND	165.91	165.91
FP-07	7/28/2014	169.36	ND	2.95	ND	166.41	166.41
FP-07	8/18/2014	169.36	ND	2.24	ND	167.12	167.12
FP-07	12/1/2014	169.36	ND	2.62	ND	166.74	166.74
FP-07	2/16/2015	169.36	ND	NM	ND	NM	NM

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
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Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
FP-07	3/31/2015	169.36	ND	NM	ND	NM	NM
FP-07	4/28/2015	169.36	ND	NM	ND	NM	NM
FP-07	6/9/2015	169.36	ND	2.49	ND	166.87	166.87
FP-07	7/14/2015	169.36	ND	NM	ND	NM	NM
FP-07	9/29/2015	169.36	ND	NM	ND	NM	NM
FP-07	10/30/2015	169.36	ND	NM	ND	NM	NM
FP-07	11/23/2015	169.36	ND	NM	ND	NM	NM
FP-07	12/8/2015	169.36	ND	2.29	ND	167.07	167.07
FP-07	1/29/2016	169.36	ND	NM	ND	NM	NM
FP-07	2/16/2016	169.36	ND	NM	ND	NM	NM
FP-07	3/29/2016	169.36	ND	NM	ND	NM	NM
FP-07	5/11/2016	169.36	ND	NM	ND	NM	NM
FP-07	5/31/2016	169.36	ND	NM	ND	NM	NM
FP-07	6/7/2016	169.36	ND	2.31	ND	167.05	167.05
FP-07	7/15/2016	169.36	ND	NM	ND	NM	NM
FP-07	8/30/2016	169.36	ND	NM	ND	NM	NM
FP-07	10/19/2016	169.36	ND	NM	ND	NM	NM
FP-07	11/30/2016	169.36	ND	4.21	ND	165.15	165.15
FP-07	12/28/2016	169.36	ND	NM	ND	NM	NM
FP-07	8/24/2017	169.36	ND	NM	ND	NM	NM
FP-08	2/10/2005	169.36	3.88	6.38	2.50	162.98	164.98
FP-08	2/22/2005	169.36	4.37	6.82	2.45	162.54	164.50
FP-08	3/14/2005	169.36	3.71	6.30	2.59	163.06	165.13
FP-08	3/16/2005	169.36	3.71	6.30	2.59	163.06	165.13
FP-08	4/25/2005	169.36	2.91	5.38	2.47	163.98	165.96
FP-08	5/26/2005	169.36	4.15	6.09	1.94	163.27	164.82
FP-08	6/24/2005	169.36	5.01	6.58	1.57	162.78	164.04
FP-08	7/25/2005	169.36	5.32	6.59	1.27	162.77	163.79
FP-08	8/22/2005	169.36	6.94	7.75	0.81	161.61	162.26
FP-08	10/13/2005	169.36	7.35	7.62	0.27	161.74	161.96
FP-08	11/28/2005	169.36	6.98	7.40	0.42	161.96	162.30
FP-08	12/16/2005	169.36	3.28	4.51	1.23	164.85	165.84
FP-08	1/31/2006	169.36	3.40	3.95	0.55	165.41	165.85
FP-08	2/24/2006	169.36	4.20	4.57	0.37	164.79	165.09
FP-08	4/4/2006	169.36	5.01	5.38	0.37	163.98	164.28
FP-08	6/6/2006	169.36	4.97	5.55	0.58	163.81	164.28
FP-08	10/3/2006	169.36	5.30	5.90	0.60	163.46	163.94
FP-08	2/21/2007	169.36	ND	2.63	ND	166.73	166.73
FP-08	5/17/2007	169.36	6.30	6.36	0.06	163.00	163.05
FP-08	8/15/2007	169.36	ND	7.46	ND	161.90	161.90
FP-08	12/5/2007	169.36	DRY	DRY	DRY	DRY	DRY
FP-08	12/13/2007	169.36	ND	4.47	ND	164.89	164.89
FP-08	3/27/2008	169.36	ND	2.56	ND	166.80	166.80
FP-08	6/1/2008	169.36	4.21	4.41	0.20	164.95	165.11
FP-08	6/11/2008	169.36	4.21	4.41	0.20	164.95	165.11
FP-08	9/3/2008	169.36	ND	6.85	ND	162.51	162.51
FP-08	9/3/2008	169.36	6.84	6.85	0.01	162.51	162.52
FP-08	11/6/2008	169.36	ND	6.15	ND	163.21	163.21
FP-08	11/20/2008	169.36	ND	2.65	ND	166.71	166.71
FP-08	2/27/2009	169.36	ND	3.08	ND	166.28	166.28

TABLE 2
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KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
FP-08	5/27/2009	169.36	ND	4.36	ND	165.00	165.00
FP-08	7/16/2009	169.05	ND	5.62	ND	163.43	163.43
FP-08	10/30/2009	169.36	ND	7.09	ND	162.27	162.27
FP-08	3/19/2010	169.05	ND	1.69	ND	167.36	167.36
FP-08	5/25/2010	169.05	2.21	3.92	1.71	165.13	166.49
FP-08	6/25/2010	169.05	3.92	3.92	0.00	165.13	165.13
FP-08	8/6/2010	169.05	4.51	4.53	0.02	164.52	164.53
FP-08	9/15/2010	169.05	3.92	6.81	2.89	162.24	164.55
FP-08	1/19/2011	169.05	ND	5.41	ND	163.64	163.64
FP-08	3/18/2011	169.05	3.38	3.38	0.00	165.67	165.67
FP-08	10/21/2011	169.05	ND	4.93	ND	164.12	164.12
FP-08	1/31/2012	169.05	ND	7.81	ND	161.24	161.24
FP-08	3/1/2012	169.05	ND	3.52	ND	165.53	165.53
FP-08	3/20/2012	169.05	ND	3.20	ND	165.85	165.85
FP-08	4/20/2012	169.05	ND	2.74	ND	166.31	166.31
FP-08	5/25/2012	169.05	ND	2.28	ND	166.77	166.77
FP-08	6/25/2012	169.05	ND	4.06	ND	164.99	164.99
FP-08	8/30/2012	169.05	ND	4.80	ND	164.25	164.25
FP-08	9/13/2012	169.05	ND	5.75	ND	163.30	163.30
FP-08	10/9/2012	169.05	ND	6.01	ND	163.04	163.04
FP-08	3/8/2013	169.05	ND	2.44	ND	166.61	166.61
FP-08	4/19/2013	169.05	ND	2.77	ND	166.28	166.28
FP-08	5/30/2013	169.05	ND	2.69	ND	166.36	166.36
FP-08	6/17/2013	169.05	ND	2.21	ND	166.84	166.84
FP-08	12/11/2013	169.05	ND	2.75	ND	166.30	166.30
FP-08	6/18/2014	169.05	ND	2.86	ND	166.19	166.19
FP-08	12/1/2014	169.05	ND	2.17	ND	166.88	166.88
FP-08	6/9/2015	169.05	ND	2.38	ND	166.67	166.67
FP-08	12/8/2015	169.05	ND	1.65	ND	167.40	167.40
FP-08	6/7/2016	169.36	ND	2.04	ND	167.32	167.32
FP-08	11/30/2016	169.36	ND	3.60	ND	165.76	165.76
FP-09	2/10/2005	NS	ND	3.89	ND	NS	NS
FP-09	2/22/2005	NS	ND	4.49	ND	NS	NS
FP-09	3/14/2005	NS	ND	3.65	ND	NS	NS
FP-09	3/16/2005	NS	ND	3.65	ND	NS	NS
FP-09	4/25/2005	NS	2.69	2.79	0.10	NS	NS
FP-09	5/26/2005	NS	3.97	3.99	0.02	NS	NS
FP-09	6/24/2005	NS	4.81	4.83	0.02	NS	NS
FP-09	7/25/2005	NS	4.75	4.75	0.00	NS	NS
FP-09	8/22/2005	NS	7.08	7.11	0.03	NS	NS
FP-09	10/13/2005	NS	ND	7.14	ND	NS	NS
FP-09	11/28/2005	NS	ND	6.26	ND	NS	NS
FP-09	12/16/2005	NS	ND	2.14	ND	NS	NS
FP-09	1/31/2006	NS	ND	3.14	ND	NS	NS
FP-09	2/24/2006	NS	ND	3.92	ND	NS	NS
FP-09	4/4/2006	NS	ND	4.73	ND	NS	NS
FP-09	6/6/2006	NS	ND	4.58	ND	NS	NS
FP-09	10/3/2006	NS	ND	4.87	ND	NS	NS
FP-09	2/21/2007	NS	ND	2.34	ND	NS	NS
FP-09	5/17/2007	NS	ND	6.20	ND	NS	NS

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
FP-09	8/15/2007	NS	ND	7.44	ND	NS	NS
FP-09	12/5/2007	NS	ND	7.49	ND	NS	NS
FP-10	1/31/2005	169.11	ND	3.82	ND	165.29	165.29
FP-10	2/10/2005	169.11	ND	4.39	ND	164.72	164.72
FP-10	2/22/2005	169.11	ND	4.95	ND	164.16	164.16
FP-10	3/14/2005	169.11	4.20	4.22	0.02	164.89	164.91
FP-10	3/16/2005	169.11	4.20	4.22	0.02	164.89	164.91
FP-10	4/25/2005	169.11	ND	3.40	ND	165.71	165.71
FP-10	5/26/2005	169.11	ND	4.70	ND	164.41	164.41
FP-10	6/24/2005	169.11	5.58	5.63	0.05	163.48	163.52
FP-10	7/25/2005	169.11	5.78	5.82	0.04	163.29	163.32
FP-10	8/22/2005	169.11	7.22	7.41	0.19	161.70	161.85
FP-10	10/13/2005	169.11	7.27	7.29	0.02	161.82	161.84
FP-10	11/28/2005	169.11	ND	7.02	ND	162.09	162.09
FP-10	12/16/2005	169.11	ND	3.76	ND	165.35	165.35
FP-10	2/24/2006	169.11	ND	4.30	ND	164.81	164.81
FP-10	4/4/2006	169.11	ND	5.29	ND	163.82	163.82
FP-10	6/6/2006	169.11	ND	4.81	ND	164.30	164.30
FP-10	10/3/2006	169.11	ND	5.58	ND	163.53	163.53
FP-10	2/21/2007	169.11	ND	2.94	ND	166.17	166.17
FP-10	5/17/2007	169.11	6.35	6.57	0.22	162.54	162.72
FP-10	8/15/2007	169.11	7.45	7.45	0.00	161.66	161.66
FP-10	12/5/2007	169.11	7.45	7.47	0.02	161.64	161.66
FP-10	12/5/2007	169.11	ND	7.47	ND	161.64	161.64
FP-10	12/13/2007	169.11	ND	5.14	ND	163.97	163.97
FP-10	3/27/2008	169.11	ND	3.01	ND	166.10	166.10
FP-10	6/1/2008	169.11	ND	4.55	ND	164.56	164.56
FP-10	6/11/2008	169.11	ND	4.55	ND	164.56	164.56
FP-10	9/3/2008	169.11	ND	6.65	ND	162.46	162.46
FP-10	11/6/2008	169.11	ND	5.32	ND	163.79	163.79
FP-10	11/20/2008	169.11	ND	3.44	ND	165.67	165.67
FP-10	2/27/2009	169.11	ND	3.41	ND	165.70	165.70
FP-10	5/27/2009	169.11	ND	4.59	ND	164.52	164.52
FP-10	7/16/2009	169.11	ND	5.71	ND	163.40	163.40
FP-10	10/30/2009	169.11	ND	6.91	ND	162.20	162.20
FP-10	3/19/2010	169.11	ND	1.86	ND	167.25	167.25
FP-10	5/25/2010	169.11	ND	2.95	ND	166.16	166.16
FP-10	6/25/2010	169.11	ND	4.31	ND	164.80	164.80
FP-10	8/6/2010	169.11	ND	5.79	ND	163.32	163.32
FP-10	9/15/2010	169.11	ND	6.90	ND	162.21	162.21
FP-10	1/19/2011	169.11	ND	5.34	ND	163.77	163.77
FP-10	10/21/2011	169.11	ND	5.66	ND	163.45	163.45
FP-10	3/20/2012	169.11	ND	3.52	ND	165.59	165.59
FP-10	6/25/2012	169.11	ND	5.12	ND	163.99	163.99
FP-10	9/13/2012	169.11	ND	6.86	ND	162.25	162.25
FP-10	3/8/2013	169.11	ND	2.99	ND	166.12	166.12
FP-10	6/17/2013	169.11	ND	2.51	ND	166.60	166.60
FP-10	12/11/2013	169.11	ND	3.31	ND	165.80	165.80
FP-10	6/18/2014	169.11	ND	2.88	ND	166.23	166.23
FP-10	12/1/2014	169.11	ND	2.41	ND	166.70	166.70

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KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
FP-10	6/9/2015	169.11	ND	2.36	ND	166.75	166.75
FP-10	12/8/2015	169.11	ND	1.94	ND	167.17	167.17
FP-10	6/7/2016	169.11	ND	1.92	ND	167.19	167.19
FP-10	11/30/2016	169.11	ND	3.20	ND	165.91	165.91
FP-11	2/10/2005	168.91	ND	4.04	ND	164.87	164.87
FP-11	2/22/2005	168.91	4.51	4.51	0.00	164.40	164.40
FP-11	3/14/2005	168.91	3.94	3.96	0.02	164.95	164.97
FP-11	3/16/2005	168.91	3.94	3.96	0.02	164.95	164.97
FP-11	4/25/2005	168.91	3.24	3.36	0.12	165.55	165.65
FP-11	5/26/2005	168.91	4.28	4.36	0.08	164.55	164.62
FP-11	6/24/2005	168.91	5.09	5.21	0.12	163.70	163.80
FP-11	7/25/2005	168.91	5.10	5.14	0.04	163.77	163.80
FP-11	8/22/2005	168.91	6.89	6.94	0.05	161.97	162.01
FP-11	10/13/2005	168.91	ND	7.36	ND	161.55	161.55
FP-11	11/28/2005	168.91	6.68	6.71	0.03	162.20	162.23
FP-11	12/16/2005	168.91	3.32	3.46	0.14	165.45	165.56
FP-11	1/31/2006	168.91	3.61	3.82	0.21	165.09	165.26
FP-11	2/24/2006	168.91	4.09	4.32	0.23	164.59	164.78
FP-11	4/4/2006	168.91	4.85	4.95	0.10	163.96	164.04
FP-11	6/6/2006	168.91	5.29	5.38	0.09	163.53	163.60
FP-11	10/3/2006	168.91	5.16	5.20	0.04	163.71	163.74
FP-11	2/21/2007	168.91	2.77	2.88	0.11	166.03	166.12
FP-11	5/17/2007	168.91	ND	6.06	ND	162.85	162.85
FP-11	8/15/2007	168.91	ND	7.66	ND	161.25	161.25
FP-11	12/5/2007	168.91	ND	7.69	ND	161.22	161.22
FP-11	12/13/2007	168.91	4.76	4.84	0.08	164.07	164.14
FP-11	3/27/2008	168.91	ND	3.80	ND	165.11	165.11
FP-11	6/1/2008	168.91	4.83	4.83	0.00	164.08	164.08
FP-11	6/11/2008	168.91	4.83	4.83	0.00	164.08	164.08
FP-11	9/3/2008	168.91	ND	6.83	ND	162.08	162.08
FP-11	11/6/2008	168.91	ND	6.00	ND	162.91	162.91
FP-11	11/20/2008	168.91	ND	2.88	ND	166.03	166.03
FP-11	2/27/2009	168.91	ND	3.21	ND	165.70	165.70
FP-11	5/27/2009	168.91	ND	4.41	ND	164.50	164.50
FP-11	7/16/2009	168.91	ND	5.39	ND	163.52	163.52
FP-11	10/30/2009	168.91	ND	6.85	ND	162.06	162.06
FP-11	3/19/2010	168.91	ND	1.90	ND	167.01	167.01
FP-11	5/25/2010	168.91	ND	2.49	ND	166.42	166.42
FP-11	6/25/2010	168.91	ND	4.19	ND	164.72	164.72
FP-11	8/6/2010	168.91	ND	5.09	ND	163.82	163.82
FP-11	9/15/2010	168.91	ND	6.64	ND	162.27	162.27
FP-11	1/19/2011	168.91	ND	4.98	ND	163.93	163.93
FP-11	10/21/2011	168.91	ND	5.49	ND	163.42	163.42
FP-11	3/20/2012	168.91	ND	3.84	ND	165.07	165.07
FP-11	6/25/2012	168.91	ND	4.90	ND	164.01	164.01
FP-11	9/13/2012	168.91	ND	6.42	ND	162.49	162.49
FP-11	3/8/2013	168.91	ND	3.96	ND	164.95	164.95
FP-11	6/17/2013	168.91	ND	3.40	ND	165.51	165.51
FP-11	12/11/2013	168.91	ND	3.88	ND	165.03	165.03
FP-11	6/18/2014	168.91	ND	3.94	ND	164.97	164.97

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
FP-11	12/1/2014	168.91	ND	3.02	ND	165.89	165.89
FP-11	6/9/2015	168.91	ND	3.06	ND	165.85	165.85
FP-11	12/8/2015	168.91	ND	1.81	ND	167.10	167.10
FP-11	12/8/2015	168.91	ND	1.84	ND	167.07	167.07
FP-11	6/7/2016	168.91	ND	2.98	ND	165.93	165.93
FP-11	11/30/2016	168.91	ND	4.12	ND	164.79	164.79
FP-12	2/10/2005	NS	ND	3.32	ND	NS	NS
FP-12	2/22/2005	NS	ND	3.90	ND	NS	NS
FP-12	3/14/2005	NS	ND	3.30	ND	NS	NS
FP-12	3/16/2005	NS	ND	3.30	ND	NS	NS
FP-12	4/25/2005	NS	ND	2.49	ND	NS	NS
FP-12	5/26/2005	NS	ND	3.40	ND	NS	NS
FP-12	6/24/2005	NS	ND	4.20	ND	NS	NS
FP-12	7/25/2005	NS	ND	5.72	ND	NS	NS
FP-12	8/22/2005	NS	ND	6.70	ND	NS	NS
FP-12	10/13/2005	NS	ND	7.48	ND	NS	NS
FP-12	11/28/2005	NS	ND	4.85	ND	NS	NS
FP-12	12/16/2005	NS	ND	2.37	ND	NS	NS
FP-12	1/31/2006	NS	ND	2.59	ND	NS	NS
FP-12	2/24/2006	NS	ND	3.04	ND	NS	NS
FP-12	4/4/2006	NS	ND	3.64	ND	NS	NS
FP-12	6/6/2006	NS	ND	5.48	ND	NS	NS
FP-12	10/3/2006	NS	ND	5.35	ND	NS	NS
FP-12	2/21/2007	NS	ND	3.89	ND	NS	NS
FP-12	5/17/2007	NS	ND	7.30	ND	NS	NS
FP-12	8/15/2007	NS	DRY	DRY	DRY	DRY	DRY
FP-12	12/5/2007	NS	ND	8.91	ND	NS	NS
FP-13	2/10/2005	167.86	3.82	3.94	0.12	163.92	164.01
FP-13	2/22/2005	167.86	4.32	4.52	0.20	163.34	163.50
FP-13	3/14/2005	167.86	3.79	3.81	0.02	164.05	164.06
FP-13	3/16/2005	167.86	3.79	3.81	0.02	164.05	164.06
FP-13	4/25/2005	167.86	3.33	3.37	0.04	164.49	164.52
FP-13	5/26/2005	167.86	4.30	4.33	0.03	163.53	163.55
FP-13	6/24/2005	167.86	4.96	5.01	0.05	162.85	162.89
FP-13	7/25/2005	167.86	5.40	5.49	0.09	162.37	162.44
FP-13	8/22/2005	167.86	6.51	6.56	0.05	161.30	161.34
FP-13	10/13/2005	167.86	ND	6.93	ND	160.93	160.93
FP-13	11/28/2005	167.86	ND	6.30	ND	161.56	161.56
FP-13	12/16/2005	167.86	ND	3.55	ND	164.31	164.31
FP-13	1/31/2006	167.86	ND	3.67	ND	164.19	164.19
FP-13	2/24/2006	167.86	ND	3.72	ND	164.14	164.14
FP-13	4/4/2006	167.86	ND	4.59	ND	163.27	163.27
FP-13	6/6/2006	167.86	ND	6.74	ND	161.12	161.12
FP-13	10/3/2006	167.86	ND	6.47	ND	161.39	161.39
FP-13	2/21/2007	167.86	ND	4.24	ND	163.62	163.62
FP-13	5/17/2007	167.86	ND	7.39	ND	160.47	160.47
FP-13	8/15/2007	167.86	ND	9.12	ND	158.74	158.74
FP-13	12/5/2007	167.86	ND	9.14	ND	158.72	158.72
FP-13	12/13/2007	167.86	ND	5.01	ND	162.85	162.85

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KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
FP-13	3/27/2008	167.86	ND	2.94	ND	164.92	164.92
FP-13	6/1/2008	167.86	ND	4.53	ND	163.33	163.33
FP-13	6/11/2008	167.86	ND	4.53	ND	163.33	163.33
FP-13	9/3/2008	167.86	ND	6.26	ND	161.60	161.60
FP-13	11/6/2008	167.86	ND	4.89	ND	162.97	162.97
FP-13	11/20/2008	167.86	2.57	2.57	0.00	165.29	165.29
FP-13	2/27/2009	167.86	ND	2.96	ND	164.90	164.90
FP-13	5/27/2009	167.86	ND	4.23	ND	163.63	163.63
FP-13	7/16/2009	167.86	ND	4.60	ND	163.26	163.26
FP-13	10/30/2009	167.86	ND	6.33	ND	161.53	161.53
FP-13	3/19/2010	167.86	ND	1.95	ND	165.91	165.91
FP-13	8/6/2010	167.86	ND	5.44	ND	162.42	162.42
FP-13	9/15/2010	167.86	ND	6.18	ND	161.68	161.68
FP-13	1/19/2011	167.86	ND	4.20	ND	163.66	163.66
FP-13	10/21/2011	167.86	ND	4.72	ND	163.14	163.14
FP-13	3/20/2012	167.86	ND	2.79	ND	165.07	165.07
FP-13	6/25/2012	167.86	ND	4.40	ND	163.46	163.46
FP-13	9/13/2012	167.86	ND	6.04	ND	161.82	161.82
FP-13	3/8/2013	167.86	ND	2.07	ND	165.79	165.79
FP-13	6/17/2013	167.86	ND	2.56	ND	165.30	165.30
FP-13	12/11/2013	167.86	ND	2.94	ND	164.92	164.92
FP-13	6/18/2014	167.86	ND	4.37	ND	163.49	163.49
FP-13	12/1/2014	167.86	ND	3.02	ND	164.84	164.84
FP-13	6/9/2015	167.86	ND	3.37	ND	164.49	164.49
FP-13	12/8/2015	167.86	ND	2.65	ND	165.21	165.21
FP-13	6/7/2016	167.56	ND	2.74	ND	164.82	164.82
FP-13	11/30/2016	167.56	ND	4.29	ND	163.27	163.27
FP-14	2/10/2005	NS	3.80	4.09	0.29	NS	NS
FP-14	2/22/2005	NS	4.29	4.54	0.25	NS	NS
FP-14	3/14/2005	NS	3.70	3.79	0.09	NS	NS
FP-14	3/16/2005	NS	3.70	3.79	0.09	NS	NS
FP-14	4/25/2005	NS	2.82	3.25	0.43	NS	NS
FP-14	5/26/2005	NS	4.15	4.42	0.27	NS	NS
FP-14	6/24/2005	NS	4.85	4.94	0.09	NS	NS
FP-14	7/25/2005	NS	5.09	5.19	0.10	NS	NS
FP-14	8/22/2005	NS	6.52	6.58	0.06	NS	NS
FP-14	10/13/2005	NS	6.99	7.13	0.14	NS	NS
FP-14	11/28/2005	NS	ND	6.14	ND	NS	NS
FP-14	12/16/2005	NS	ND	1.99	ND	NS	NS
FP-14	1/31/2006	NS	2.60	2.71	0.11	NS	NS
FP-14	2/24/2006	NS	ND	3.84	ND	NS	NS
FP-14	4/4/2006	NS	ND	4.49	ND	NS	NS
FP-14	6/6/2006	NS	ND	4.79	ND	NS	NS
FP-14	10/3/2006	NS	ND	4.75	ND	NS	NS
FP-14	2/21/2007	NS	2.35	2.37	0.02	NS	NS
FP-14	5/17/2007	NS	ND	5.61	ND	NS	NS
FP-14	8/15/2007	NS	ND	7.29	ND	NS	NS
FP-14	12/5/2007	NS	ND	7.38	ND	NS	NS
FP-15	2/10/2005	168.72	6.66	7.48	0.82	161.24	161.89

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KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
FP-15	2/22/2005	168.72	7.09	8.22	1.13	160.50	161.40
FP-15	3/14/2005	168.72	6.55	7.46	0.91	161.26	161.99
FP-15	3/16/2005	168.72	6.55	7.46	0.91	161.26	161.99
FP-15	4/25/2005	168.72	5.69	7.32	1.63	161.40	162.70
FP-15	5/26/2005	168.72	6.92	7.88	0.96	160.84	161.61
FP-15	6/24/2005	168.72	7.57	9.32	1.75	159.40	160.80
FP-15	7/25/2005	168.72	8.26	9.30	1.04	159.42	160.25
FP-15	8/22/2005	168.72	9.40	10.48	1.08	158.24	159.10
FP-15	10/13/2005	168.72	10.01	10.37	0.36	158.35	158.64
FP-15	11/28/2005	168.72	9.91	10.50	0.59	158.22	158.69
FP-15	12/16/2005	168.72	6.84	7.42	0.58	161.30	161.76
FP-15	1/31/2006	168.72	6.34	7.18	0.84	161.54	162.21
FP-15	2/24/2006	168.72	6.96	7.54	0.58	161.18	161.64
FP-15	4/4/2006	168.72	7.57	8.15	0.58	160.57	161.03
FP-15	6/6/2006	168.72	7.80	8.48	0.68	160.24	160.78
FP-15	10/3/2006	168.72	7.94	8.31	0.37	160.41	160.70
FP-15	2/21/2007	168.72	5.37	6.39	1.02	162.33	163.14
FP-15	5/17/2007	168.72	8.80	8.89	0.09	159.83	159.90
FP-15	8/15/2007	168.72	ND	10.02	ND	158.70	158.70
FP-15	10/9/2007	168.72	DRY	DRY	DRY	DRY	DRY
FP-15	12/5/2007	168.72	ND	9.98	ND	158.74	158.74
FP-15	12/13/2007	168.72	5.32	5.53	0.21	163.19	163.36
FP-15	3/27/2008	168.72	3.06	3.68	0.62	165.04	165.53
FP-15	6/1/2008	168.72	4.64	4.65	0.01	164.07	164.08
FP-15	6/11/2008	168.72	4.64	4.65	0.01	164.07	164.08
FP-15	9/3/2008	168.72	ND	6.73	ND	161.99	161.99
FP-15	11/6/2008	168.72	ND	5.64	ND	163.08	163.08
FP-15	11/20/2008	168.72	2.94	3.71	0.77	165.01	165.62
FP-15	2/27/2009	168.72	3.34	3.69	0.35	165.03	165.31
FP-15	3/17/2009	168.72	0.90	3.07	2.17	165.65	167.38
FP-15	5/27/2009	168.72	4.68	4.70	0.02	164.02	164.03
FP-15	6/17/2009	168.72	2.36	2.37	0.01	166.35	166.36
FP-15	7/16/2009	168.72	5.66	5.67	0.01	163.05	163.06
FP-15	9/10/2009	168.72	6.15	6.20	0.05	162.52	162.56
FP-15	10/30/2009	168.72	ND	6.96	ND	161.76	161.76
FP-15	3/19/2010	168.72	1.91	2.80	0.89	165.92	166.63
FP-15	3/22/2010	168.72	1.91	2.80	0.89	165.92	166.63
FP-15	5/25/2010	168.72	2.51	2.65	0.14	166.07	166.18
FP-15	6/17/2010	168.72	ND	3.47	ND	165.25	165.25
FP-15	6/25/2010	168.72	4.25	4.25	0.00	164.47	164.47
FP-15	8/6/2010	168.72	ND	6.14	ND	162.58	162.58
FP-15	9/15/2010	168.72	ND	6.72	ND	162.00	162.00
FP-15	1/19/2011	168.72	ND	5.17	ND	163.55	163.55
FP-15	10/21/2011	168.72	ND	5.60	ND	163.12	163.12
FP-15	3/20/2012	168.72	3.20	3.26	0.06	165.46	165.51
FP-15	4/20/2012	168.72	ND	2.95	ND	165.77	165.77
FP-15	5/25/2012	168.72	ND	2.73	ND	165.99	165.99
FP-15	6/25/2012	168.72	ND	5.22	ND	163.50	163.50
FP-15	7/24/2012	168.72	ND	6.41	ND	162.31	162.31
FP-15	9/13/2012	168.72	ND	6.42	ND	162.30	162.30

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
FP-15	10/9/2012	168.72	ND	6.49	ND	162.23	162.23
FP-15	12/18/2012	168.72	ND	5.99	ND	162.73	162.73
FP-15	1/3/2013	168.72	ND	5.52	ND	163.20	163.20
FP-15	1/13/2013	168.72	ND	5.52	ND	163.20	163.20
FP-15	1/31/2013	168.72	ND	3.81	ND	164.91	164.91
FP-15	3/8/2013	168.72	ND	2.37	ND	166.35	166.35
FP-15	4/19/2013	168.72	ND	2.75	ND	165.97	165.97
FP-15	5/30/2013	168.72	ND	2.76	ND	165.96	165.96
FP-15	6/17/2013	168.72	ND	2.41	ND	166.31	166.31
FP-15	12/11/2013	168.72	ND	4.38	ND	164.34	164.34
FP-15	6/18/2014	168.72	ND	3.33	ND	165.39	165.39
FP-15	12/1/2014	168.72	ND	2.56	ND	166.16	166.16
FP-15	6/9/2015	168.72	ND	2.71	ND	166.01	166.01
FP-15	12/8/2015	168.72	ND	1.80	ND	166.92	166.92
FP-15	6/7/2016	168.72	ND	2.31	ND	166.41	166.41
FP-15	11/30/2016	168.72	ND	3.82	ND	164.90	164.90
FP-17	2/10/2005	167.47	ND	4.24	ND	163.23	163.23
FP-17	2/22/2005	167.47	ND	4.59	ND	162.88	162.88
FP-17	3/14/2005	167.47	ND	4.25	ND	163.22	163.22
FP-17	3/16/2005	167.47	ND	4.25	ND	163.22	163.22
FP-17	4/25/2005	167.47	ND	3.81	ND	163.66	163.66
FP-17	5/26/2005	167.47	ND	4.34	ND	163.13	163.13
FP-17	6/24/2005	167.47	ND	4.54	ND	162.93	162.93
FP-17	7/25/2005	167.47	ND	4.88	ND	162.59	162.59
FP-17	8/22/2005	167.47	ND	6.31	ND	161.16	161.16
FP-17	10/13/2005	167.47	ND	7.45	ND	160.02	160.02
FP-17	11/28/2005	167.47	ND	6.28	ND	161.19	161.19
FP-17	12/16/2005	167.47	ND	3.58	ND	163.89	163.89
FP-17	1/31/2006	167.47	ND	3.90	ND	163.57	163.57
FP-17	2/24/2006	167.47	ND	4.11	ND	163.36	163.36
FP-17	4/4/2006	167.47	ND	4.58	ND	162.89	162.89
FP-17	6/6/2006	167.47	ND	4.64	ND	162.83	162.83
FP-17	10/3/2006	167.47	ND	4.42	ND	163.05	163.05
FP-17	2/21/2007	167.47	ND	3.64	ND	163.83	163.83
FP-17	5/17/2007	167.47	ND	5.40	ND	162.07	162.07
FP-17	8/15/2007	167.47	ND	6.73	ND	160.74	160.74
FP-17	12/5/2007	167.47	ND	6.97	ND	160.50	160.50
FP-17	12/13/2007	167.47	ND	2.13	ND	165.34	165.34
FP-17	3/27/2008	167.47	ND	1.48	ND	165.99	165.99
FP-17	6/1/2008	167.47	ND	2.07	ND	165.40	165.40
FP-17	6/11/2008	167.47	ND	2.07	ND	165.40	165.40
FP-17	9/3/2008	167.47	ND	2.56	ND	164.91	164.91
FP-17	11/6/2008	167.47	ND	2.33	ND	165.14	165.14
FP-17	11/20/2008	167.47	ND	1.18	ND	166.29	166.29
FP-17	2/27/2009	167.47	ND	1.84	ND	165.63	165.63
FP-17	5/27/2009	167.47	ND	2.45	ND	165.02	165.02
FP-17	7/16/2009	167.47	ND	2.44	ND	165.03	165.03
FP-17	10/30/2009	167.47	ND	4.14	ND	163.33	163.33
FP-17	3/19/2010	167.47	ND	1.08	ND	166.39	166.39
FP-17	8/6/2010	167.47	ND	3.52	ND	163.95	163.95

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
FP-17	9/15/2010	167.47	ND	4.00	ND	163.47	163.47
FP-17	1/19/2011	167.47	ND	2.53	ND	164.94	164.94
FP-17	10/21/2011	167.47	ND	2.29	ND	165.18	165.18
FP-17	3/20/2012	167.47	ND	1.86	ND	165.61	165.61
FP-17	6/25/2012	167.47	ND	2.29	ND	165.18	165.18
FP-17	9/13/2012	167.47	ND	3.13	ND	164.34	164.34
FP-17	3/8/2013	167.47	ND	2.23	ND	165.24	165.24
FP-17	6/17/2013	167.47	ND	1.36	ND	166.11	166.11
FP-17	12/11/2013	167.47	ND	0.93	ND	166.54	166.54
FP-17	6/18/2014	167.47	ND	1.97	ND	165.50	165.50
FP-17	12/1/2014	167.47	ND	1.33	ND	166.14	166.14
FP-17	6/9/2015	167.47	ND	1.78	ND	165.69	165.69
FP-17	12/8/2015	167.47	ND	0.70	ND	166.77	166.77
FP-17	6/7/2016	167.47	ND	1.16	ND	166.31	166.31
FP-17	11/30/2016	167.47	ND	2.51	ND	164.96	164.96
FP-18	2/10/2005	168.61	4.36	4.48	0.12	164.13	164.23
FP-18	2/22/2005	168.61	4.79	4.91	0.12	163.70	163.80
FP-18	3/14/2005	168.61	4.26	4.30	0.04	164.31	164.35
FP-18	3/16/2005	168.61	4.26	4.30	0.04	164.31	164.35
FP-18	4/25/2005	168.61	3.58	3.58	0.00	165.03	165.03
FP-18	5/26/2005	168.61	ND	4.67	ND	163.94	163.94
FP-18	6/24/2005	168.61	5.24	5.24	0.00	163.37	163.37
FP-18	7/25/2005	168.61	ND	5.85	ND	162.76	162.76
FP-18	8/22/2005	168.61	ND	7.28	ND	161.33	161.33
FP-18	10/13/2005	168.61	ND	7.25	ND	161.36	161.36
FP-18	11/28/2005	168.61	ND	6.75	ND	161.86	161.86
FP-18	12/16/2005	168.61	2.70	2.73	0.03	165.88	165.91
FP-18	1/31/2006	168.61	3.70	3.76	0.06	164.85	164.90
FP-18	2/24/2006	168.61	ND	4.02	ND	164.59	164.59
FP-18	4/4/2006	106.65	ND	4.55	ND	102.10	102.10
FP-18	4/4/2006	168.61	ND	4.55	ND	164.06	164.06
FP-18	6/6/2006	168.61	ND	6.30	ND	162.31	162.31
FP-18	10/3/2006	168.61	ND	6.46	ND	162.15	162.15
FP-18	2/21/2007	168.61	ND	5.35	ND	163.26	163.26
FP-18	5/17/2007	168.61	ND	7.29	ND	161.32	161.32
FP-18	8/15/2007	168.61	ND	9.21	ND	159.40	159.40
FP-18	12/5/2007	168.61	ND	9.36	ND	159.25	159.25
FP-18	12/13/2007	168.61	ND	5.52	ND	163.09	163.09
FP-18	3/27/2008	168.61	4.81	4.85	0.04	163.76	163.80
FP-18	6/1/2008	168.61	4.91	4.91	0.00	163.70	163.70
FP-18	6/11/2008	168.61	4.91	4.91	0.00	163.70	163.70
FP-18	9/3/2008	168.61	ND	6.43	ND	162.18	162.18
FP-18	11/6/2008	168.61	ND	5.68	ND	162.93	162.93
FP-18	11/20/2008	168.61	ND	2.99	ND	165.62	165.62
FP-18	2/27/2009	168.61	ND	3.16	ND	165.45	165.45
FP-18	5/27/2009	168.61	ND	4.16	ND	164.45	164.45
FP-18	7/16/2009	168.61	ND	5.04	ND	163.57	163.57
FP-18	10/30/2009	168.61	ND	6.80	ND	161.81	161.81
FP-18	3/19/2010	168.61	ND	2.76	ND	165.85	165.85
FP-18	8/6/2010	168.61	ND	5.68	ND	162.93	162.93

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
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Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
FP-18	9/15/2010	168.61	ND	6.62	ND	161.99	161.99
FP-18	1/19/2011	168.61	ND	4.87	ND	163.74	163.74
FP-18	10/21/2011	168.61	ND	5.14	ND	163.47	163.47
FP-18	3/20/2012	168.61	ND	3.44	ND	165.17	165.17
FP-18	6/25/2012	168.61	ND	4.72	ND	163.89	163.89
FP-18	9/13/2012	168.61	ND	6.79	ND	161.82	161.82
FP-18	3/8/2013	168.61	ND	5.76	ND	162.85	162.85
FP-18	6/17/2013	168.61	ND	3.35	ND	165.26	165.26
FP-18	12/11/2013	168.61	ND	4.64	ND	163.97	163.97
FP-18	6/18/2014	168.61	ND	4.11	ND	164.50	164.50
FP-18	12/1/2014	168.61	ND	4.38	ND	164.23	164.23
FP-18	6/9/2015	168.61	ND	3.65	ND	164.96	164.96
FP-18	12/8/2015	168.61	ND	3.44	ND	165.17	165.17
FP-18	6/7/2016	168.61	ND	4.15	ND	164.46	164.46
FP-18	11/30/2016	168.61	ND	4.96	ND	163.65	163.65
FP-19	2/10/2005	167.75	ND	5.29	ND	162.46	162.46
FP-19	2/22/2005	167.75	ND	5.79	ND	161.96	161.96
FP-19	3/14/2005	167.75	ND	5.19	ND	162.56	162.56
FP-19	3/14/2005	167.75	ND	5.94	ND	161.81	161.81
FP-19	3/16/2005	167.75	ND	5.19	ND	162.56	162.56
FP-19	4/25/2005	167.75	ND	4.95	ND	162.80	162.80
FP-19	5/26/2005	167.75	ND	5.50	ND	162.25	162.25
FP-19	6/24/2005	167.75	ND	5.92	ND	161.83	161.83
FP-19	7/25/2005	167.75	ND	7.14	ND	160.61	160.61
FP-19	8/22/2005	167.75	ND	8.15	ND	159.60	159.60
FP-19	10/13/2005	167.75	ND	9.02	ND	158.73	158.73
FP-19	11/28/2005	167.75	ND	8.13	ND	159.62	159.62
FP-19	12/16/2005	167.75	ND	4.27	ND	163.48	163.48
FP-19	1/31/2006	167.75	ND	4.78	ND	162.97	162.97
FP-19	2/24/2006	167.75	ND	5.06	ND	162.69	162.69
FP-19	4/4/2006	167.75	ND	5.90	ND	161.85	161.85
FP-19	6/6/2006	167.75	ND	5.78	ND	161.97	161.97
FP-19	10/3/2006	167.75	ND	5.25	ND	162.50	162.50
FP-19	2/21/2007	167.75	ND	4.39	ND	163.36	163.36
FP-19	5/17/2007	167.75	ND	6.80	ND	160.95	160.95
FP-19	8/15/2007	167.75	ND	9.24	ND	158.51	158.51
FP-19	12/5/2007	167.75	ND	9.41	ND	158.34	158.34
FP-19	12/13/2007	167.75	ND	3.05	ND	164.70	164.70
FP-19	3/27/2008	167.75	ND	2.02	ND	165.73	165.73
FP-19	6/1/2008	167.75	ND	2.97	ND	164.78	164.78
FP-19	6/11/2008	167.75	ND	2.97	ND	164.78	164.78
FP-19	9/3/2008	167.75	ND	4.59	ND	163.16	163.16
FP-19	11/6/2008	167.75	ND	4.52	ND	163.23	163.23
FP-19	11/20/2008	167.75	ND	1.77	ND	165.98	165.98
FP-19	2/27/2009	167.75	ND	2.45	ND	165.30	165.30
FP-19	5/27/2009	167.75	ND	3.48	ND	164.27	164.27
FP-19	7/16/2009	167.75	ND	3.59	ND	164.16	164.16
FP-19	10/30/2009	167.75	ND	5.76	ND	161.99	161.99
FP-19	3/19/2010	167.75	ND	1.79	ND	165.96	165.96
FP-19	8/6/2010	167.75	ND	3.68	ND	164.07	164.07

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
FP-19	9/15/2010	167.75	ND	4.51	ND	163.24	163.24
FP-19	1/19/2011	167.75	ND	3.30	ND	164.45	164.45
FP-19	10/21/2011	167.75	ND	3.21	ND	164.54	164.54
FP-19	3/20/2012	167.75	ND	2.50	ND	165.25	165.25
FP-19	6/25/2012	167.75	ND	3.16	ND	164.59	164.59
FP-19	9/13/2012	167.75	ND	4.08	ND	163.67	163.67
FP-19	3/8/2013	167.75	ND	2.81	ND	164.94	164.94
FP-19	6/17/2013	167.75	ND	2.12	ND	165.63	165.63
FP-19	12/11/2013	167.75	ND	2.90	ND	164.85	164.85
FP-19	6/18/2014	167.75	ND	2.69	ND	165.06	165.06
FP-19	6/9/2015	167.75	ND	2.57	ND	165.18	165.18
FP-19	12/8/2015	167.75	ND	1.24	ND	166.51	166.51
FP-19	6/7/2016	167.75	ND	1.78	ND	165.97	165.97
FP-19	11/30/2016	167.75	ND	3.28	ND	164.47	164.47
FP-20	2/10/2005	NS	ND	6.01	ND	NS	NS
FP-20	2/22/2005	NS	ND	6.81	ND	NS	NS
FP-20	3/16/2005	NS	ND	5.94	ND	NS	NS
FP-20	4/25/2005	NS	ND	5.60	ND	NS	NS
FP-20	5/26/2005	NS	ND	6.38	ND	NS	NS
FP-20	6/24/2005	NS	ND	6.90	ND	NS	NS
FP-20	7/25/2005	NS	ND	6.42	ND	NS	NS
FP-20	8/22/2005	NS	ND	9.88	ND	NS	NS
FP-20	10/13/2005	NS	ND	7.38	ND	NS	NS
FP-20	11/28/2005	NS	ND	6.04	ND	NS	NS
FP-20	12/16/2005	NS	ND	4.16	ND	NS	NS
FP-20	1/31/2006	NS	ND	5.84	ND	NS	NS
FP-20	2/24/2006	NS	ND	5.84	ND	NS	NS
FP-20	4/4/2006	NS	ND	5.83	ND	NS	NS
FP-20	6/6/2006	NS	ND	5.76	ND	NS	NS
FP-20	10/3/2006	NS	ND	6.42	ND	NS	NS
FP-20	2/21/2007	NS	ND	5.16	ND	NS	NS
FP-20	5/17/2007	NS	ND	8.14	ND	NS	NS
FP-20	8/15/2007	NS	ND	9.90	ND	NS	NS
FP-20	12/5/2007	NS	ND	9.91	ND	NS	NS
MW-01	3/29/2000	166.95	ND	2.19	ND	164.76	164.76
MW-01	5/31/2000	166.95	ND	4.77	ND	162.18	162.18
MW-01	10/27/2000	166.95	ND	4.69	ND	162.26	162.26
MW-01	4/16/2001	166.95	ND	2.63	ND	164.32	164.32
MW-01	2/8/2005	166.95	ND	4.05	ND	162.90	162.90
MW-01	3/15/2005	166.95	ND	3.95	ND	163.00	163.00
MW-01	4/4/2006	166.95	ND	4.89	ND	162.06	162.06
MW-01	3/27/2007	166.95	ND	2.92	ND	164.03	164.03
MW-01	3/28/2007	166.95	ND	2.92	ND	164.03	164.03
MW-01	12/13/2007	166.95	ND	6.05	ND	160.90	160.90
MW-01	6/11/2008	166.95	ND	5.35	ND	161.60	161.60
MW-01	11/30/2009	166.95	ND	4.70	ND	162.25	162.25
MW-01	9/22/2010	166.95	ND	8.56	ND	158.39	158.39
MW-01	5/24/2011	166.95	ND	4.61	ND	162.34	162.34
MW-01	12/6/2011	166.95	ND	5.66	ND	161.29	161.29

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
MW-01	6/25/2012	166.95	ND	6.65	ND	160.30	160.30
MW-01	12/3/2012	166.95	ND	8.89	ND	158.06	158.06
MW-01	6/17/2013	166.95	ND	2.14	ND	164.81	164.81
MW-01	12/11/2013	166.95	ND	3.89	ND	163.06	163.06
MW-01	6/18/2014	166.95	ND	3.55	ND	163.40	163.40
MW-01	12/1/2014	166.95	ND	2.26	ND	164.69	164.69
MW-01	6/9/2015	166.95	ND	2.96	ND	163.99	163.99
MW-01	12/8/2015	166.95	ND	1.33	ND	165.62	165.62
MW-01	6/7/2016	166.95	ND	3.27	ND	163.68	163.68
MW-01	11/30/2016	166.95	ND	4.51	ND	162.44	162.44
MW-02	3/29/2000	169.08	ND	1.47	ND	167.61	167.61
MW-02	5/31/2000	169.08	ND	5.06	ND	164.02	164.02
MW-02	10/27/2000	169.08	ND	5.33	ND	163.75	163.75
MW-02	4/16/2001	169.08	ND	2.56	ND	166.52	166.52
MW-02	2/8/2005	169.08	ND	5.22	ND	163.86	163.86
MW-02	3/15/2005	169.08	ND	4.97	ND	164.11	164.11
MW-02	4/4/2006	169.08	ND	6.22	ND	162.86	162.86
MW-02	3/27/2007	169.08	ND	3.20	ND	165.88	165.88
MW-02	3/28/2007	169.08	ND	3.20	ND	165.88	165.88
MW-02	12/13/2007	169.08	ND	8.53	ND	160.55	160.55
MW-02	6/11/2008	169.08	ND	6.16	ND	162.92	162.92
MW-02	11/30/2009	169.08	ND	6.15	ND	162.93	162.93
MW-02	9/22/2010	169.08	ND	9.67	ND	159.41	159.41
MW-02	5/24/2011	169.08	ND	5.81	ND	163.27	163.27
MW-02	12/6/2011	169.08	ND	7.72	ND	161.36	161.36
MW-02	6/25/2012	169.08	ND	7.63	ND	161.45	161.45
MW-02	12/3/2012	169.08	ND	10.33	ND	158.75	158.75
MW-02	6/17/2013	169.08	ND	2.76	ND	166.32	166.32
MW-02	12/11/2013	169.08	ND	5.07	ND	164.01	164.01
MW-02	6/18/2014	169.08	ND	2.51	ND	166.57	166.57
MW-02	12/1/2014	169.08	ND	2.91	ND	166.17	166.17
MW-02	6/9/2015	169.08	ND	2.67	ND	166.41	166.41
MW-02	12/8/2015	169.08	ND	2.33	ND	166.75	166.75
MW-02	6/7/2016	169.08	ND	3.40	ND	165.68	165.68
MW-02	11/30/2016	169.08	ND	4.81	ND	164.27	164.27
MW-03	3/29/2000	168.89	ND	2.55	ND	166.34	166.34
MW-03	5/31/2000	168.89	ND	4.56	ND	164.33	164.33
MW-03	10/27/2000	168.89	ND	4.20	ND	164.69	164.69
MW-03	4/16/2001	168.89	ND	2.62	ND	166.27	166.27
MW-03	2/8/2005	168.89	ND	3.54	ND	165.35	165.35
MW-03	3/14/2005	168.89	ND	3.61	ND	165.28	165.28
MW-03	4/4/2006	168.89	ND	4.41	ND	164.48	164.48
MW-03	3/27/2007	168.89	ND	2.75	ND	166.14	166.14
MW-03	12/13/2007	168.89	ND	5.61	ND	163.28	163.28
MW-03	6/11/2008	168.89	ND	4.87	ND	164.02	164.02
MW-03	11/30/2009	168.89	ND	4.29	ND	164.60	164.60
MW-03	9/22/2010	168.89	ND	7.28	ND	161.61	161.61
MW-03	5/24/2011	168.89	ND	4.43	ND	164.46	164.46
MW-03	12/6/2011	168.89	ND	5.54	ND	163.35	163.35

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
MW-03	6/25/2012	168.89	ND	5.82	ND	163.07	163.07
MW-03	12/3/2012	168.89	ND	7.76	ND	161.13	161.13
MW-03	6/17/2013	168.89	ND	3.59	ND	165.30	165.30
MW-03	12/11/2013	168.89	ND	3.85	ND	165.04	165.04
MW-03	6/18/2014	168.89	ND	3.42	ND	165.47	165.47
MW-03	12/1/2014	168.89	ND	2.81	ND	166.08	166.08
MW-03	6/9/2015	168.89	ND	3.00	ND	165.89	165.89
MW-03	12/8/2015	168.89	ND	2.61	ND	166.28	166.28
MW-03	6/7/2016	168.89	ND	2.73	ND	166.16	166.16
MW-03	11/30/2016	168.89	ND	4.12	ND	164.77	164.77
MW-04	3/29/2000	168.29	ND	3.77	ND	164.52	164.52
MW-04	5/31/2000	168.29	ND	5.74	ND	162.55	162.55
MW-04	10/27/2000	168.29	ND	5.32	ND	162.97	162.97
MW-04	4/16/2001	168.29	ND	4.11	ND	164.18	164.18
MW-04	2/8/2005	168.29	ND	4.61	ND	163.68	163.68
MW-04	3/14/2005	168.29	ND	4.73	ND	163.56	163.56
MW-04	4/4/2006	168.29	ND	5.35	ND	162.94	162.94
MW-04	3/27/2007	168.29	ND	4.07	ND	164.22	164.22
MW-04	12/13/2007	168.29	ND	6.33	ND	161.96	161.96
MW-04	6/11/2008	168.29	ND	6.18	ND	162.11	162.11
MW-04	11/30/2009	168.29	ND	4.76	ND	163.53	163.53
MW-04	9/22/2010	168.29	ND	8.24	ND	160.05	160.05
MW-04	5/24/2011	168.29	ND	5.52	ND	162.77	162.77
MW-04	12/6/2011	168.29	ND	6.23	ND	162.06	162.06
MW-04	6/25/2012	168.29	ND	7.26	ND	161.03	161.03
MW-04	12/3/2012	168.29	ND	8.69	ND	159.60	159.60
MW-04	6/17/2013	168.29	ND	5.37	ND	162.92	162.92
MW-04	12/11/2013	168.29	ND	4.83	ND	163.46	163.46
MW-04	6/18/2014	168.29	ND	5.30	ND	162.99	162.99
MW-04	12/1/2014	168.29	ND	1.11	ND	167.18	167.18
MW-04	6/9/2015	168.29	ND	4.58	ND	163.71	163.71
MW-04	12/8/2015	168.29	ND	5.86	ND	162.43	162.43
MW-04	6/7/2016	168.29	ND	6.71	ND	161.58	161.58
MW-04	11/30/2016	168.29	ND	7.61	ND	160.68	160.68
MW-05	3/29/2000	169.19	3.02	6.63	3.61	162.56	165.45
MW-05	5/31/2000	169.19	4.82	9.10	4.28	160.09	163.51
MW-05	10/27/2000	169.19	4.99	6.64	1.65	162.55	163.87
MW-05	4/16/2001	169.19	3.86	4.19	0.33	165.00	165.26
MW-05	2/10/2005	169.19	ND	4.94	ND	164.25	164.25
MW-05	2/22/2005	169.19	ND	5.19	ND	164.00	164.00
MW-05	3/16/2005	169.19	ND	4.82	ND	164.37	164.37
MW-05	4/4/2006	169.19	ND	5.59	ND	163.60	163.60
MW-05	10/3/2006	169.19	ND	6.03	ND	163.16	163.16
MW-05	3/14/2007	169.19	ND	4.82	ND	164.37	164.37
MW-05	3/27/2007	169.19	ND	3.99	ND	165.20	165.20
MW-05	3/28/2007	169.19	ND	3.99	ND	165.20	165.20
MW-05	12/13/2007	169.19	ND	5.61	ND	163.58	163.58
MW-05	12/13/2007	169.19	ND	6.49	ND	162.70	162.70
MW-05	6/11/2008	169.19	ND	6.01	ND	163.18	163.18

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
MW-05	3/17/2009	169.19	ND	2.46	ND	166.73	166.73
MW-05	6/17/2009	169.19	ND	3.82	ND	165.37	165.37
MW-05	9/10/2009	169.19	ND	7.34	ND	161.85	161.85
MW-05	11/30/2009	169.19	ND	4.88	ND	164.31	164.31
MW-05	9/22/2010	169.19	ND	8.31	ND	160.88	160.88
MW-05	5/24/2011	169.19	ND	4.71	ND	164.48	164.48
MW-05	12/6/2011	169.19	ND	7.45	ND	161.74	161.74
MW-05	6/25/2012	169.19	ND	7.64	ND	161.55	161.55
MW-05	12/3/2012	169.19	ND	10.06	ND	159.13	159.13
MW-05	6/17/2013	169.19	ND	4.95	ND	164.24	164.24
MW-05	12/11/2013	169.19	ND	7.50	ND	161.69	161.69
MW-05	6/18/2014	169.19	ND	6.42	ND	162.77	162.77
MW-05	12/1/2014	169.19	ND	6.84	ND	162.35	162.35
MW-05	6/9/2015	169.19	ND	4.61	ND	164.58	164.58
MW-05	12/8/2015	169.19	ND	5.39	ND	163.80	163.80
MW-05	6/7/2016	169.19	ND	1.20	ND	167.99	167.99
MW-05	11/30/2016	169.19	ND	4.49	ND	164.70	164.70
MW-05	3/19/2010	169.19	ND	3.17	ND	166.02	166.02
MW-06	3/29/2000	168.88	2.89	5.56	2.67	163.32	165.46
MW-06	5/31/2000	168.88	4.62	6.88	2.26	162.00	163.81
MW-06	10/27/2000	168.88	4.88	5.27	0.39	163.61	163.92
MW-06	4/16/2001	168.88	3.35	3.62	0.27	165.26	165.48
MW-06	2/10/2005	168.88	3.85	5.73	1.88	163.15	164.65
MW-06	2/22/2005	168.88	4.36	6.22	1.86	162.66	164.15
MW-06	3/14/2005	168.88	3.92	5.06	1.14	163.82	164.73
MW-06	3/16/2005	168.88	3.92	5.06	1.14	163.82	164.73
MW-06	4/25/2005	168.88	2.60	5.95	3.35	162.93	165.61
MW-06	5/26/2005	168.88	4.26	6.32	2.06	162.56	164.21
MW-06	6/24/2005	168.88	4.99	6.01	1.02	162.87	163.69
MW-06	7/25/2005	168.88	5.55	6.19	0.64	162.69	163.20
MW-06	8/22/2005	168.88	ND	6.60	ND	162.28	162.28
MW-06	10/13/2005	168.88	ND	6.76	ND	162.12	162.12
MW-06	11/28/2005	168.88	ND	6.80	ND	162.08	162.08
MW-06	12/16/2005	168.88	3.60	5.14	1.54	163.74	164.97
MW-06	1/31/2006	168.88	3.52	6.49	2.97	162.39	164.77
MW-06	2/24/2006	168.88	4.11	6.32	2.21	162.56	164.33
MW-06	4/4/2006	168.88	4.88	6.25	1.37	162.63	163.73
MW-06	6/6/2006	168.88	5.34	5.86	0.52	163.02	163.44
MW-06	10/3/2006	168.88	5.17	6.60	1.43	162.28	163.42
MW-06	2/21/2007	168.88	2.44	3.69	1.25	165.19	166.19
MW-06	3/28/2007	168.88	3.08	4.83	1.75	164.05	165.45
MW-06	5/17/2007	168.88	6.18	6.65	0.47	162.23	162.61
MW-06	8/15/2007	168.88	DRY	DRY	DRY	DRY	DRY
MW-06	10/9/2007	168.88	DRY	DRY	DRY	DRY	DRY
MW-06	12/5/2007	168.88	ND	6.64	ND	162.24	162.24
MW-06	12/13/2007	168.88	5.75	6.54	0.79	162.34	162.97
MW-06	3/27/2008	168.88	3.53	4.44	0.91	164.44	165.17
MW-06	6/11/2008	168.88	5.19	6.44	1.25	162.44	163.44
MW-06	6/30/2008	168.88	NM	NM	NM	NM	NM
MW-06	9/3/2008	168.88	6.59	6.59	0.00	162.29	162.29

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
MW-06	11/6/2008	168.88	5.49	5.70	0.21	163.18	163.35
MW-06	11/20/2008	168.88	2.58	2.93	0.35	165.95	166.23
MW-06	2/27/2009	168.88	3.31	4.45	1.14	164.43	165.34
MW-06	3/17/2009	168.88	0.91	1.43	0.52	167.45	167.87
MW-06	5/27/2009	168.88	5.07	5.52	0.45	163.36	163.72
MW-06	6/17/2009	168.88	1.62	2.49	0.87	166.39	167.09
MW-06	7/16/2009	168.88	5.98	6.32	0.34	162.56	162.83
MW-06	9/10/2009	168.88	6.48	6.58	0.10	162.30	162.38
MW-06	10/30/2009	168.88	6.60	6.60	0.00	162.28	162.28
MW-06	11/30/2009	168.88	ND	3.85	ND	165.03	165.03
MW-06	3/19/2010	168.88	1.87	2.10	0.23	166.78	166.96
MW-06	3/22/2010	168.88	1.87	2.10	0.23	166.78	166.96
MW-06	5/25/2010	168.88	2.15	2.75	0.60	166.13	166.61
MW-06	6/17/2010	168.88	3.28	3.97	0.69	164.91	165.46
MW-06	6/25/2010	168.88	4.87	5.01	0.14	163.87	163.98
MW-06	8/6/2010	168.88	ND	6.16	ND	162.72	162.72
MW-06	9/15/2010	168.88	ND	6.58	ND	162.30	162.30
MW-06	9/22/2010	168.88	ND	6.62	ND	162.26	162.26
MW-06	1/19/2011	168.88	ND	5.27	ND	163.61	163.61
MW-06	3/18/2011	168.88	3.54	3.54	0.00	165.34	165.34
MW-06	5/24/2011	168.88	ND	3.78	ND	165.10	165.10
MW-06	10/21/2011	168.88	ND	5.51	ND	163.37	163.37
MW-06	12/6/2011	168.88	ND	4.84	ND	164.04	164.04
MW-06	1/31/2012	168.88	ND	3.49	ND	165.39	165.39
MW-06	3/1/2012	168.88	ND	3.12	ND	165.76	165.76
MW-06	3/20/2012	168.88	ND	3.04	ND	165.84	165.84
MW-06	4/20/2012	168.88	ND	2.53	ND	166.35	166.35
MW-06	5/25/2012	168.88	ND	2.01	ND	166.87	166.87
MW-06	6/25/2012	168.88	ND	5.89	ND	162.99	162.99
MW-06	7/24/2012	168.88	DRY	DRY	DRY	DRY	DRY
MW-06	9/13/2012	168.88	ND	5.28	ND	163.60	163.60
MW-06	10/9/2012	168.88	ND	5.46	ND	163.42	163.42
MW-06	12/3/2012	168.88	ND	6.62	ND	162.26	162.26
MW-06	12/18/2012	168.88	ND	6.08	ND	162.80	162.80
MW-06	1/3/2013	168.88	ND	5.88	ND	163.00	163.00
MW-06	1/13/2013	168.88	ND	5.88	ND	163.00	163.00
MW-06	1/31/2013	168.88	ND	2.57	ND	166.31	166.31
MW-06	3/8/2013	168.88	ND	2.08	ND	166.80	166.80
MW-06	4/19/2013	168.88	ND	2.55	ND	166.33	166.33
MW-06	5/30/2013	168.88	ND	2.34	ND	166.54	166.54
MW-06	6/17/2013	168.88	ND	2.60	ND	166.28	166.28
MW-06	12/11/2013	168.88	ND	5.30	ND	163.58	163.58
MW-06	6/18/2014	168.88	ND	5.56	ND	163.32	163.32
MW-06	12/1/2014	168.88	ND	2.12	ND	166.76	166.76
MW-06	6/9/2015	168.88	ND	2.85	ND	166.03	166.03
MW-06	12/8/2015	168.88	ND	1.54	ND	167.34	167.34
MW-06	6/7/2016	168.88	ND	1.22	ND	167.66	167.66
MW-06	11/30/2016	168.88	ND	3.17	ND	165.71	165.71
MW-07	3/29/2000	167.97	ND	3.18	ND	164.79	164.79
MW-07	5/31/2000	167.97	ND	5.10	ND	162.87	162.87

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
MW-07	10/27/2000	167.97	ND	4.75	ND	163.22	163.22
MW-07	4/16/2001	167.97	3.35	3.53	0.18	164.44	164.58
MW-07	2/8/2005	167.97	ND	3.95	ND	164.02	164.02
MW-07	2/10/2005	167.97	ND	3.95	ND	164.02	164.02
MW-07	2/22/2005	167.97	ND	4.44	ND	163.53	163.53
MW-07	3/14/2005	167.97	ND	4.05	ND	163.92	163.92
MW-07	3/16/2005	167.97	ND	4.05	ND	163.92	163.92
MW-07	4/4/2006	167.97	ND	4.77	ND	163.20	163.20
MW-07	10/3/2006	167.97	NG	NG	NG	NG	NG
MW-07	3/28/2007	167.97	ND	3.36	ND	164.61	164.61
MW-07	12/13/2007	167.97	ND	5.66	ND	162.31	162.31
MW-07	6/11/2008	167.97	ND	5.44	ND	162.53	162.53
MW-07	11/30/2009	167.97	ND	4.07	ND	163.90	163.90
MW-07	9/22/2010	167.97	ND	7.68	ND	160.29	160.29
MW-07	5/24/2011	167.97	ND	4.61	ND	163.36	163.36
MW-07	12/6/2011	167.97	ND	6.32	ND	161.65	161.65
MW-07	6/25/2012	167.97	ND	4.07	ND	163.90	163.90
MW-07	12/3/2012	167.97	ND	8.51	ND	159.46	159.46
MW-07	6/17/2013	167.97	ND	4.02	ND	163.95	163.95
MW-07	12/11/2013	167.97	ND	5.84	ND	162.13	162.13
MW-07	6/18/2014	167.97	ND	5.49	ND	162.48	162.48
MW-07	12/1/2014	167.97	ND	4.86	ND	163.11	163.11
MW-07	6/9/2015	167.97	ND	3.97	ND	164.00	164.00
MW-07	12/8/2015	167.97	ND	4.12	ND	163.85	163.85
MW-07	6/7/2016	167.97	ND	3.52	ND	164.45	164.45
MW-07	11/30/2016	167.97	ND	4.13	ND	163.84	163.84
MW-08	3/29/2000	165.85	ND	1.54	ND	164.31	164.31
MW-08	5/31/2000	165.85	ND	3.41	ND	162.44	162.44
MW-08	10/27/2000	165.85	ND	3.08	ND	162.77	162.77
MW-08	4/16/2001	165.85	ND	1.95	ND	163.90	163.90
MW-08	2/8/2005	165.85	ND	6.49	ND	159.36	159.36
MW-08	3/14/2005	165.85	NM	NM	NM	NM	NM
MW-08	4/4/2006	165.85	ND	2.97	ND	162.88	162.88
MW-08	3/28/2007	165.85	ND	1.88	ND	163.97	163.97
MW-08	12/13/2007	165.85	ND	3.93	ND	161.92	161.92
MW-08	6/11/2008	165.85	ND	3.95	ND	161.90	161.90
MW-08	11/30/2009	165.85	ND	2.66	ND	163.19	163.19
MW-08	9/22/2010	165.85	ND	6.38	ND	159.47	159.47
MW-08	5/24/2011	165.85	ND	3.37	ND	162.48	162.48
MW-08	12/6/2011	165.85	ND	4.84	ND	161.01	161.01
MW-08	6/25/2012	165.85	ND	5.00	ND	160.85	160.85
MW-08	12/3/2012	165.85	ND	6.38	ND	159.47	159.47
MW-08	6/17/2013	165.85	ND	2.39	ND	163.46	163.46
MW-08	12/11/2013	165.85	ND	2.67	ND	163.18	163.18
MW-08	6/18/2014	165.85	ND	3.29	ND	162.56	162.56
MW-08	12/1/2014	165.85	ND	1.11	ND	164.74	164.74
MW-08	6/9/2015	165.85	ND	2.70	ND	163.15	163.15
MW-08	12/8/2015	165.85	ND	NM	ND	NM	NM
MW-08	6/7/2016	165.47	ND	2.35	ND	163.12	163.12

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
MW-08	11/30/2016	165.47	ND	3.20	ND	162.27	162.27
MW-09	3/29/2000	169.82	ND	5.23	ND	164.59	164.59
MW-09	5/31/2000	169.82	ND	7.15	ND	162.67	162.67
MW-09	10/27/2000	169.82	ND	7.92	ND	161.90	161.90
MW-09	4/16/2001	169.82	ND	5.64	ND	164.18	164.18
MW-09	3/14/2005	169.82	ND	6.63	ND	163.19	163.19
MW-09	3/14/2005	169.82	ND	6.63	ND	163.19	163.19
MW-09	4/4/2006	169.82	ND	7.32	ND	162.50	162.50
MW-09	4/4/2006	169.82	ND	7.32	ND	162.50	162.50
MW-09	3/28/2007	169.82	ND	5.78	ND	164.04	164.04
MW-09	3/28/2007	169.82	ND	5.78	ND	164.04	164.04
MW-09	12/13/2007	169.82	ND	8.47	ND	161.35	161.35
MW-09	6/11/2008	169.82	ND	7.92	ND	161.90	161.90
MW-09	11/30/2009	169.82	ND	6.81	ND	163.01	163.01
MW-09	9/22/2010	169.82	ND	10.85	ND	158.97	158.97
MW-09	5/24/2011	169.82	ND	7.78	ND	162.04	162.04
MW-09	12/6/2011	169.82	ND	8.19	ND	161.63	161.63
MW-09	6/27/2012	169.82	ND	8.81	ND	161.01	161.01
MW-09	12/3/2012	169.82	ND	10.72	ND	159.10	159.10
MW-09	6/17/2013	169.82	ND	5.69	ND	164.13	164.13
MW-09	12/11/2013	169.82	ND	6.86	ND	162.96	162.96
MW-09	6/18/2014	169.82	ND	6.72	ND	163.10	163.10
MW-09	12/1/2014	169.82	NM	NM	NM	NM	NM
MW-09	6/9/2015	169.82	ND	6.21	ND	163.61	163.61
MW-09	12/8/2015	169.82	ND	5.10	ND	164.72	164.72
MW-09	6/7/2016	169.53	ND	5.45	ND	164.08	164.08
MW-09	11/30/2016	169.53	ND	6.98	ND	162.55	162.55
MW-10	3/29/2000	169.82	ND	2.00	ND	167.82	167.82
MW-10	5/31/2000	169.82	ND	4.62	ND	165.20	165.20
MW-10	10/27/2000	169.82	ND	4.43	ND	165.39	165.39
MW-10	4/16/2001	169.82	ND	2.42	ND	167.40	167.40
MW-11D	3/29/2000	166.93	ND	1.65	ND	165.28	165.28
MW-11D	5/31/2000	166.93	ND	3.78	ND	163.15	163.15
MW-11D	10/27/2000	166.93	ND	3.57	ND	163.36	163.36
MW-11D	4/16/2001	166.93	ND	2.17	ND	164.76	164.76
MW-11d	2/8/2005	166.93	ND	3.22	ND	163.71	163.71
MW-11D	3/14/2005	166.93	ND	3.42	ND	163.51	163.51
MW-11D	4/4/2006	166.93	ND	4.60	ND	162.33	162.33
MW-11D	3/27/2007	166.93	ND	2.24	ND	164.69	164.69
MW-11D	3/28/2007	166.93	ND	2.24	ND	164.69	164.69
MW-11D	12/13/2007	166.93	ND	5.15	ND	161.78	161.78
MW-11D	6/11/2008	166.93	ND	4.74	ND	162.19	162.19
MW-11D	11/30/2009	166.93	ND	4.11	ND	162.82	162.82
MW-11D	9/22/2010	166.93	ND	6.12	ND	160.81	160.81
MW-11D	5/24/2011	166.93	ND	4.47	ND	162.46	162.46
MW-11D	12/6/2011	166.93	ND	4.34	ND	162.59	162.59
MW-11D	6/25/2012	166.93	ND	5.32	ND	161.61	161.61
MW-11D	12/3/2012	166.93	ND	6.17	ND	160.76	160.76
MW-11D	6/17/2013	166.93	ND	5.05	ND	161.88	161.88

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
MW-11D	12/11/2013	166.93	ND	3.26	ND	163.67	163.67
MW-11D	6/18/2014	166.93	ND	3.32	ND	163.61	163.61
MW-11D	12/1/2014	166.93	ND	1.05	ND	165.88	165.88
MW-11D	6/9/2015	166.93	ND	1.49	ND	165.44	165.44
MW-11D	12/8/2015	166.93	ND	1.64	ND	165.29	165.29
MW-11D	6/7/2016	166.65	ND	1.81	ND	164.84	164.84
MW-11D	11/30/2016	166.65	ND	2.38	ND	164.27	164.27
MW-12D	3/29/2000	168.36	ND	4.64	ND	163.72	163.72
MW-12D	5/31/2000	168.36	ND	16.44	ND	151.92	151.92
MW-12D	10/27/2000	168.36	ND	8.25	ND	160.11	160.11
MW-12D	4/16/2001	168.36	ND	4.63	ND	163.73	163.73
MW-12D	3/14/2005	168.36	ND	5.83	ND	162.53	162.53
MW-12D	3/14/2005	168.36	ND	5.83	ND	162.53	162.53
MW-12D	4/4/2006	168.36	ND	8.15	ND	160.21	160.21
MW-12D	3/27/2007	168.36	ND	4.79	ND	163.57	163.57
MW-12D	3/27/2007	168.36	ND	4.79	ND	163.57	163.57
MW-12D	12/13/2007	168.36	ND	7.48	ND	160.88	160.88
MW-12D	6/11/2008	168.36	ND	6.72	ND	161.64	161.64
MW-12D	11/30/2009	168.36	ND	6.71	ND	161.65	161.65
MW-12D	9/22/2010	168.36	ND	8.90	ND	159.46	159.46
MW-12D	5/24/2011	168.36	ND	6.18	ND	162.18	162.18
MW-12D	12/6/2011	168.36	ND	6.94	ND	161.42	161.42
MW-12D	6/25/2012	168.36	ND	7.52	ND	160.84	160.84
MW-12D	12/3/2012	168.36	ND	9.30	ND	159.06	159.06
MW-12D	6/17/2013	168.36	ND	5.21	ND	163.15	163.15
MW-12D	12/11/2013	168.36	ND	6.06	ND	162.30	162.30
MW-12D	6/18/2014	168.36	ND	5.76	ND	162.60	162.60
MW-12D	12/1/2014	168.36	ND	4.92	ND	163.44	163.44
MW-12D	6/9/2015	168.36	ND	5.19	ND	163.17	163.17
MW-12D	12/8/2015	171.09	ND	7.43	ND	163.66	163.66
MW-12D	6/7/2016	171.09	ND	8.11	ND	162.98	162.98
MW-12D	11/30/2016	171.09	ND	8.86	ND	162.23	162.23
MW-13	3/29/2000	168.27	ND	3.50	ND	164.77	164.77
MW-13	5/31/2000	168.27	ND	5.55	ND	162.72	162.72
MW-13	10/27/2000	168.27	ND	5.18	ND	163.09	163.09
MW-13	4/16/2001	168.27	ND	3.95	ND	164.32	164.32
MW-13	2/8/2005	168.27	ND	4.51	ND	163.76	163.76
MW-13	2/8/2005	168.27	ND	5.58	ND	162.69	162.69
MW-13	3/14/2005	168.27	ND	4.65	ND	163.62	163.62
MW-13	4/4/2006	168.27	ND	5.32	ND	162.95	162.95
MW-13	3/27/2007	168.27	ND	3.78	ND	164.49	164.49
MW-13	12/13/2007	168.27	ND	6.34	ND	161.93	161.93
MW-13	6/11/2008	168.27	ND	6.04	ND	162.23	162.23
MW-13	3/25/2009	168.27	ND	3.26	ND	165.01	165.01
MW-13	6/17/2009	168.27	ND	4.23	ND	164.04	164.04
MW-13	9/10/2009	168.27	ND	7.30	ND	160.97	160.97
MW-13	11/30/2009	168.27	ND	4.79	ND	163.48	163.48
MW-13	9/22/2010	168.27	ND	8.50	ND	159.77	159.77
MW-13	5/24/2011	168.27	ND	5.31	ND	162.96	162.96

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
MW-13	12/6/2011	168.27	ND	6.15	ND	162.12	162.12
MW-13	6/25/2012	168.27	ND	7.06	ND	161.21	161.21
MW-13	12/3/2012	168.27	ND	8.76	ND	159.51	159.51
MW-13	6/17/2013	168.27	ND	4.94	ND	163.33	163.33
MW-13	12/11/2013	168.27	ND	4.75	ND	163.52	163.52
MW-13	6/18/2014	168.27	ND	5.08	ND	163.19	163.19
MW-13	12/1/2014	168.27	NM	NM	NM	NM	NM
MW-13	6/9/2015	168.27	ND	5.99	ND	162.28	162.28
MW-13	12/8/2015	168.27	ND	4.97	ND	163.30	163.30
MW-13	6/7/2016	169.32	ND	6.09	ND	163.23	163.23
MW-13	11/30/2016	169.32	ND	6.77	ND	162.55	162.55
MW-14	3/29/2000	168.59	ND	3.09	ND	165.50	165.50
MW-14	5/31/2000	168.59	ND	4.87	ND	163.72	163.72
MW-14	10/27/2000	168.59	ND	4.56	ND	164.03	164.03
MW-14	4/16/2001	168.59	ND	3.29	ND	165.30	165.30
MW-14	2/8/2005	168.59	ND	4.35	ND	164.24	164.24
MW-14	3/14/2005	168.59	ND	4.45	ND	164.14	164.14
MW-14	4/4/2006	168.59	ND	5.32	ND	163.27	163.27
MW-14	3/27/2007	168.59	ND	3.18	ND	165.41	165.41
MW-14	12/13/2007	168.59	ND	6.71	ND	161.88	161.88
MW-14	6/11/2008	168.59	ND	5.49	ND	163.10	163.10
MW-14	11/30/2009	168.59	ND	4.83	ND	163.76	163.76
MW-14	9/22/2010	168.59	ND	8.51	ND	160.08	160.08
MW-14	5/24/2011	168.59	ND	4.94	ND	163.65	163.65
MW-14	12/6/2011	168.59	ND	6.31	ND	162.28	162.28
MW-14	6/25/2012	168.59	ND	6.79	ND	161.80	161.80
MW-14	12/3/2012	168.59	ND	9.15	ND	159.44	159.44
MW-14	6/17/2013	168.59	ND	3.56	ND	165.03	165.03
MW-14	12/11/2013	168.59	ND	4.95	ND	163.64	163.64
MW-14	6/18/2014	168.59	ND	4.03	ND	164.56	164.56
MW-14	12/1/2014	168.59	NM	NM	NM	NM	NM
MW-14	6/9/2015	168.59	ND	3.60	ND	164.99	164.99
MW-14	12/8/2015	170.66	ND	5.34	ND	165.32	165.32
MW-14	6/7/2016	170.66	ND	5.81	ND	164.85	164.85
MW-14	11/30/2016	170.66	ND	7.13	ND	163.53	163.53
MW-15	3/29/2000	167.40	ND	1.63	ND	165.77	165.77
MW-15	5/31/2000	167.40	ND	4.27	ND	163.13	163.13
MW-15	10/27/2000	167.40	ND	4.34	ND	163.06	163.06
MW-15	4/16/2001	167.40	ND	2.05	ND	165.35	165.35
MW-15	2/8/2005	167.40	ND	3.94	ND	163.46	163.46
MW-15	3/14/2005	167.40	ND	2.05	ND	165.35	165.35
MW-15	4/4/2006	167.40	ND	4.67	ND	162.73	162.73
MW-15	3/27/2007	167.40	ND	2.38	ND	165.02	165.02
MW-15	3/28/2007	167.40	ND	2.38	ND	165.02	165.02
MW-15	12/13/2007	167.40	ND	6.22	ND	161.18	161.18
MW-15	6/11/2008	167.40	ND	4.62	ND	162.78	162.78
MW-15	11/30/2009	167.40	ND	3.13	ND	164.27	164.27
MW-15	9/22/2010	167.40	ND	8.51	ND	158.89	158.89
MW-15	5/24/2011	167.40	ND	4.00	ND	163.40	163.40

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
MW-15	12/6/2011	167.40	ND	5.48	ND	161.92	161.92
MW-15	6/25/2012	167.40	ND	6.51	ND	160.89	160.89
MW-15	12/3/2012	167.40	NM	NM	NM	NM	NM
MW-15	6/17/2013	167.40	NM	NM	NM	NM	NM
MW-15	12/11/2013	167.40	ND	3.14	ND	164.26	164.26
MW-15	6/18/2014	167.40	ND	2.88	ND	164.52	164.52
MW-15	12/1/2014	167.40	NM	NM	NM	NM	NM
MW-15	6/9/2015	167.40	ND	2.37	ND	165.03	165.03
MW-15	12/8/2015	167.40	NM	NM	NM	NM	NM
MW-15	6/7/2016	169.62	ND	4.74	ND	164.88	164.88
MW-15	11/30/2016	169.62	ND	6.66	ND	162.96	162.96
MW-16	3/29/2000	162.71	ND	2.14	ND	160.57	160.57
MW-16	5/31/2000	162.71	ND	1.54	ND	161.17	161.17
MW-16	10/27/2000	162.71	ND	3.86	ND	158.85	158.85
MW-16	4/16/2001	162.71	NF	NF	NF	NF	NF
MW-16	3/27/2007	162.71	ND	1.13	ND	161.58	161.58
MW-16	3/28/2007	162.71	ND	1.13	ND	161.58	161.58
MW-16	12/13/2007	162.71	ND	2.28	ND	160.43	160.43
MW-16	6/11/2008	162.71	ND	3.47	ND	159.24	159.24
MW-16	11/30/2009	162.71	ND	1.07	ND	161.64	161.64
MW-16	9/22/2010	162.71	ND	5.02	ND	157.69	157.69
MW-16	5/24/2011	162.71	ND	2.42	ND	160.29	160.29
MW-16	12/6/2011	162.71	ND	2.09	ND	160.62	160.62
MW-16	6/25/2012	162.71	ND	4.09	ND	158.62	158.62
MW-16	12/3/2012	162.71	ND	4.57	ND	158.14	158.14
MW-16	6/17/2013	162.71	ND	1.77	ND	160.94	160.94
MW-16	12/11/2013	162.71	ND	0.91	ND	161.80	161.80
MW-16	6/18/2014	162.71	ND	2.64	ND	160.07	160.07
MW-16	12/1/2014	162.71	ND	0.51	ND	162.20	162.20
MW-16	6/9/2015	162.71	ND	1.97	ND	160.74	160.74
MW-16	12/8/2015	162.71	ND	0.20	ND	162.51	162.51
MW-16	6/7/2016	162.34	ND	1.52	ND	160.82	160.82
MW-16	11/30/2016	162.34	ND	2.19	ND	160.15	160.15
MW-18	3/29/2000	161.18	ND	0.50	ND	160.68	160.68
MW-18	5/31/2000	161.18	ND	1.89	ND	159.29	159.29
MW-18	10/27/2000	161.18	ND	1.83	ND	159.35	159.35
MW-18	4/16/2001	161.18	NF	NF	NF	NF	NF
MW-18	3/27/2007	161.18	ND	0.94	ND	160.24	160.24
MW-18	3/28/2007	161.18	ND	0.94	ND	160.24	160.24
MW-18	12/13/2007	161.18	ND	1.96	ND	159.22	159.22
MW-18	6/11/2008	161.18	ND	2.97	ND	158.21	158.21
MW-18	11/30/2009	161.18	ND	1.44	ND	159.74	159.74
MW-18	9/22/2010	161.18	ND	4.34	ND	156.84	156.84
MW-18	5/24/2011	161.18	ND	2.31	ND	158.87	158.87
MW-18	12/6/2011	161.18	ND	2.02	ND	159.16	159.16
MW-18	6/25/2012	161.18	ND	3.32	ND	157.86	157.86
MW-18	12/3/2012	161.18	ND	3.49	ND	157.69	157.69
MW-18	6/17/2013	161.18	ND	1.79	ND	159.39	159.39
MW-18	12/11/2013	161.18	ND	1.09	ND	160.09	160.09

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
MW-18	6/18/2014	161.18	ND	2.33	ND	158.85	158.85
MW-18	12/1/2014	161.18	ND	0.79	ND	160.39	160.39
MW-18	6/9/2015	161.18	ND	1.89	ND	159.29	159.29
MW-18	12/8/2015	161.18	ND	0.30	ND	160.88	160.88
MW-18	6/7/2016	160.74	ND	1.48	ND	159.26	159.26
MW-18	11/30/2016	160.74	ND	2.11	ND	158.63	158.63
MW-19	3/29/2000	167.29	ND	3.23	ND	164.06	164.06
MW-19	5/31/2000	167.29	ND	4.98	ND	162.31	162.31
MW-19	10/27/2000	167.29	ND	2.19	ND	165.10	165.10
MW-19	4/16/2001	167.29	ND	3.24	ND	164.05	164.05
MW-19	2/8/2005	167.29	ND	3.84	ND	163.45	163.45
MW-19	2/10/2005	167.29	ND	3.84	ND	163.45	163.45
MW-19	2/22/2005	167.29	ND	3.99	ND	163.30	163.30
MW-19	3/14/2005	167.29	ND	4.09	ND	163.20	163.20
MW-19	3/16/2005	167.29	ND	4.09	ND	163.20	163.20
MW-19	4/4/2006	167.29	ND	3.79	ND	163.50	163.50
MW-19	10/3/2006	167.29	NG	NG	NG	NG	NG
MW-19	3/27/2007	167.29	ND	3.26	ND	164.03	164.03
MW-19	3/28/2007	167.29	ND	3.26	ND	164.03	164.03
MW-19	12/13/2007	167.29	ND	4.79	ND	162.50	162.50
MW-19	6/11/2008	167.29	ND	4.63	ND	162.66	162.66
MW-19	3/17/2009	167.29	ND	2.05	ND	165.24	165.24
MW-19	6/17/2009	167.29	ND	2.91	ND	164.38	164.38
MW-19	9/10/2009	167.29	ND	5.21	ND	162.08	162.08
MW-19	11/30/2009	167.29	ND	3.77	ND	163.52	163.52
MW-19	9/22/2010	167.29	ND	8.33	ND	158.96	158.96
MW-19	5/24/2011	167.29	ND	6.76	ND	160.53	160.53
MW-19	12/6/2011	167.29	ND	6.89	ND	160.40	160.40
MW-19	6/25/2012	167.29	ND	5.28	ND	162.01	162.01
MW-19	12/3/2012	167.29	ND	8.98	ND	158.31	158.31
MW-19	6/17/2013	167.29	ND	3.69	ND	163.60	163.60
MW-19	12/11/2013	167.29	ND	5.21	ND	162.08	162.08
MW-19	6/18/2014	167.29	ND	5.69	ND	161.60	161.60
MW-19	12/1/2014	167.29	ND	8.43	ND	158.86	158.86
MW-19	6/9/2015	167.29	ND	4.02	ND	163.27	163.27
MW-19	12/8/2015	167.29	ND	7.44	ND	159.85	159.85
MW-19	6/7/2016	167.14	ND	3.80	ND	163.34	163.34
MW-19	11/30/2016	167.14	DRY	DRY	DRY	DRY	DRY
MW-20	3/29/2000	162.10	ND	1.33	ND	160.77	160.77
MW-20	5/31/2000	162.10	ND	4.86	ND	157.24	157.24
MW-20	10/27/2000	162.10	ND	2.19	ND	159.91	159.91
MW-20	4/16/2001	162.10	NF	NF	NF	NF	NF
MW-20	3/14/2005	162.10	NM	NM	NM	NM	NM
MW-20	4/4/2006	162.10	ND	1.33	ND	160.77	160.77
MW-20	3/27/2007	162.10	ND	0.94	ND	161.16	161.16
MW-20	12/13/2007	162.10	ND	1.66	ND	160.44	160.44
MW-20	6/11/2008	162.10	ND	3.10	ND	159.00	159.00
MW-20	3/17/2009	162.10	ND	3.59	ND	158.51	158.51
MW-20	6/17/2009	162.10	ND	3.65	ND	158.45	158.45

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
MW-20	9/10/2009	162.10	ND	6.68	ND	155.42	155.42
MW-20	11/30/2009	162.10	ND	4.85	ND	157.25	157.25
MW-20	9/22/2010	162.10	ND	7.87	ND	154.23	154.23
MW-20	5/24/2011	162.10	ND	6.03	ND	156.07	156.07
MW-20	12/6/2011	162.10	ND	6.49	ND	155.61	155.61
MW-20	6/25/2012	162.10	ND	7.09	ND	155.01	155.01
MW-20	12/3/2012	162.10	ND	7.60	ND	154.50	154.50
MW-20	6/17/2013	162.10	ND	5.57	ND	156.53	156.53
MW-20	12/11/2013	162.10	ND	4.04	ND	158.06	158.06
MW-20	6/18/2014	162.10	ND	6.51	ND	155.59	155.59
MW-20	12/1/2014	162.10	ND	4.39	ND	157.71	157.71
MW-20	6/9/2015	162.10	ND	6.05	ND	156.05	156.05
MW-20	12/8/2015	162.10	ND	3.91	ND	158.19	158.19
MW-20	6/7/2016	165.57	ND	5.38	ND	160.19	160.19
MW-20	11/30/2016	165.57	ND	5.89	ND	159.68	159.68
MW-21	3/29/2000	164.27	ND	4.03	ND	160.24	160.24
MW-21	5/31/2000	164.27	ND	2.31	ND	161.96	161.96
MW-21	10/27/2000	164.27	ND	3.81	ND	160.46	160.46
MW-21	4/16/2001	164.27	ND	3.91	ND	160.36	160.36
MW-21	3/14/2005	164.27	NM	NM	NM	NM	NM
MW-21	4/4/2006	164.27	ND	4.39	ND	159.88	159.88
MW-21	4/4/2006	164.27	ND	4.39	ND	159.88	159.88
MW-21	3/27/2007	164.27	ND	4.38	ND	159.89	159.89
MW-21	3/27/2007	164.27	ND	4.38	ND	159.89	159.89
MW-21	12/13/2007	164.27	ND	4.46	ND	159.81	159.81
MW-21	6/11/2008	164.27	ND	5.74	ND	158.53	158.53
MW-21	11/30/2009	164.27	ND	4.34	ND	159.93	159.93
MW-21	9/22/2010	164.27	ND	6.75	ND	157.52	157.52
MW-21	5/24/2011	164.27	ND	5.21	ND	159.06	159.06
MW-21	12/6/2011	164.27	ND	4.97	ND	159.30	159.30
MW-21	6/25/2012	164.27	ND	6.14	ND	158.13	158.13
MW-21	12/3/2012	164.27	ND	6.44	ND	157.83	157.83
MW-21	6/17/2013	164.27	ND	4.95	ND	159.32	159.32
MW-21	12/11/2013	164.27	ND	NM	ND	NM	NM
MW-24	2/10/2005	174.17	8.54	11.30	2.76	162.87	165.08
MW-24	2/22/2005	174.17	8.96	11.71	2.75	162.46	164.66
MW-24	3/14/2005	174.17	8.39	11.12	2.73	163.05	165.23
MW-24	3/16/2005	174.17	8.39	11.12	2.73	163.05	165.23
MW-24	4/25/2005	174.17	8.20	8.68	0.48	165.49	165.87
MW-24	5/26/2005	174.17	9.02	11.23	2.21	162.94	164.71
MW-24	6/24/2005	174.17	9.80	12.46	2.66	161.71	163.84
MW-24	7/25/2005	174.17	10.30	12.28	1.98	161.89	163.47
MW-24	8/22/2005	174.17	11.84	13.03	1.19	161.14	162.09
MW-24	10/13/2005	174.17	12.39	13.13	0.74	161.04	161.63
MW-24	11/28/2005	174.17	12.06	12.54	0.48	161.63	162.01
MW-24	12/16/2005	174.17	9.30	10.12	0.82	164.05	164.71
MW-24	1/31/2006	174.17	8.68	11.05	2.37	163.12	165.02
MW-24	2/24/2006	174.17	8.91	10.98	2.07	163.19	164.85
MW-24	4/4/2006	174.17	9.66	11.48	1.82	162.69	164.15

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
MW-24	6/6/2006	174.17	10.04	11.71	1.67	162.46	163.80
MW-24	10/3/2006	174.17	9.97	12.46	2.49	161.71	163.70
MW-24	2/21/2007	174.17	7.24	9.09	1.85	165.08	166.56
MW-24	3/27/2007	174.17	7.63	10.06	2.43	164.11	166.05
MW-24	3/28/2007	174.17	7.63	10.06	2.43	164.11	166.05
MW-24	5/17/2007	174.17	10.84	12.41	1.57	161.76	163.02
MW-24	8/15/2007	174.17	12.92	13.88	0.96	160.29	161.06
MW-24	10/9/2007	174.17	13.68	14.96	1.28	159.21	160.23
MW-24	12/5/2007	174.17	13.03	14.00	0.97	160.17	160.95
MW-24	12/13/2007	174.17	11.05	11.36	0.31	162.81	163.06
MW-24	3/27/2008	174.17	8.75	9.46	0.71	164.71	165.28
MW-24	6/1/2008	174.17	10.20	10.76	0.56	163.41	163.86
MW-24	6/11/2008	174.17	10.20	10.76	0.56	163.41	163.86
MW-24	6/30/2008	174.17	NM	NM	NM	NM	NM
MW-24	9/3/2008	174.17	12.05	12.87	0.82	161.30	161.96
MW-24	11/6/2008	174.17	10.60	11.52	0.92	162.65	163.39
MW-24	11/20/2008	174.17	8.97	9.52	0.55	164.65	165.09
MW-24	2/27/2009	174.17	7.91	11.99	4.08	162.18	165.44
MW-24	3/17/2009	174.17	6.45	7.80	1.35	166.37	167.45
MW-24	5/27/2009	174.17	9.46	12.39	2.93	161.78	164.12
MW-24	6/17/2009	174.17	8.32	9.69	1.37	164.48	165.58
MW-24	7/16/2009	174.17	10.81	12.25	1.44	161.92	163.07
MW-24	9/10/2009	174.17	11.28	12.49	1.21	161.68	162.65
MW-24	10/30/2009	174.17	12.41	12.84	0.43	161.33	161.67
MW-24	11/30/2009	174.17	9.57	9.97	0.40	164.20	164.52
MW-24	3/19/2010	174.17	6.84	9.65	2.81	164.52	166.77
MW-24	3/22/2010	174.17	6.84	9.65	2.81	164.52	166.77
MW-24	5/25/2010	174.17	8.40	9.10	0.70	165.07	165.63
MW-24	6/17/2010	174.17	9.19	9.41	0.22	164.76	164.94
MW-24	6/25/2010	174.17	9.77	9.85	0.08	164.32	164.38
MW-24	8/6/2010	174.17	9.75	9.75	0.00	164.42	164.42
MW-24	9/15/2010	174.17	12.05	13.70	1.65	160.47	161.79
MW-24	9/22/2010	174.17	13.62	13.71	0.09	160.46	160.53
MW-24	1/19/2011	174.17	ND	10.39	ND	163.78	163.78
MW-24	3/18/2011	174.17	9.51	9.53	0.02	164.64	164.66
MW-24	5/24/2011	174.17	ND	9.11	ND	165.06	165.06
MW-24	10/21/2011	174.17	9.65	9.65	0.00	164.52	164.52
MW-24	12/6/2011	174.17	ND	11.11	ND	163.06	163.06
MW-24	1/31/2012	174.17	ND	9.45	ND	164.72	164.72
MW-24	3/1/2012	174.17	ND	9.18	ND	164.99	164.99
MW-24	3/20/2012	174.17	ND	8.77	ND	165.40	165.40
MW-24	4/20/2012	174.17	ND	8.70	ND	165.47	165.47
MW-24	5/25/2012	174.17	ND	8.62	ND	165.55	165.55
MW-24	6/25/2012	174.17	ND	10.92	ND	163.25	163.25
MW-24	7/24/2012	174.17	ND	11.48	ND	162.69	162.69
MW-24	8/30/2012	174.17	ND	12.31	ND	161.86	161.86
MW-24	9/13/2012	174.17	ND	12.61	ND	161.56	161.56
MW-24	10/9/2012	174.17	ND	11.77	ND	162.40	162.40
MW-24	11/20/2012	174.17	ND	13.01	ND	161.16	161.16
MW-24	12/3/2012	174.17	ND	13.41	ND	160.76	160.76

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
MW-24	12/18/2012	174.17	ND	12.68	ND	161.49	161.49
MW-24	1/3/2013	174.17	ND	10.10	ND	164.07	164.07
MW-24	1/13/2013	174.17	ND	10.10	ND	164.07	164.07
MW-24	1/31/2013	174.17	ND	9.08	ND	165.09	165.09
MW-24	2/28/2013	174.17	ND	7.63	ND	166.54	166.54
MW-24	3/8/2013	174.17	ND	8.42	ND	165.75	165.75
MW-24	4/19/2013	174.17	ND	9.65	ND	164.52	164.52
MW-24	5/30/2013	174.17	ND	10.75	ND	163.42	163.42
MW-24	6/17/2013	174.17	ND	8.92	ND	165.25	165.25
MW-24	12/11/2013	174.17	ND	10.10	ND	164.07	164.07
MW-24	6/18/2014	174.17	ND	9.23	ND	164.94	164.94
MW-24	12/1/2014	174.17	ND	9.31	ND	164.86	164.86
MW-24	6/9/2015	174.17	ND	8.15	ND	166.02	166.02
MW-24	12/8/2015	174.17	ND	8.50	ND	165.67	165.67
MW-24	6/7/2016	173.93	ND	8.11	ND	165.82	165.82
MW-24	11/30/2016	173.93	ND	10.22	ND	163.71	163.71
MW-25	2/10/2005	173.76	8.55	8.66	0.11	165.10	165.19
MW-25	2/22/2005	173.76	8.94	9.76	0.82	164.00	164.66
MW-25	3/14/2005	173.76	8.37	8.41	0.04	165.35	165.39
MW-25	3/16/2005	173.76	8.37	8.41	0.04	165.35	165.39
MW-25	4/25/2005	173.76	7.88	7.90	0.02	165.86	165.88
MW-25	5/26/2005	173.76	8.88	8.90	0.02	164.86	164.88
MW-25	6/24/2005	173.76	ND	9.75	ND	164.01	164.01
MW-25	7/25/2005	173.76	9.92	9.96	0.04	163.80	163.84
MW-25	8/22/2005	173.76	11.47	11.52	0.05	162.24	162.28
MW-25	10/13/2005	173.76	11.79	11.84	0.05	161.92	161.96
MW-25	11/28/2005	173.76	11.44	11.51	0.07	162.25	162.31
MW-25	12/16/2005	173.76	ND	8.74	ND	165.02	165.02
MW-25	1/31/2006	173.76	ND	8.51	ND	165.25	165.25
MW-25	2/24/2006	173.76	ND	8.76	ND	165.00	165.00
MW-25	4/4/2006	111.04	ND	9.42	ND	101.62	101.62
MW-25	4/4/2006	173.76	ND	9.42	ND	164.34	164.34
MW-25	6/6/2006	173.76	ND	9.67	ND	164.09	164.09
MW-25	10/3/2006	173.76	9.67	9.73	0.06	164.03	164.08
MW-25	2/21/2007	173.76	6.92	6.93	0.01	166.83	166.84
MW-25	3/27/2007	173.76	7.31	7.34	0.03	166.42	166.45
MW-25	3/28/2007	173.76	7.31	7.34	0.03	166.42	166.45
MW-25	5/17/2007	173.76	ND	10.60	ND	163.16	163.16
MW-25	8/15/2007	173.76	ND	12.55	ND	161.21	161.21
MW-25	10/9/2007	173.76	ND	13.31	ND	160.45	160.45
MW-25	12/5/2007	173.76	ND	12.66	ND	161.10	161.10
MW-25	12/13/2007	173.76	ND	10.85	ND	162.91	162.91
MW-25	3/27/2008	173.76	ND	8.67	ND	165.09	165.09
MW-25	6/1/2008	173.76	9.79	9.79	0.00	163.97	163.97
MW-25	6/11/2008	173.76	9.79	9.79	0.00	163.97	163.97
MW-25	9/3/2008	173.76	ND	11.58	ND	162.18	162.18
MW-25	11/6/2008	173.76	ND	10.18	ND	163.58	163.58
MW-25	11/20/2008	173.76	8.90	8.90	0.00	164.86	164.86
MW-25	2/27/2009	173.76	8.22	8.35	0.13	165.41	165.52
MW-25	5/27/2009	173.76	ND	9.54	ND	164.22	164.22

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
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Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
MW-25	6/17/2009	173.76	ND	8.23	ND	165.53	165.53
MW-25	7/16/2009	173.76	ND	10.66	ND	163.10	163.10
MW-25	10/30/2009	173.76	11.90	11.90	0.00	161.86	161.86
MW-25	11/30/2009	173.76	ND	9.47	ND	164.29	164.29
MW-25	3/19/2010	173.76	ND	7.15	ND	166.61	166.61
MW-25	5/25/2010	173.76	ND	7.35	ND	166.41	166.41
MW-25	6/17/2010	173.76	ND	8.21	ND	165.55	165.55
MW-25	6/25/2010	173.76	ND	9.97	ND	163.79	163.79
MW-25	8/6/2010	173.76	ND	10.86	ND	162.90	162.90
MW-25	9/15/2010	173.76	12.38	12.38	0.00	161.38	161.38
MW-25	9/22/2010	173.76	ND	11.94	ND	161.82	161.82
MW-25	1/19/2011	173.76	ND	9.76	ND	164.00	164.00
MW-25	3/18/2011	173.76	9.04	9.04	0.00	164.72	164.72
MW-25	5/24/2011	173.76	ND	8.73	ND	165.03	165.03
MW-25	10/21/2011	173.76	ND	9.93	ND	163.83	163.83
MW-25	12/6/2011	173.76	ND	10.64	ND	163.12	163.12
MW-25	1/31/2012	173.76	ND	9.72	ND	164.04	164.04
MW-25	3/1/2012	173.76	ND	9.52	ND	164.24	164.24
MW-25	3/20/2012	173.76	ND	8.65	ND	165.11	165.11
MW-25	4/20/2012	173.76	ND	8.47	ND	165.29	165.29
MW-25	5/25/2012	173.76	ND	8.28	ND	165.48	165.48
MW-25	6/25/2012	173.76	ND	10.25	ND	163.51	163.51
MW-25	7/24/2012	173.76	ND	10.76	ND	163.00	163.00
MW-25	8/30/2012	173.76	ND	11.02	ND	162.74	162.74
MW-25	9/13/2012	173.76	ND	12.64	ND	161.12	161.12
MW-25	10/9/2012	173.76	ND	12.74	ND	161.02	161.02
MW-25	11/20/2012	173.76	ND	12.14	ND	161.62	161.62
MW-25	12/3/2012	173.76	ND	13.46	ND	160.30	160.30
MW-25	12/18/2012	173.76	ND	12.99	ND	160.77	160.77
MW-25	1/3/2013	173.76	ND	11.55	ND	162.21	162.21
MW-25	1/13/2013	173.76	ND	11.55	ND	162.21	162.21
MW-25	1/31/2013	173.76	ND	9.55	ND	164.21	164.21
MW-25	2/28/2013	173.76	ND	10.41	ND	163.35	163.35
MW-25	3/8/2013	173.76	ND	8.31	ND	165.45	165.45
MW-25	4/19/2013	173.76	ND	8.60	ND	165.16	165.16
MW-25	5/30/2013	173.76	ND	9.60	ND	164.16	164.16
MW-25	6/17/2013	173.76	ND	8.44	ND	165.32	165.32
MW-25	12/11/2013	173.76	ND	9.42	ND	164.34	164.34
MW-25	6/18/2014	173.76	ND	8.46	ND	165.30	165.30
MW-25	12/1/2014	173.76	ND	8.49	ND	165.27	165.27
MW-25	6/9/2015	173.76	ND	7.85	ND	165.91	165.91
MW-25	12/8/2015	173.76	ND	7.91	ND	165.85	165.85
MW-25	6/7/2016	173.52	ND	6.68	ND	166.84	166.84
MW-25	11/30/2016	173.52	ND	9.69	ND	163.83	163.83
MW-26	2/10/2005	173.24	7.9	11.04	3.14	162.20	164.72
MW-26	2/22/2005	173.24	8.19	11.20	3.01	162.04	164.45
MW-26	3/14/2005	173.24	7.51	10.94	3.43	162.30	165.05
MW-26	3/16/2005	173.24	7.51	10.94	3.43	162.30	165.05
MW-26	4/25/2005	173.24	7.35	9.10	1.75	164.14	165.54
MW-26	5/26/2005	173.24	8.11	11.04	2.93	162.20	164.55

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
MW-26	6/24/2005	173.24	8.9	11.60	2.70	161.64	163.80
MW-26	7/25/2005	173.24	9.46	10.75	1.29	162.49	163.53
MW-26	8/22/2005	173.24	11.01	11.62	0.61	161.62	162.11
MW-26	10/13/2005	173.24	11.53	11.70	0.17	161.54	161.68
MW-26	11/28/2005	173.24	11.01	11.48	0.47	161.76	162.14
MW-26	12/16/2005	173.24	7.61	9.43	1.82	163.81	165.27
MW-26	1/31/2006	173.24	7.88	8.46	0.58	164.78	165.25
MW-26	2/24/2006	173.24	8.41	8.93	0.52	164.31	164.73
MW-26	4/4/2006	173.24	8.8	11.05	2.25	162.19	163.99
MW-26	6/6/2006	173.24	8.93	12.27	3.34	160.97	163.65
MW-26	10/3/2006	173.24	8.88	11.97	3.09	161.27	163.75
MW-26	2/21/2007	173.24	6.5	7.65	1.15	165.59	166.51
MW-26	3/27/2007	173.24	7.22	7.31	0.09	165.93	166.01
MW-26	3/28/2007	173.24	7.22	7.31	0.09	165.93	166.01
MW-26	5/17/2007	173.24	ND	10.59	ND	162.65	162.65
MW-26	8/15/2007	173.24	12.05	12.42	0.37	160.82	161.12
MW-26	10/9/2007	173.24	12.82	13.65	0.83	159.59	160.26
MW-26	12/5/2007	173.24	13.24	13.30	0.06	159.94	159.99
MW-26	12/13/2007	173.24	9.77	11.64	1.87	161.60	163.10
MW-26	3/27/2008	173.24	7.51	9.52	2.01	163.72	165.33
MW-26	6/1/2008	173.24	9.15	11.20	2.05	162.04	163.68
MW-26	6/11/2008	173.24	9.15	11.20	2.05	162.04	163.68
MW-26	6/11/2008	173.24	9.15	11.20	2.05	162.04	163.68
MW-26	6/30/2008	173.24	NM	NM	NM	NM	NM
MW-26	9/3/2008	173.24	10.91	12.32	1.41	160.92	162.05
MW-26	11/6/2008	173.24	9.43	11.74	2.31	161.50	163.35
MW-26	11/20/2008	173.24	7.53	10.46	2.93	162.78	165.13
MW-26	2/27/2009	173.24	7.54	10.91	3.37	162.33	165.03
MW-26	3/17/2009	173.24	5.31	6.44	1.13	166.80	167.71
MW-26	5/27/2009	173.24	9.12	9.48	0.36	163.76	164.05
MW-26	6/17/2009	173.24	6.55	7.02	0.47	166.22	166.60
MW-26	7/16/2009	173.24	9.82	11.47	1.65	161.77	163.09
MW-26	9/10/2009	173.24	10.40	12.05	1.65	161.19	162.51
MW-26	10/30/2009	173.24	11.29	11.65	0.36	161.59	161.88
MW-26	11/30/2009	173.24	8.41	9.13	0.72	164.11	164.69
MW-26	3/19/2010	173.24	6.14	6.45	0.31	166.79	167.04
MW-26	3/22/2010	173.24	6.14	6.45	0.31	166.79	167.04
MW-26	5/25/2010	173.24	ND	6.70	ND	166.54	166.54
MW-26	6/17/2010	173.24	ND	8.21	ND	165.03	165.03
MW-26	6/25/2010	173.24	ND	8.93	ND	164.31	164.31
MW-26	8/6/2010	173.24	ND	10.19	ND	163.05	163.05
MW-26	9/15/2010	173.24	12.35	12.37	0.02	160.87	160.89
MW-26	9/22/2010	173.24	11.90	11.92	0.02	161.32	161.34
MW-26	1/19/2011	173.24	ND	9.53	ND	163.71	163.71
MW-26	3/18/2011	173.24	ND	7.64	ND	165.60	165.60
MW-26	5/24/2011	173.24	ND	8.22	ND	165.02	165.02
MW-26	10/21/2011	173.24	9.98	9.98	0.00	163.26	163.26
MW-26	12/6/2011	173.24	ND	10.25	ND	162.99	162.99
MW-26	1/31/2012	173.24	ND	8.57	ND	164.67	164.67
MW-26	3/1/2012	173.24	ND	8.38	ND	164.86	164.86

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
MW-26	3/20/2012	173.24	ND	8.22	ND	165.02	165.02
MW-26	4/20/2012	173.24	ND	8.11	ND	165.13	165.13
MW-26	5/25/2012	173.24	ND	7.99	ND	165.25	165.25
MW-26	6/25/2012	173.24	ND	9.72	ND	163.52	163.52
MW-26	7/24/2012	173.24	ND	10.01	ND	163.23	163.23
MW-26	8/30/2012	173.24	ND	10.21	ND	163.03	163.03
MW-26	9/13/2012	173.24	ND	11.06	ND	162.18	162.18
MW-26	10/9/2012	173.24	ND	10.25	ND	162.99	162.99
MW-26	11/20/2012	173.24	ND	12.23	ND	161.01	161.01
MW-26	12/3/2012	173.24	ND	12.51	ND	160.73	160.73
MW-26	12/18/2012	173.24	ND	10.14	ND	163.10	163.10
MW-26	1/3/2013	173.24	ND	8.65	ND	164.59	164.59
MW-26	1/13/2013	173.24	ND	8.65	ND	164.59	164.59
MW-26	1/31/2013	173.24	ND	8.69	ND	164.55	164.55
MW-26	2/28/2013	173.24	ND	7.35	ND	165.89	165.89
MW-26	3/8/2013	173.24	ND	7.98	ND	165.26	165.26
MW-26	4/19/2013	173.24	ND	8.48	ND	164.76	164.76
MW-26	5/30/2013	173.24	ND	8.50	ND	164.74	164.74
MW-26	6/17/2013	173.24	ND	7.94	ND	165.30	165.30
MW-26	12/11/2013	173.24	ND	8.04	ND	165.20	165.20
MW-26	6/18/2014	173.24	ND	8.54	ND	164.70	164.70
MW-26	12/1/2014	173.24	ND	9.63	ND	163.61	163.61
MW-26	6/9/2015	173.24	ND	7.88	ND	165.36	165.36
MW-26	12/8/2015	173.24	ND	8.49	ND	164.75	164.75
MW-26	6/7/2016	172.99	ND	6.87	ND	166.12	166.12
MW-26	11/30/2016	172.99	ND	8.70	ND	164.29	164.29
MW-27	2/8/2005	169.71	ND	4.51	ND	165.20	165.20
MW-27	2/10/2005	169.71	ND	4.51	ND	165.20	165.20
MW-27	2/22/2005	169.71	ND	4.95	ND	164.76	164.76
MW-27	3/14/2005	169.71	ND	4.60	ND	165.11	165.11
MW-27	3/16/2005	169.71	ND	4.60	ND	165.11	165.11
MW-27	4/4/2006	169.71	ND	5.49	ND	164.22	164.22
MW-27	3/27/2007	169.71	ND	3.38	ND	166.33	166.33
MW-27	12/13/2007	169.71	ND	6.54	ND	163.17	163.17
MW-27	6/11/2008	169.71	ND	5.47	ND	164.24	164.24
MW-27	11/30/2009	169.71	ND	4.92	ND	164.79	164.79
MW-27	9/22/2010	169.71	ND	8.33	ND	161.38	161.38
MW-27	5/24/2011	169.71	ND	4.67	ND	165.04	165.04
MW-27	12/6/2011	169.71	ND	6.87	ND	162.84	162.84
MW-27	6/25/2012	169.71	ND	7.07	ND	162.64	162.64
MW-27	12/3/2012	169.71	ND	8.51	ND	161.20	161.20
MW-27	6/17/2013	169.71	ND	4.41	ND	165.30	165.30
MW-27	12/11/2013	169.71	ND	NM	ND	NM	NM
MW-27	6/18/2014	169.71	ND	NM	ND	NM	NM
MW-27	12/1/2014	169.71	ND	NM	ND	NM	NM
MW-27	6/9/2015	169.71	ND	4.09	ND	165.62	165.62
MW-27	12/8/2015	169.71	ND	3.90	ND	165.81	165.81
MW-27	6/7/2016	169.38	ND	4.31	ND	165.07	165.07
MW-27	11/30/2016	169.38	ND	4.32	ND	165.06	165.06

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
MW-28	2/8/2005	169.45	ND	4.10	ND	165.35	165.35
MW-28	3/14/2005	169.45	ND	4.21	ND	165.24	165.24
MW-28	4/4/2006	169.45	ND	5.14	ND	164.31	164.31
MW-28	3/27/2007	169.45	ND	2.82	ND	166.63	166.63
MW-28	12/13/2007	169.45	ND	6.62	ND	162.83	162.83
MW-28	6/11/2008	169.45	ND	5.49	ND	163.96	163.96
MW-28	11/30/2009	169.45	ND	4.41	ND	165.04	165.04
MW-28	9/22/2010	169.45	ND	8.30	ND	161.15	161.15
MW-28	5/24/2011	169.45	ND	4.83	ND	164.62	164.62
MW-28	12/6/2011	169.45	ND	6.68	ND	162.77	162.77
MW-28	6/25/2012	169.45	ND	6.97	ND	162.48	162.48
MW-28	12/3/2012	169.45	ND	8.89	ND	160.56	160.56
MW-28	6/17/2013	169.45	ND	3.61	ND	165.84	165.84
MW-28	12/11/2013	169.45	ND	3.79	ND	165.66	165.66
MW-28	6/18/2014	169.45	NM	NM	NM	NM	NM
MW-28	12/1/2014	169.45	ND	2.53	ND	166.92	166.92
MW-28	6/9/2015	169.45	ND	3.15	ND	166.30	166.30
MW-28	12/8/2015	169.45	ND	2.68	ND	166.77	166.77
MW-28	6/7/2016	169.16	ND	3.14	ND	166.02	166.02
MW-28	11/30/2016	169.16	ND	4.62	ND	164.54	164.54
MW-29	3/14/2005	168.89	ND	4.34	ND	164.55	164.55
MW-29	4/4/2006	168.89	ND	5.11	ND	163.78	163.78
MW-29	3/27/2007	168.89	ND	2.81	ND	166.08	166.08
MW-29	12/13/2007	168.89	ND	6.58	ND	162.31	162.31
MW-29	6/11/2008	168.89	ND	4.97	ND	163.92	163.92
MW-29	11/30/2009	168.89	ND	4.42	ND	164.47	164.47
MW-29	9/22/2010	168.89	ND	8.53	ND	160.36	160.36
MW-29	5/24/2011	168.89	ND	4.80	ND	164.09	164.09
MW-29	12/6/2011	168.89	ND	6.25	ND	162.64	162.64
MW-29	6/25/2012	168.89	ND	7.01	ND	161.88	161.88
MW-29	12/3/2012	168.89	ND	9.18	ND	159.71	159.71
MW-29	6/17/2013	168.89	ND	3.27	ND	165.62	165.62
MW-29	12/11/2013	168.89	ND	4.52	ND	164.37	164.37
MW-29	6/18/2014	168.89	ND	3.37	ND	165.52	165.52
MW-29	12/1/2014	168.89	ND	1.07	ND	167.82	167.82
MW-29	6/9/2015	168.89	ND	2.83	ND	166.06	166.06
MW-29	12/8/2015	171.21	ND	5.02	ND	166.19	166.19
MW-29	6/7/2016	171.21	ND	5.56	ND	165.65	165.65
MW-29	11/30/2016	171.21	ND	7.09	ND	164.12	164.12
MW-30	2/8/2005	167.41	ND	4.23	ND	163.18	163.18
MW-30	3/14/2005	167.41	ND	4.15	ND	163.26	163.26
MW-30	4/4/2006	167.41	ND	4.78	ND	162.63	162.63
MW-30	3/27/2007	167.41	ND	3.16	ND	164.25	164.25
MW-30	3/28/2007	167.41	ND	3.16	ND	164.25	164.25
MW-30	12/13/2007	167.41	ND	6.03	ND	161.38	161.38
MW-30	6/11/2008	167.41	ND	5.31	ND	162.10	162.10
MW-30	11/30/2009	167.41	ND	4.24	ND	163.17	163.17
MW-30	9/22/2010	167.41	ND	8.12	ND	159.29	159.29
MW-30	5/24/2011	167.41	ND	4.61	ND	162.80	162.80

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
MW-30	12/6/2011	167.41	ND	5.53	ND	161.88	161.88
MW-30	6/25/2012	167.41	ND	6.39	ND	161.02	161.02
MW-30	12/3/2012	167.41	ND	8.43	ND	158.98	158.98
MW-30	6/17/2013	167.41	ND	NM	ND	NM	NM
MW-30	12/11/2013	167.41	ND	4.51	ND	162.90	162.90
MW-30	6/18/2014	167.41	ND	4.48	ND	162.93	162.93
MW-30	12/1/2014	167.41	ND	NM	ND	NM	NM
MW-30	6/9/2015	167.41	ND	NM	ND	NM	NM
MW-30	12/8/2015	167.41	ND	NM	ND	NM	NM
MW-30	6/7/2016	169.23	ND	5.31	ND	163.92	163.92
MW-30	11/30/2016	169.23	ND	6.53	ND	162.70	162.70
MW-31	2/8/2005	172.16	ND	7.64	ND	164.52	164.52
MW-31	3/14/2005	172.16	ND	7.71	ND	164.45	164.45
MW-31	4/4/2006	172.16	ND	8.53	ND	163.63	163.63
MW-31	3/27/2007	172.16	ND	6.71	ND	165.45	165.45
MW-31	12/13/2007	172.16	ND	9.69	ND	162.47	162.47
MW-31	6/11/2008	172.16	ND	8.92	ND	163.24	163.24
MW-31	11/30/2009	172.16	ND	7.97	ND	164.19	164.19
MW-31	9/22/2010	172.16	ND	11.58	ND	160.58	160.58
MW-31	5/24/2011	172.16	ND	8.26	ND	163.90	163.90
MW-31	12/6/2011	172.16	ND	9.92	ND	162.24	162.24
MW-31	6/25/2012	172.16	ND	10.27	ND	161.89	161.89
MW-31	12/3/2012	172.16	ND	12.14	ND	160.02	160.02
MW-31	6/17/2013	172.16	ND	7.39	ND	164.77	164.77
MW-31	12/11/2013	172.16	ND	8.53	ND	163.63	163.63
MW-31	6/18/2014	172.16	ND	7.94	ND	164.22	164.22
MW-31	12/1/2014	172.16	ND	6.61	ND	165.55	165.55
MW-31	6/9/2015	172.16	ND	7.11	ND	165.05	165.05
MW-31	12/8/2015	172.16	ND	6.91	ND	165.25	165.25
MW-31	6/7/2016	171.87	ND	7.41	ND	164.46	164.46
MW-31	11/30/2016	171.87	ND	8.06	ND	163.81	163.81
MW-32	2/10/2005	167.92	ND	4.01	ND	163.91	163.91
MW-32	2/22/2005	167.92	ND	3.12	ND	164.80	164.80
MW-32	3/14/2005	167.92	ND	2.68	ND	165.24	165.24
MW-32	3/16/2005	167.92	ND	2.68	ND	165.24	165.24
MW-32	4/4/2006	167.92	ND	3.50	ND	164.42	164.42
MW-32	3/27/2007	167.92	ND	2.21	ND	165.71	165.71
MW-32	3/28/2007	167.92	ND	2.21	ND	165.71	165.71
MW-32	12/13/2007	167.92	ND	4.08	ND	163.84	163.84
MW-32	6/11/2008	167.92	ND	3.42	ND	164.50	164.50
MW-32	3/17/2009	167.92	ND	1.13	ND	166.79	166.79
MW-32	6/17/2009	167.92	ND	1.41	ND	166.51	166.51
MW-32	9/10/2009	167.92	ND	4.51	ND	163.41	163.41
MW-32	11/30/2009	167.92	ND	2.72	ND	165.20	165.20
MW-32	9/22/2010	167.92	ND	6.12	ND	161.80	161.80
MW-32	5/24/2011	167.92	ND	2.87	ND	165.05	165.05
MW-32	12/6/2011	167.92	ND	2.89	ND	165.03	165.03
MW-32	6/25/2012	167.92	ND	3.66	ND	164.26	164.26
MW-32	12/3/2012	167.92	ND	6.03	ND	161.89	161.89

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
MW-32	6/17/2013	167.92	ND	2.14	ND	165.78	165.78
MW-32	12/11/2013	167.92	ND	1.83	ND	166.09	166.09
MW-32	6/18/2014	167.92	ND	4.00	ND	163.92	163.92
MW-32	12/1/2014	167.92	ND	2.37	ND	165.55	165.55
MW-32	6/9/2015	167.92	ND	2.89	ND	165.03	165.03
MW-32	12/8/2015	167.92	ND	2.43	ND	165.49	165.49
MW-32	6/7/2016	167.88	ND	2.47	ND	165.41	165.41
MW-32	11/30/2016	167.88	ND	3.71	ND	164.17	164.17
MW-33	2/8/2005	167.45	ND	3.97	ND	163.48	163.48
MW-33	2/10/2005	167.45	ND	3.97	ND	163.48	163.48
MW-33	2/22/2005	167.45	ND	4.15	ND	163.30	163.30
MW-33	3/14/2005	167.45	ND	4.14	ND	163.31	163.31
MW-33	3/16/2005	167.45	ND	4.14	ND	163.31	163.31
MW-33	4/4/2006	167.45	ND	3.79	ND	163.66	163.66
MW-33	3/27/2007	167.45	ND	3.18	ND	164.27	164.27
MW-33	3/28/2007	167.45	ND	3.18	ND	164.27	164.27
MW-33	12/13/2007	167.45	ND	4.51	ND	162.94	162.94
MW-33	6/11/2008	167.45	ND	4.60	ND	162.85	162.85
MW-33	11/30/2009	167.45	ND	2.84	ND	164.61	164.61
MW-33	9/22/2010	167.45	ND	7.19	ND	160.26	160.26
MW-33	5/24/2011	167.45	ND	4.03	ND	163.42	163.42
MW-33	12/6/2011	167.45	ND	4.63	ND	162.82	162.82
MW-33	6/25/2012	167.45	ND	5.71	ND	161.74	161.74
MW-33	12/3/2012	167.45	ND	7.51	ND	159.94	159.94
MW-33	6/17/2013	167.45	ND	2.25	ND	165.20	165.20
MW-33	12/11/2013	167.45	ND	3.03	ND	164.42	164.42
MW-33	6/18/2014	167.45	ND	4.29	ND	163.16	163.16
MW-33	12/1/2014	167.45	ND	2.48	ND	164.97	164.97
MW-33	6/9/2015	167.45	ND	3.78	ND	163.67	163.67
MW-33	12/8/2015	167.45	ND	2.17	ND	165.28	165.28
MW-33	6/7/2016	167.19	ND	3.28	ND	163.91	163.91
MW-33	11/30/2016	167.19	ND	4.55	ND	162.64	162.64
MW-34	4/4/2006	164.11	ND	1.52	ND	162.59	162.59
MW-34	3/27/2007	164.11	ND	0.88	ND	163.23	163.23
MW-34	12/13/2007	164.11	ND	1.39	ND	162.72	162.72
MW-34	6/11/2008	164.11	ND	2.61	ND	161.50	161.50
MW-34	3/17/2009	164.11	ND	3.73	ND	160.38	160.38
MW-34	6/17/2009	164.11	ND	4.32	ND	159.79	159.79
MW-34	9/10/2009	164.11	ND	7.46	ND	156.65	156.65
MW-34	11/30/2009	164.11	ND	5.21	ND	158.90	158.90
MW-34	9/22/2010	164.11	ND	8.88	ND	155.23	155.23
MW-34	5/24/2011	164.11	ND	5.91	ND	158.20	158.20
MW-34	12/6/2011	164.11	ND	7.36	ND	156.75	156.75
MW-34	6/25/2012	164.11	ND	7.56	ND	156.55	156.55
MW-34	12/3/2012	164.11	ND	9.94	ND	154.17	154.17
MW-34	6/17/2013	164.11	ND	5.21	ND	158.90	158.90
MW-34	12/11/2013	164.11	ND	5.31	ND	158.80	158.80
MW-34	6/18/2014	164.11	ND	6.31	ND	157.80	157.80
MW-34	12/1/2014	164.11	ND	4.33	ND	159.78	159.78

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
MW-34	6/9/2015	164.11	ND	5.65	ND	158.46	158.46
MW-34	12/8/2015	167.87	ND	4.31	ND	163.56	163.56
MW-34	6/7/2016	167.87	ND	5.38	ND	162.49	162.49
MW-34	11/30/2016	167.87	ND	6.01	ND	161.86	161.86
MW-35	4/4/2006	160.52	ND	1.28	ND	159.24	159.24
MW-35	3/27/2007	160.52	ND	1.34	ND	159.18	159.18
MW-35	12/13/2007	160.52	ND	1.44	ND	159.08	159.08
MW-35	6/11/2008	160.52	ND	2.65	ND	157.87	157.87
MW-35	3/17/2009	160.52	ND	0.51	ND	160.01	160.01
MW-35	6/17/2009	160.52	ND	0.64	ND	159.88	159.88
MW-35	9/10/2009	160.52	ND	2.18	ND	158.34	158.34
MW-35	11/30/2009	160.52	ND	1.33	ND	159.19	159.19
MW-35	9/22/2010	160.52	ND	3.82	ND	156.70	156.70
MW-35	5/24/2011	160.52	ND	1.95	ND	158.57	158.57
MW-35	12/6/2011	160.52	ND	1.46	ND	159.06	159.06
MW-35	6/25/2012	160.52	ND	2.80	ND	157.72	157.72
MW-35	12/3/2012	160.52	ND	3.22	ND	157.30	157.30
MW-35	6/17/2013	160.52	ND	2.02	ND	158.50	158.50
MW-35	12/11/2013	160.52	ND	0.89	ND	159.63	159.63
MW-35	6/18/2014	160.52	ND	2.17	ND	158.35	158.35
MW-35	12/1/2014	160.52	ND	0.97	ND	159.55	159.55
MW-35	6/9/2015	160.52	ND	1.67	ND	158.85	158.85
MW-35	12/8/2015	160.52	ND	0.66	ND	159.86	159.86
MW-35	6/7/2016	160.28	ND	1.26	ND	159.02	159.02
MW-35	11/30/2016	160.28	ND	1.62	ND	158.66	158.66
MW-36	4/4/2006	160.94	ND	1.69	ND	159.25	159.25
MW-36	3/27/2007	160.94	ND	1.60	ND	159.34	159.34
MW-36	12/13/2007	160.94	ND	1.65	ND	159.29	159.29
MW-36	6/11/2008	160.94	ND	2.69	ND	158.25	158.25
MW-36	3/17/2009	160.94	ND	0.77	ND	160.17	160.17
MW-36	6/17/2009	160.94	ND	0.79	ND	160.15	160.15
MW-36	9/10/2009	160.94	ND	2.30	ND	158.64	158.64
MW-36	11/30/2009	160.94	ND	1.50	ND	159.44	159.44
MW-36	9/22/2010	160.94	ND	3.36	ND	157.58	157.58
MW-36	5/24/2011	160.94	ND	2.62	ND	158.32	158.32
MW-36	12/6/2011	160.94	ND	1.65	ND	159.29	159.29
MW-36	6/25/2012	160.94	ND	2.76	ND	158.18	158.18
MW-36	12/3/2012	160.94	ND	3.31	ND	157.63	157.63
MW-36	6/17/2013	160.94	ND	2.51	ND	158.43	158.43
MW-36	12/11/2013	160.94	ND	0.91	ND	160.03	160.03
MW-36	6/18/2014	160.94	ND	2.49	ND	158.45	158.45
MW-36	12/1/2014	160.94	ND	1.29	ND	159.65	159.65
MW-36	6/9/2015	160.94	ND	1.71	ND	159.23	159.23
MW-36	12/8/2015	160.94	ND	0.75	ND	160.19	160.19
MW-36	6/7/2016	160.68	ND	1.30	ND	159.38	159.38
MW-36	11/30/2016	160.68	ND	1.74	ND	158.94	158.94
MW-37	4/4/2006	165.51	ND	2.97	ND	162.54	162.54
MW-37	3/27/2007	165.51	ND	2.76	ND	162.75	162.75
MW-37	12/13/2007	165.51	ND	3.48	ND	162.03	162.03

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
MW-37	6/11/2008	165.51	ND	3.77	ND	161.74	161.74
MW-37	3/17/2009	165.51	ND	4.89	ND	160.62	160.62
MW-37	6/17/2009	165.51	ND	5.48	ND	160.03	160.03
MW-37	9/10/2009	165.51	ND	7.78	ND	157.73	157.73
MW-37	11/30/2009	165.51	ND	6.03	ND	159.48	159.48
MW-37	9/22/2010	165.51	ND	9.24	ND	156.27	156.27
MW-37	5/24/2011	165.51	ND	6.91	ND	158.60	158.60
MW-37	12/6/2011	165.51	ND	7.13	ND	158.38	158.38
MW-37	6/25/2012	165.51	ND	8.09	ND	157.42	157.42
MW-37	12/3/2012	165.51	ND	9.56	ND	155.95	155.95
MW-37	6/17/2013	165.51	ND	6.45	ND	159.06	159.06
MW-37	12/11/2013	165.51	ND	6.05	ND	159.46	159.46
MW-37	6/18/2014	165.51	ND	7.39	ND	158.12	158.12
MW-37	12/1/2014	165.51	ND	5.62	ND	159.89	159.89
MW-37	6/9/2015	165.51	ND	6.92	ND	158.59	158.59
MW-37	12/8/2015	165.51	ND	5.53	ND	159.98	159.98
MW-37	6/7/2016	168.86	ND	6.66	ND	162.20	162.20
MW-37	11/30/2016	168.86	ND	7.50	ND	161.36	161.36
MW-38	3/27/2007	164.96	ND	3.99	ND	160.97	160.97
MW-38	3/28/2007	164.96	ND	3.99	ND	160.97	160.97
MW-38	12/13/2007	164.96	ND	5.49	ND	159.47	159.47
MW-38	6/11/2008	164.96	ND	5.86	ND	159.10	159.10
MW-38	11/30/2009	164.96	ND	4.74	ND	160.22	160.22
MW-38	9/22/2010	164.96	ND	7.97	ND	156.99	156.99
MW-38	5/24/2011	164.96	ND	5.41	ND	159.55	159.55
MW-38	12/6/2011	164.96	ND	5.54	ND	159.42	159.42
MW-38	6/25/2012	164.96	ND	6.72	ND	158.24	158.24
MW-38	12/3/2012	164.96	ND	7.52	ND	157.44	157.44
MW-38	6/17/2013	164.96	ND	4.65	ND	160.31	160.31
MW-38	12/11/2013	164.96	ND	4.59	ND	160.37	160.37
MW-38	6/18/2014	164.96	ND	5.24	ND	159.72	159.72
MW-38	12/1/2014	164.96	ND	3.68	ND	161.28	161.28
MW-38	6/9/2015	164.96	ND	4.68	ND	160.28	160.28
MW-38	12/8/2015	164.96	ND	3.04	ND	161.92	161.92
MW-38	6/7/2016	164.61	ND	4.34	ND	160.27	160.27
MW-38	11/30/2016	164.61	ND	5.13	ND	159.48	159.48
MW-39	3/27/2007	164.96	ND	3.76	ND	161.20	161.20
MW-39	3/28/2007	164.96	ND	3.76	ND	161.20	161.20
MW-39	12/13/2007	164.96	ND	5.41	ND	159.55	159.55
MW-39	6/11/2008	164.96	ND	6.12	ND	158.84	158.84
MW-39	3/17/2009	164.96	ND	2.35	ND	162.61	162.61
MW-39	6/17/2009	164.96	ND	3.73	ND	161.23	161.23
MW-39	9/10/2009	164.96	ND	6.79	ND	158.17	158.17
MW-39	11/30/2009	164.96	ND	4.23	ND	160.73	160.73
MW-39	9/22/2010	164.96	ND	7.27	ND	157.69	157.69
MW-39	5/24/2011	164.96	ND	5.14	ND	159.82	159.82
MW-39	12/6/2011	164.96	ND	5.29	ND	159.67	159.67
MW-39	6/25/2012	164.96	ND	6.98	ND	157.98	157.98
MW-39	12/3/2012	164.96	ND	8.84	ND	156.12	156.12

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
MW-39	6/17/2013	164.96	ND	4.49	ND	160.47	160.47
MW-39	12/11/2013	164.96	ND	4.17	ND	160.79	160.79
MW-39	6/18/2014	164.96	ND	5.38	ND	159.58	159.58
MW-39	12/1/2014	164.96	ND	4.05	ND	160.91	160.91
MW-39	6/9/2015	164.96	ND	4.90	ND	160.06	160.06
MW-39	12/8/2015	164.96	ND	3.21	ND	161.75	161.75
MW-39	6/7/2016	165.91	ND	4.20	ND	161.71	161.71
MW-39	11/30/2016	165.91	ND	5.73	ND	160.18	160.18
MW-39 D	12/13/2007	166.49	ND	5.75	ND	160.74	160.74
MW-39 D	6/11/2008	166.49	ND	5.05	ND	161.44	161.44
MW-39 D	11/30/2009	166.49	ND	4.20	ND	162.29	162.29
MW-39 D	9/22/2010	166.49	ND	7.01	ND	159.48	159.48
MW-39 D	5/24/2011	166.49	ND	4.48	ND	162.01	162.01
MW-39 D	12/6/2011	166.49	ND	5.30	ND	161.19	161.19
MW-39 D	6/25/2012	166.49	ND	5.80	ND	160.69	160.69
MW-39 D	12/3/2012	166.49	ND	7.49	ND	159.00	159.00
MW-39 D	6/17/2013	166.49	ND	3.45	ND	163.04	163.04
MW-39 D	12/11/2013	166.49	ND	4.37	ND	162.12	162.12
MW-39 D	6/18/2014	166.49	ND	3.88	ND	162.61	162.61
MW-39 D	12/1/2014	166.49	ND	2.83	ND	163.66	163.66
MW-39 D	6/9/2015	166.49	ND	3.31	ND	163.18	163.18
MW-39 D	12/8/2015	166.49	ND	2.86	ND	163.63	163.63
MW-39 D	6/7/2016	166.08	ND	3.19	ND	162.89	162.89
MW-39 D	11/30/2016	166.08	ND	4.03	ND	162.05	162.05
MW-39 I	3/27/2007	166.32	ND	3.72	ND	162.60	162.60
MW-39 I	3/28/2007	166.32	ND	3.72	ND	162.60	162.60
MW-39 I	12/13/2007	166.32	ND	5.36	ND	160.96	160.96
MW-39 I	6/11/2008	166.32	ND	5.62	ND	160.70	160.70
MW-39 I	11/30/2009	166.32	ND	5.38	ND	160.94	160.94
MW-39 I	9/22/2010	166.32	ND	7.53	ND	158.79	158.79
MW-39 I	5/24/2011	166.32	ND	5.49	ND	160.83	160.83
MW-39 I	12/6/2011	166.32	ND	5.48	ND	160.84	160.84
MW-39 I	6/25/2012	166.32	ND	7.01	ND	159.31	159.31
MW-39 I	12/3/2012	166.32	ND	8.18	ND	158.14	158.14
MW-39 I	6/17/2013	166.32	ND	4.50	ND	161.82	161.82
MW-39 I	12/11/2013	166.32	ND	4.33	ND	161.99	161.99
MW-39 I	6/18/2014	166.32	ND	5.47	ND	160.85	160.85
MW-39 I	12/1/2014	166.32	ND	4.28	ND	162.04	162.04
MW-39 I	6/9/2015	166.32	ND	4.90	ND	161.42	161.42
MW-39 I	12/8/2015	166.32	ND	3.41	ND	162.91	162.91
MW-39 I	6/7/2016	166.32	ND	4.50	ND	161.82	161.82
MW-39 I	11/30/2016	166.32	ND	5.28	ND	161.04	161.04
MW-40	3/27/2007	168.79	ND	2.92	ND	165.87	165.87
MW-40	12/13/2007	168.79	ND	5.50	ND	163.29	163.29
MW-40	6/11/2008	168.79	ND	4.78	ND	164.01	164.01
MW-40	11/30/2009	168.79	ND	4.15	ND	164.64	164.64
MW-40	9/22/2010	168.79	ND	7.08	ND	161.71	161.71
MW-40	5/24/2011	168.79	ND	4.35	ND	164.44	164.44
MW-40	12/6/2011	168.79	ND	5.39	ND	163.40	163.40

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
MW-40	6/25/2012	168.79	ND	5.65	ND	163.14	163.14
MW-40	12/3/2012	168.79	ND	7.64	ND	161.15	161.15
MW-40	6/17/2013	168.79	ND	3.70	ND	165.09	165.09
MW-40	12/11/2013	168.79	ND	3.86	ND	164.93	164.93
MW-40	6/18/2014	168.79	ND	3.42	ND	165.37	165.37
MW-40	12/1/2014	168.79	ND	3.00	ND	165.79	165.79
MW-40	6/9/2015	168.79	ND	3.05	ND	165.74	165.74
MW-40	12/8/2015	168.79	ND	2.80	ND	165.99	165.99
MW-40	6/7/2016	168.60	ND	2.78	ND	165.82	165.82
MW-40	11/30/2016	168.60	ND	4.17	ND	164.43	164.43
MW-41	3/27/2007	168.58	ND	2.74	ND	165.84	165.84
MW-41	12/13/2007	168.58	ND	5.32	ND	163.26	163.26
MW-41	6/1/2008	168.58	4.52	4.58	0.06	164.00	164.05
MW-41	6/11/2008	168.58	4.52	4.58	0.06	164.00	164.05
MW-41	9/3/2008	168.58	ND	6.19	ND	162.39	162.39
MW-41	11/6/2008	168.58	ND	4.81	ND	163.77	163.77
MW-41	11/20/2008	168.58	ND	3.49	ND	165.09	165.09
MW-41	2/27/2009	168.58	ND	3.29	ND	165.29	165.29
MW-41	3/17/2009	168.58	ND	1.71	ND	166.87	166.87
MW-41	5/27/2009	168.58	ND	4.28	ND	164.30	164.30
MW-41	6/17/2009	168.58	ND	3.08	ND	165.50	165.50
MW-41	9/10/2009	168.58	ND	5.58	ND	163.00	163.00
MW-41	10/30/2009	168.58	ND	6.31	ND	162.27	162.27
MW-41	11/30/2009	168.58	ND	2.86	ND	165.72	165.72
MW-41	9/22/2010	168.58	ND	6.83	ND	161.75	161.75
MW-41	5/24/2011	168.58	ND	4.42	ND	164.16	164.16
MW-41	12/6/2011	168.58	ND	5.23	ND	163.35	163.35
MW-41	6/25/2012	168.58	ND	5.45	ND	163.13	163.13
MW-41	12/3/2012	168.58	ND	7.38	ND	161.20	161.20
MW-41	6/17/2013	168.58	ND	3.47	ND	165.11	165.11
MW-41	12/11/2013	168.58	ND	3.75	ND	164.83	164.83
MW-41	6/18/2014	168.58	ND	3.36	ND	165.22	165.22
MW-41	12/1/2014	168.58	ND	2.90	ND	165.68	165.68
MW-41	6/9/2015	168.58	ND	2.85	ND	165.73	165.73
MW-41	12/8/2015	168.58	ND	2.75	ND	165.83	165.83
MW-41	6/7/2016	168.24	ND	2.62	ND	165.62	165.62
MW-41	11/30/2016	168.24	ND	3.97	ND	164.27	164.27
MW-41	7/16/2009	168.58	ND	5.21	ND	163.37	163.37
MW-42	3/27/2007	169.23	ND	3.11	ND	166.12	166.12
MW-42	3/28/2007	169.23	ND	3.11	ND	166.12	166.12
MW-42	8/15/2007	169.23	ND	7.47	ND	161.76	161.76
MW-42	12/13/2007	169.23	ND	6.00	ND	163.23	163.23
MW-42	6/11/2008	169.23	4.22	4.32	0.10	164.91	164.99
MW-42	9/3/2008	169.23	ND	5.57	ND	163.66	163.66
MW-42	9/3/2008	169.23	ND	6.97	ND	162.26	162.26
MW-42	11/6/2008	169.23	ND	7.58	ND	161.65	161.65
MW-42	11/20/2008	169.23	4.14	4.14	0.00	165.09	165.09
MW-42	2/27/2009	169.23	ND	3.68	ND	165.55	165.55
MW-42	5/27/2009	169.23	ND	4.93	ND	164.30	164.30

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
MW-42	10/30/2009	169.23	ND	7.18	ND	162.05	162.05
MW-42	11/30/2009	169.23	ND	4.50	ND	164.73	164.73
MW-42	9/22/2010	169.23	ND	7.46	ND	161.77	161.77
MW-42	5/24/2011	169.23	ND	4.65	ND	164.58	164.58
MW-42	12/6/2011	169.23	ND	6.14	ND	163.09	163.09
MW-42	6/25/2012	169.23	ND	6.28	ND	162.95	162.95
MW-42	12/3/2012	169.23	ND	7.81	ND	161.42	161.42
MW-42	6/17/2013	169.23	ND	3.97	ND	165.26	165.26
MW-42	12/11/2013	169.23	ND	4.70	ND	164.53	164.53
MW-42	6/18/2014	169.23	ND	3.95	ND	165.28	165.28
MW-42	12/1/2014	169.23	ND	3.44	ND	165.79	165.79
MW-42	6/9/2015	169.23	ND	3.30	ND	165.93	165.93
MW-42	12/8/2015	169.23	ND	3.33	ND	165.90	165.90
MW-42	6/7/2016	168.90	ND	2.70	ND	166.20	166.20
MW-42	11/30/2016	168.90	ND	4.56	ND	164.34	164.34
MW-42	3/19/2010	169.23	ND	2.32	ND	166.91	166.91
MW-42	7/16/2009	169.23	ND	5.96	ND	163.27	163.27
MW-43	3/27/2007	168.70	ND	4.10	ND	164.60	164.60
MW-43	3/28/2007	168.70	ND	4.10	ND	164.60	164.60
MW-43	12/13/2007	168.70	ND	6.29	ND	162.41	162.41
MW-43	6/11/2008	168.70	ND	6.04	ND	162.66	162.66
MW-43	3/17/2009	168.70	ND	2.53	ND	166.17	166.17
MW-43	6/17/2009	168.70	ND	3.65	ND	165.05	165.05
MW-43	9/10/2009	168.70	ND	7.04	ND	161.66	161.66
MW-43	11/30/2009	168.70	ND	4.69	ND	164.01	164.01
MW-43	9/22/2010	168.70	ND	8.44	ND	160.26	160.26
MW-43	5/24/2011	168.70	ND	5.61	ND	163.09	163.09
MW-43	12/6/2011	168.70	ND	7.24	ND	161.46	161.46
MW-43	6/25/2012	168.70	ND	7.35	ND	161.35	161.35
MW-43	12/3/2012	168.70	ND	8.41	ND	160.29	160.29
MW-43	6/17/2013	168.70	ND	4.71	ND	163.99	163.99
MW-43	12/11/2013	168.70	ND	7.26	ND	161.44	161.44
MW-43	6/18/2014	168.70	ND	5.52	ND	163.18	163.18
MW-43	12/1/2014	168.70	ND	5.59	ND	163.11	163.11
MW-43	6/9/2015	168.70	ND	4.68	ND	164.02	164.02
MW-43	12/8/2015	168.70	ND	4.55	ND	164.15	164.15
MW-43	6/7/2016	168.23	ND	4.29	ND	163.94	163.94
MW-43	11/30/2016	168.23	ND	5.90	ND	162.33	162.33
MW-43 D	12/13/2007	168.92	ND	7.71	ND	161.21	161.21
MW-43 D	6/11/2008	168.92	ND	7.01	ND	161.91	161.91
MW-43 D	11/30/2009	168.92	ND	7.11	ND	161.81	161.81
MW-43 D	9/22/2010	168.92	ND	8.37	ND	160.55	160.55
MW-43 D	5/24/2011	168.92	ND	6.32	ND	162.60	162.60
MW-43 D	12/6/2011	168.92	ND	7.36	ND	161.56	161.56
MW-43 D	6/25/2012	168.92	ND	7.69	ND	161.23	161.23
MW-43 D	12/3/2012	168.92	ND	9.43	ND	159.49	159.49
MW-43 D	6/17/2013	168.92	ND	5.47	ND	163.45	163.45
MW-43 D	12/11/2013	168.92	ND	6.49	ND	162.43	162.43
MW-43 D	6/18/2014	168.92	ND	5.93	ND	162.99	162.99

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
MW-43 D	12/1/2014	168.92	ND	5.40	ND	163.52	163.52
MW-43 D	6/9/2015	168.92	ND	4.76	ND	164.16	164.16
MW-43 D	12/8/2015	168.92	ND	4.99	ND	163.93	163.93
MW-43 D	6/7/2016	168.23	ND	5.16	ND	163.07	163.07
MW-43 D	11/30/2016	168.23	ND	6.02	ND	162.21	162.21
MW-43 I	3/27/2007	168.68	ND	4.05	ND	164.63	164.63
MW-43 I	3/28/2007	168.68	ND	4.05	ND	164.63	164.63
MW-43 I	12/13/2007	168.68	ND	6.26	ND	162.42	162.42
MW-43 I	6/11/2008	168.68	ND	6.02	ND	162.66	162.66
MW-43 I	11/30/2009	168.68	ND	4.58	ND	164.10	164.10
MW-43 I	9/22/2010	168.68	ND	8.30	ND	160.38	160.38
MW-43 I	5/24/2011	168.68	ND	5.30	ND	163.38	163.38
MW-43 I	12/6/2011	168.68	ND	6.19	ND	162.49	162.49
MW-43 I	6/25/2012	168.68	ND	7.57	ND	161.11	161.11
MW-43 I	12/3/2012	168.68	ND	7.96	ND	160.72	160.72
MW-43 I	6/17/2013	168.68	ND	5.65	ND	163.03	163.03
MW-43 I	12/11/2013	168.68	ND	19.80	ND	148.88	148.88
MW-43 I	6/18/2014	168.68	ND	7.07	ND	161.61	161.61
MW-43 I	12/1/2014	168.68	ND	6.81	ND	161.87	161.87
MW-43 I	6/9/2015	168.68	ND	4.76	ND	163.92	163.92
MW-43 I	12/8/2015	168.68	ND	5.61	ND	163.07	163.07
MW-43 I	6/7/2016	168.36	ND	4.76	ND	163.60	163.60
MW-43 I	11/30/2016	168.36	ND	6.16	ND	162.20	162.20
MW-44	3/27/2007	169.44	5.31	5.37	0.06	164.07	164.12
MW-44	8/15/2007	169.44	ND	10.28	ND	159.16	159.16
MW-44	12/5/2007	169.44	9.97	10.07	0.10	159.37	159.45
MW-44	12/13/2007	169.44	ND	7.44	ND	162.00	162.00
MW-44	12/13/2007	169.44	ND	7.74	ND	161.70	161.70
MW-44	3/27/2008	169.44	ND	5.94	ND	163.50	163.50
MW-44	6/11/2008	169.44	7.44	7.44	0.00	162.00	162.00
MW-44	9/3/2008	169.44	ND	9.35	ND	160.09	160.09
MW-44	11/6/2008	169.44	ND	7.58	ND	161.86	161.86
MW-44	11/20/2008	169.44	ND	5.72	ND	163.72	163.72
MW-44	2/27/2009	169.44	ND	5.61	ND	163.83	163.83
MW-44	5/27/2009	169.44	ND	7.11	ND	162.33	162.33
MW-44	10/30/2009	169.44	9.39	9.39	0.01	160.05	160.05
MW-44	11/30/2009	169.44	ND	6.22	ND	163.22	163.22
MW-44	9/22/2010	169.44	ND	9.96	ND	159.48	159.48
MW-44	5/24/2011	169.44	ND	6.51	ND	162.93	162.93
MW-44	12/6/2011	169.44	ND	7.57	ND	161.87	161.87
MW-44	6/25/2012	169.44	ND	8.46	ND	160.98	160.98
MW-44	12/3/2012	169.44	ND	10.19	ND	159.25	159.25
MW-44	6/17/2013	169.44	ND	5.49	ND	163.95	163.95
MW-44	12/11/2013	169.44	ND	6.12	ND	163.32	163.32
MW-44	6/18/2014	169.44	ND	6.37	ND	163.07	163.07
MW-44	12/1/2014	169.44	NM	NM	NM	NM	NM
MW-44	6/9/2015	169.44	ND	5.82	ND	163.62	163.62
MW-44	12/8/2015	169.44	ND	5.58	ND	163.86	163.86
MW-44	6/7/2016	169.22	ND	6.40	ND	162.82	162.82

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
MW-44	11/30/2016	169.22	ND	6.69	ND	162.53	162.53
MW-44	3/19/2010	169.44	ND	4.37	ND	165.07	165.07
MW-44	5/25/2010	169.44	ND	4.90	ND	164.54	164.54
MW-44	6/25/2010	169.44	ND	6.82	ND	162.62	162.62
MW-44	8/6/2010	169.44	ND	8.59	ND	160.85	160.85
MW-44	9/15/2010	169.44	ND	4.67	ND	164.77	164.77
MW-44	1/19/2011	169.44	ND	5.38	ND	164.06	164.06
MW-44	10/21/2011	169.44	ND	8.18	ND	161.26	161.26
MW-44	1/31/2012	169.44	ND	6.99	ND	162.45	162.45
MW-44	3/1/2012	169.44	ND	6.43	ND	163.01	163.01
MW-44	3/20/2012	169.44	ND	6.54	ND	162.90	162.90
MW-44	4/20/2012	169.44	ND	6.23	ND	163.21	163.21
MW-44	5/25/2012	169.44	ND	5.92	ND	163.52	163.52
MW-44	9/13/2012	169.44	ND	10.02	ND	159.42	159.42
MW-44	3/8/2013	169.44	ND	7.42	ND	162.02	162.02
MW-44	7/16/2009	169.44	ND	8.19	ND	161.25	161.25
MW-45	3/27/2007	170.22	ND	4.43	ND	165.79	165.79
MW-45	3/28/2007	170.22	ND	4.43	ND	165.79	165.79
MW-45	12/13/2007	170.22	ND	9.14	ND	161.08	161.08
MW-45	6/11/2008	170.22	ND	7.04	ND	163.18	163.18
MW-45	11/30/2009	170.22	ND	6.86	ND	163.36	163.36
MW-45	9/22/2010	170.22	ND	10.51	ND	159.71	159.71
MW-45	5/24/2011	170.22	ND	6.71	ND	163.51	163.51
MW-45	12/6/2011	170.22	ND	8.44	ND	161.78	161.78
MW-45	6/25/2012	170.22	ND	8.52	ND	161.70	161.70
MW-45	12/3/2012	170.22	ND	11.21	ND	159.01	159.01
MW-45	6/17/2013	170.22	ND	4.48	ND	165.74	165.74
MW-45	12/11/2013	170.22	ND	6.48	ND	163.74	163.74
MW-45	6/18/2014	170.22	ND	4.85	ND	165.37	165.37
MW-45	12/1/2014	170.22	ND	4.31	ND	165.91	165.91
MW-45	6/9/2015	170.22	ND	4.43	ND	165.79	165.79
MW-45	12/8/2015	170.22	ND	3.63	ND	166.59	166.59
MW-45	6/7/2016	169.94	ND	4.50	ND	165.44	165.44
MW-45	11/30/2016	169.94	ND	5.82	ND	164.12	164.12
MW-46	3/27/2007	168.89	ND	4.11	ND	164.78	164.78
MW-46	3/28/2007	168.89	ND	4.11	ND	164.78	164.78
MW-46	12/13/2007	168.89	ND	7.31	ND	161.58	161.58
MW-46	6/11/2008	168.89	ND	6.37	ND	162.52	162.52
MW-46	11/30/2009	168.89	ND	5.32	ND	163.57	163.57
MW-46	9/22/2010	168.89	ND	9.69	ND	159.20	159.20
MW-46	5/24/2011	168.89	ND	5.91	ND	162.98	162.98
MW-46	12/6/2011	168.89	ND	7.12	ND	161.77	161.77
MW-46	6/25/2012	168.89	ND	7.79	ND	161.10	161.10
MW-46	12/3/2012	168.89	ND	10.23	ND	158.66	158.66
MW-46	6/17/2013	168.89	ND	2.45	ND	166.44	166.44
MW-46	12/11/2013	168.89	ND	5.37	ND	163.52	163.52
MW-46	6/18/2014	168.89	ND	4.63	ND	164.26	164.26
MW-46	12/1/2014	168.89	NM	NM	NM	NM	NM
MW-46	6/9/2015	168.89	ND	4.12	ND	164.77	164.77

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
MW-46	12/8/2015	168.89	NM	NM	NM	NM	NM
MW-46	6/7/2016	168.65	ND	3.59	ND	165.06	165.06
MW-46	11/30/2016	168.65	ND	5.57	ND	163.08	163.08
MW-47	12/13/2007	164.06	ND	4.07	ND	159.99	159.99
MW-47	6/11/2008	164.06	ND	5.28	ND	158.78	158.78
MW-47	11/30/2009	164.06	ND	3.85	ND	160.21	160.21
MW-47	9/22/2010	164.06	ND	6.07	ND	157.99	157.99
MW-47	5/24/2011	164.06	ND	4.92	ND	159.14	159.14
MW-47	12/6/2011	164.06	ND	4.38	ND	159.68	159.68
MW-47	6/25/2012	164.06	ND	5.56	ND	158.50	158.50
MW-47	12/3/2012	164.06	ND	6.86	ND	157.20	157.20
MW-47	6/17/2013	164.06	ND	4.29	ND	159.77	159.77
MW-47	12/11/2013	164.06	NM	NM	NM	NM	NM
MW-48	12/13/2007	164.06	ND	3.82	ND	160.24	160.24
MW-48	6/11/2008	164.06	ND	3.87	ND	160.19	160.19
MW-48	11/30/2009	164.06	ND	2.73	ND	161.33	161.33
MW-48	9/22/2010	164.06	ND	5.34	ND	158.72	158.72
MW-48	5/24/2011	164.06	ND	3.34	ND	160.72	160.72
MW-48	12/6/2011	164.06	ND	3.59	ND	160.47	160.47
MW-48	6/25/2012	164.06	ND	4.21	ND	159.85	159.85
MW-48	12/3/2012	164.06	ND	5.61	ND	158.45	158.45
MW-48	6/17/2013	164.06	ND	3.06	ND	161.00	161.00
MW-48	12/11/2013	164.06	NM	NM	NM	NM	NM
MW-49	12/13/2007	166.32	ND	3.18	ND	163.14	163.14
MW-49	6/11/2008	166.32	ND	2.71	ND	163.61	163.61
MW-50	12/13/2007	165.40	ND	2.98	ND	162.42	162.42
MW-50	12/13/2007	165.40	ND	2.98	ND	162.42	162.42
MW-50	6/11/2008	165.40	ND	2.69	ND	162.71	162.71
MW-51	12/13/2007	163.76	ND	1.59	ND	162.17	162.17
MW-51	12/13/2007	163.76	ND	1.59	ND	162.17	162.17
MW-51	6/11/2008	163.76	ND	1.52	ND	162.24	162.24
MW-B	2/8/2005	NS	ND	4.22	ND	NS	NS
MW-B	3/14/2005	NS	ND	4.40	ND	NS	NS
MW-B	4/4/2006	NS	4.94	5.11	0.17	NS	NS
MW-B	6/6/2006	NS	5.59	6.26	0.67	NS	NS
MW-C	2/8/2005	167.54	ND	4.45	ND	163.09	163.09
MW-C	3/14/2005	167.54	ND	4.59	ND	162.95	162.95
MW-C	3/14/2005	167.54	ND	4.59	ND	162.95	162.95
MW-C	4/4/2006	167.54	ND	5.31	ND	162.23	162.23
MW-C	4/4/2006	167.54	ND	5.31	ND	162.23	162.23
MW-C	3/28/2007	167.54	ND	3.82	ND	163.72	163.72
MW-C	3/28/2007	167.54	ND	3.82	ND	163.72	163.72
MW-C	12/13/2007	167.54	ND	6.41	ND	161.13	161.13
MW-C	6/11/2008	167.54	ND	5.88	ND	161.66	161.66
MW-C	11/30/2009	167.54	ND	4.70	ND	162.84	162.84
MW-C	9/22/2010	167.54	ND	8.07	ND	159.47	159.47
MW-C	5/24/2011	167.54	ND	5.59	ND	161.95	161.95
MW-C	12/6/2011	167.54	ND	6.19	ND	161.35	161.35
MW-C	6/25/2012	167.54	ND	7.05	ND	160.49	160.49

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
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Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
MW-C	12/3/2012	167.54	ND	8.43	ND	159.11	159.11
MW-C	6/17/2013	167.54	ND	3.84	ND	163.70	163.70
MW-C	12/11/2013	167.54	ND	4.96	ND	162.58	162.58
MW-C	6/18/2014	167.54	ND	4.97	ND	162.57	162.57
MW-C	12/1/2014	167.54	ND	2.85	ND	164.69	164.69
MW-C	6/9/2015	167.54	ND	4.44	ND	163.10	163.10
MW-C	12/8/2015	167.54	ND	3.21	ND	164.33	164.33
MW-C	6/7/2016	167.36	ND	4.34	ND	163.02	163.02
MW-C	11/30/2016	167.36	ND	5.06	ND	162.30	162.30
MW-E	2/8/2005	167.78	ND	3.90	ND	163.88	163.88
MW-E	3/14/2005	167.78	ND	3.94	ND	163.84	163.84
MW-E	3/14/2005	167.78	ND	3.94	ND	163.84	163.84
MW-E	4/4/2006	167.78	ND	4.82	ND	162.96	162.96
MW-E	4/4/2006	167.78	ND	4.82	ND	162.96	162.96
MW-E	3/28/2007	167.78	ND	2.72	ND	165.06	165.06
MW-E	3/28/2007	167.78	ND	2.72	ND	165.06	165.06
MW-E	12/13/2007	167.78	ND	6.20	ND	161.58	161.58
MW-E	6/11/2008	167.78	ND	5.02	ND	162.76	162.76
MW-E	11/30/2009	167.78	ND	4.27	ND	163.51	163.51
MW-E	9/22/2010	167.78	ND	7.82	ND	159.96	159.96
MW-E	5/24/2011	167.78	ND	4.48	ND	163.30	163.30
MW-E	12/6/2011	167.78	ND	5.78	ND	162.00	162.00
MW-E	6/25/2012	167.78	ND	6.25	ND	161.53	161.53
MW-E	12/3/2012	167.78	ND	7.74	ND	160.04	160.04
MW-E	6/17/2013	167.78	ND	3.25	ND	164.53	164.53
MW-E	12/11/2013	167.78	ND	4.32	ND	163.46	163.46
MW-E	6/18/2014	167.78	ND	3.51	ND	164.27	164.27
MW-E	12/1/2014	167.78	ND	1.13	ND	166.65	166.65
MW-E	6/9/2015	167.78	ND	1.67	ND	166.11	166.11
MW-E	12/8/2015	170.21	ND	4.95	ND	165.26	165.26
MW-E	6/7/2016	170.21	ND	5.59	ND	164.62	164.62
MW-E	11/30/2016	170.21	ND	6.94	ND	163.27	163.27
MW-F	2/8/2005	168.10	ND	4.11	ND	163.99	163.99
MW-F	3/14/2005	168.10	ND	4.21	ND	163.89	163.89
MW-F	4/4/2006	168.10	ND	4.97	ND	163.13	163.13
MW-F	3/28/2007	168.10	ND	3.12	ND	164.98	164.98
MW-F	12/13/2007	168.10	ND	6.00	ND	162.10	162.10
MW-F	6/11/2008	168.10	ND	5.11	ND	162.99	162.99
MW-F	11/30/2009	168.10	ND	4.40	ND	163.70	163.70
MW-F	9/22/2010	168.10	ND	7.52	ND	160.58	160.58
MW-F	5/24/2011	168.10	ND	4.61	ND	163.49	163.49
MW-F	12/6/2011	168.10	ND	5.94	ND	162.16	162.16
MW-F	6/25/2012	168.10	ND	6.54	ND	161.56	161.56
MW-F	12/3/2012	168.10	ND	7.45	ND	160.65	160.65
MW-F	6/17/2013	168.10	ND	3.47	ND	164.63	164.63
MW-F	12/11/2013	168.10	NM	NM	NM	NM	NM
MW-F	6/18/2014	168.10	NM	NM	NM	NM	NM
MW-F	12/1/2014	168.10	NM	NM	NM	NM	NM
MW-F	6/9/2015	168.10	ND	3.53	ND	164.57	164.57

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
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Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
MW-F	12/8/2015	170.67	ND	5.63	ND	165.04	165.04
MW-F	6/7/2016	170.67	ND	6.31	ND	164.36	164.36
MW-F	11/30/2016	170.67	ND	7.35	ND	163.32	163.32
PZ-1	3/28/2007	162.12	ND	3.83	ND	158.29	158.29
PZ-1	3/28/2007	162.12	ND	3.83	ND	158.29	158.29
PZ-1	12/13/2007	162.12	ND	4.16	ND	157.96	157.96
PZ-1	6/11/2008	162.12	ND	4.77	ND	157.35	157.35
PZ-1	11/30/2009	162.12	ND	3.85	ND	158.27	158.27
PZ-1	9/22/2010	162.12	ND	5.96	ND	156.16	156.16
PZ-1	5/24/2011	162.12	ND	4.45	ND	157.67	157.67
PZ-1	12/6/2011	162.12	ND	4.15	ND	157.97	157.97
PZ-1	6/25/2012	162.12	ND	5.11	ND	157.01	157.01
PZ-1	12/3/2012	162.12	ND	5.12	ND	157.00	157.00
PZ-1	6/17/2013	162.12	ND	4.21	ND	157.91	157.91
PZ-1	12/11/2013	162.12	ND	3.76	ND	158.36	158.36
PZ-1	6/18/2014	162.12	ND	4.40	ND	157.72	157.72
PZ-1	12/1/2014	162.12	ND	3.79	ND	158.33	158.33
PZ-1	6/9/2015	162.12	ND	4.21	ND	157.91	157.91
PZ-1	12/8/2015	162.12	ND	3.58	ND	158.54	158.54
PZ-1	6/7/2016	161.72	ND	4.00	ND	157.72	157.72
PZ-1	11/30/2016	161.72	ND	4.21	ND	157.51	157.51
PZ-2	3/28/2007	162.79	ND	4.26	ND	158.53	158.53
PZ-2	12/13/2007	162.79	ND	4.57	ND	158.22	158.22
PZ-2	6/11/2008	162.79	ND	5.21	ND	157.58	157.58
PZ-2	3/17/2009	162.79	ND	2.97	ND	159.82	159.82
PZ-2	6/17/2009	162.79	ND	3.50	ND	159.29	159.29
PZ-2	9/10/2009	162.79	ND	5.05	ND	157.74	157.74
PZ-2	11/30/2009	162.79	ND	3.91	ND	158.88	158.88
PZ-2	9/22/2010	162.79	ND	6.26	ND	156.53	156.53
PZ-2	5/24/2011	162.79	ND	4.79	ND	158.00	158.00
PZ-2	12/6/2011	162.79	ND	4.54	ND	158.25	158.25
PZ-2	6/25/2012	162.79	ND	5.47	ND	157.32	157.32
PZ-2	12/3/2012	162.79	ND	5.62	ND	157.17	157.17
PZ-2	6/17/2013	162.79	ND	4.55	ND	158.24	158.24
PZ-2	12/11/2013	162.79	ND	3.99	ND	158.80	158.80
PZ-2	6/18/2014	162.79	ND	4.63	ND	158.16	158.16
PZ-2	12/1/2014	162.79	ND	3.76	ND	159.03	159.03
PZ-2	6/9/2015	162.79	ND	4.41	ND	158.38	158.38
PZ-2	12/8/2015	162.79	ND	3.59	ND	159.20	159.20
PZ-2	6/7/2016	162.42	ND	4.09	ND	158.33	158.33
PZ-2	11/30/2016	162.42	ND	4.46	ND	157.96	157.96
PZ-3	3/28/2007	162.10	ND	3.04	ND	159.06	159.06
PZ-3	12/13/2007	162.10	ND	3.40	ND	158.70	158.70
PZ-3	6/11/2008	162.10	ND	4.25	ND	157.85	157.85
PZ-3	3/17/2009	162.10	ND	1.91	ND	160.19	160.19
PZ-3	3/17/2009	162.10	ND	2.14	ND	159.96	159.96
PZ-3	6/17/2009	162.10	ND	2.20	ND	159.90	159.90
PZ-3	6/17/2009	162.10	ND	2.45	ND	159.65	159.65
PZ-3	9/10/2009	162.10	ND	4.06	ND	158.04	158.04

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
PZ-3	9/10/2009	162.10	ND	4.63	ND	157.47	157.47
PZ-3	11/30/2009	162.10	ND	2.87	ND	159.23	159.23
PZ-3	9/22/2010	162.10	ND	5.17	ND	156.93	156.93
PZ-3	5/24/2011	162.10	ND	3.76	ND	158.34	158.34
PZ-3	12/6/2011	162.10	ND	3.35	ND	158.75	158.75
PZ-3	6/25/2012	162.10	ND	4.52	ND	157.58	157.58
PZ-3	12/3/2012	162.10	ND	4.54	ND	157.56	157.56
PZ-3	6/17/2013	162.10	ND	3.54	ND	158.56	158.56
PZ-3	12/11/2013	162.10	ND	2.79	ND	159.31	159.31
PZ-3	6/18/2014	162.10	ND	3.75	ND	158.35	158.35
PZ-3	12/1/2014	162.10	ND	2.64	ND	159.46	159.46
PZ-3	6/9/2015	162.10	ND	3.40	ND	158.70	158.70
PZ-3	12/8/2015	162.10	ND	2.40	ND	159.70	159.70
PZ-3	6/7/2016	161.74	ND	3.17	ND	158.57	158.57
PZ-3	11/30/2016	161.74	ND	3.56	ND	158.18	158.18
PZ-4	3/28/2007	162.62	ND	3.60	ND	NA	NA
PZ-4	3/28/2007	162.62	ND	3.60	ND	159.02	159.02
PZ-4	12/13/2007	162.62	ND	3.81	ND	158.81	158.81
PZ-4	6/11/2008	162.62	ND	4.88	ND	157.74	157.74
PZ-4	3/17/2009	162.62	ND	2.14	ND	160.48	160.48
PZ-4	11/30/2009	162.62	ND	3.36	ND	159.26	159.26
PZ-4	9/22/2010	162.62	ND	5.66	ND	156.96	156.96
PZ-4	5/24/2011	162.62	ND	4.31	ND	158.31	158.31
PZ-4	12/6/2011	162.62	ND	3.76	ND	158.86	158.86
PZ-4	6/25/2012	162.62	ND	5.05	ND	157.57	157.57
PZ-4	12/3/2012	162.62	ND	5.05	ND	157.57	157.57
PZ-4	6/17/2013	162.62	ND	4.11	ND	158.51	158.51
PZ-4	12/11/2013	162.62	ND	3.14	ND	159.48	159.48
PZ-4	6/18/2014	162.62	ND	4.34	ND	158.28	158.28
PZ-4	12/1/2014	162.62	ND	3.04	ND	159.58	159.58
PZ-4	6/9/2015	162.62	ND	3.94	ND	158.68	158.68
PZ-4	12/8/2015	162.62	ND	2.69	ND	159.93	159.93
PZ-4	6/7/2016	162.22	ND	3.56	ND	158.66	158.66
PZ-4	11/30/2016	162.22	ND	3.95	ND	158.27	158.27
PZ-5	9/22/2010	164.83	ND	6.10	ND	158.73	158.73
PZ-5	5/24/2011	164.83	ND	3.09	ND	161.74	161.74
PZ-5	12/6/2011	164.83	ND	3.35	ND	161.48	161.48
PZ-5	6/25/2012	164.83	ND	4.49	ND	160.34	160.34
PZ-5	12/3/2012	164.83	ND	5.96	ND	158.87	158.87
PZ-5	6/17/2013	164.83	ND	2.29	ND	162.54	162.54
PZ-5	12/11/2013	164.83	ND	2.27	ND	162.56	162.56
PZ-5	6/18/2014	164.83	ND	3.59	ND	161.24	161.24
PZ-5	12/1/2014	164.83	ND	1.27	ND	163.56	163.56
PZ-5	6/9/2015	164.83	ND	2.94	ND	161.89	161.89
PZ-5	12/8/2015	164.83	ND	1.17	ND	163.66	163.66
PZ-5	6/7/2016	164.89	ND	2.59	ND	162.30	162.30
PZ-5	11/30/2016	164.89	ND	2.83	ND	162.06	162.06
PZ-6	9/22/2010	163.30	ND	4.95	ND	158.35	158.35
PZ-6	5/24/2011	163.30	ND	2.04	ND	161.26	161.26

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
PZ-6	12/6/2011	163.30	ND	2.14	ND	161.16	161.16
PZ-6	6/25/2012	163.30	ND	3.50	ND	159.80	159.80
PZ-6	12/3/2012	163.30	ND	4.74	ND	158.56	158.56
PZ-6	6/17/2013	163.30	ND	1.45	ND	161.85	161.85
PZ-6	12/11/2013	163.30	ND	0.98	ND	162.32	162.32
PZ-6	6/18/2014	163.30	ND	2.54	ND	160.76	160.76
PZ-6	12/1/2014	163.30	ND	0.26	ND	163.04	163.04
PZ-6	6/9/2015	163.30	ND	1.97	ND	161.33	161.33
PZ-6	12/8/2015	163.30	ND	0.50	ND	162.80	162.80
PZ-6	6/7/2016	163.27	ND	1.55	ND	161.72	161.72
PZ-6	11/30/2016	163.27	ND	2.08	ND	161.19	161.19
PZ-7	9/22/2010	163.49	ND	5.11	ND	158.38	158.38
PZ-7	5/24/2011	163.49	ND	2.48	ND	161.01	161.01
PZ-7	12/6/2011	163.49	ND	2.53	ND	160.96	160.96
PZ-7	6/25/2012	163.49	ND	3.91	ND	159.58	159.58
PZ-7	12/3/2012	163.49	ND	5.06	ND	158.43	158.43
PZ-7	6/17/2013	163.49	ND	1.80	ND	161.69	161.69
PZ-7	12/11/2013	163.49	ND	1.35	ND	162.14	162.14
PZ-7	6/18/2014	163.49	ND	3.08	ND	160.41	160.41
PZ-7	12/1/2014	163.49	ND	0.77	ND	162.72	162.72
PZ-7	6/9/2015	163.49	ND	2.54	ND	160.95	160.95
PZ-7	12/8/2015	163.49	ND	0.65	ND	162.84	162.84
PZ-7	6/7/2016	163.64	ND	2.11	ND	161.53	161.53
PZ-7	11/30/2016	163.64	ND	2.80	ND	160.84	160.84
PZ-8	9/22/2010	163.53	ND	4.92	ND	158.61	158.61
PZ-8	5/24/2011	163.53	ND	2.60	ND	160.93	160.93
PZ-8	12/6/2011	163.53	ND	2.58	ND	160.95	160.95
PZ-8	6/25/2012	163.53	ND	3.85	ND	159.68	159.68
PZ-8	12/3/2012	163.53	ND	4.99	ND	158.54	158.54
PZ-8	6/17/2013	163.53	ND	2.16	ND	161.37	161.37
PZ-8	12/11/2013	163.53	ND	1.42	ND	162.11	162.11
PZ-8	6/18/2014	163.53	ND	3.29	ND	160.24	160.24
PZ-8	12/1/2014	163.53	ND	1.07	ND	162.46	162.46
PZ-8	6/9/2015	163.53	ND	2.81	ND	160.72	160.72
PZ-8	12/8/2015	163.53	ND	0.93	ND	162.60	162.60
PZ-8	6/7/2016	163.59	ND	2.39	ND	161.20	161.20
PZ-8	11/30/2016	163.59	ND	2.90	ND	160.69	160.69
PZ-9	9/22/2010	162.08	ND	4.61	ND	157.47	157.47
PZ-9	5/24/2011	162.08	ND	2.26	ND	159.82	159.82
PZ-9	12/6/2011	162.08	ND	1.92	ND	160.16	160.16
PZ-9	6/25/2012	162.08	ND	3.58	ND	158.50	158.50
PZ-9	12/3/2012	162.08	ND	4.18	ND	157.90	157.90
PZ-9	6/17/2013	162.08	ND	1.94	ND	160.14	160.14
PZ-9	12/11/2013	162.08	ND	0.61	ND	161.47	161.47
PZ-9	6/18/2014	162.08	ND	2.85	ND	159.23	159.23
PZ-9	12/1/2014	162.08	ND	0.54	ND	161.54	161.54
PZ-9	6/9/2015	162.08	ND	2.23	ND	159.85	159.85
PZ-9	12/8/2015	162.08	ND	0.30	ND	161.78	161.78
PZ-9	6/7/2016	162.11	ND	1.65	ND	160.46	160.46

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
PZ-9	11/30/2016	162.11	ND	2.16	ND	159.95	159.95
RW-1	3/29/2000	NS	NM	NM	NM	NM	NM
RW-1	10/27/2000	NS	4.20	5.46	1.26	NS	NS
RW-1	4/16/2001	NS	2.23	2.85	0.62	NS	NS
RW-1	10/9/2007	NS	8.49	9.53	1.04	NS	NS
RW-2	3/29/2000	NS	NM	NM	NM	NM	NM
RW-2	5/31/2000	NS	0.00	3.12	3.12	NS	NS
RW-2	10/27/2000	NS	3.27	3.36	0.09	NS	NS
RW-2	4/16/2001	NS	1.98	2.26	0.28	NS	NS
RW-3	5/12/2004	168.63	NG	NG	NG	NG	NG
RW-3	2/10/2005	168.63	3.40	7.75	4.35	160.88	164.36
RW-3	2/22/2005	168.63	3.99	7.94	3.95	160.69	163.85
RW-3	3/14/2005	168.63	2.94	3.15	0.21	165.48	165.65
RW-3	3/16/2005	168.63	3.40	7.64	4.24	160.99	164.38
RW-3	4/25/2005	168.63	2.94	3.15	0.21	165.48	165.65
RW-3	5/26/2005	168.63	4.36	4.77	0.41	163.86	164.19
RW-3	6/24/2005	168.63	5.01	5.81	0.80	162.82	163.46
RW-3	7/25/2005	168.63	5.36	7.39	2.03	161.24	162.87
RW-3	8/22/2005	168.63	6.74	7.92	1.18	160.71	161.66
RW-3	10/13/2005	168.63	7.18	8.20	1.02	160.43	161.25
RW-3	11/28/2005	168.63	6.52	7.86	1.34	160.77	161.84
RW-3	12/16/2005	168.63	3.12	4.74	1.62	163.89	165.19
RW-3	1/31/2006	168.63	3.41	3.68	0.27	164.95	165.17
RW-3	2/24/2006	168.63	4.15	4.52	0.37	164.11	164.41
RW-3	4/4/2006	168.63	4.97	5.20	0.23	163.43	163.62
RW-3	6/6/2006	168.63	4.96	7.32	2.36	161.31	163.20
RW-3	10/3/2006	168.63	5.19	6.18	0.99	162.45	163.24
RW-3	2/21/2007	168.63	2.99	3.35	0.36	165.28	165.57
RW-3	3/28/2007	168.63	3.02	3.86	0.84	164.77	165.44
RW-3	5/17/2007	168.63	6.27	6.75	0.48	161.88	162.27
RW-3	8/15/2007	168.63	7.75	8.80	1.05	159.83	160.67

TABLE 2
HISTORICAL GROUNDWATER ELEVATION DATA
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	TOC Elevation (feet)	Depth to LNAPL (ft. btoc)	Depth to Water (ft. btoc)	LNAPL Thickness (feet)	Groundwater Elevation (feet)	Corrected Groundwater Elevation (feet)
RW-3	10/9/2007	168.63	8.49	9.53	1.04	159.10	159.93
RW-3	12/5/2007	168.63	9.05	9.22	0.17	159.41	159.55
RW-3	12/13/2007	168.63	ND	5.70	ND	162.93	162.93
RW-3	3/27/2008	168.63	ND	2.76	ND	165.87	165.87
RW-3	6/11/2008	168.63	3.96	3.96	0.00	164.67	164.67
RW-3	9/3/2008	168.63	ND	6.97	ND	161.66	161.66
RW-3	11/6/2008	168.63	ND	5.46	ND	163.17	163.17
RW-3	11/20/2008	168.63	ND	2.49	ND	166.14	166.14
RW-3	2/27/2009	168.63	ND	2.93	ND	165.70	165.70
RW-3	5/27/2009	168.63	ND	4.79	ND	163.84	163.84
RW-3	7/16/2009	168.63	ND	2.69	ND	165.94	165.94
RW-3	10/30/2009	168.63	ND	7.15	ND	161.48	161.48
RW-3	11/30/2009	168.63	ND	2.81	ND	165.82	165.82
RW-3	3/19/2010	168.63	ND	1.86	ND	166.77	166.77
RW-3	8/6/2010	168.63	ND	5.84	ND	162.79	162.79
RW-3	9/15/2010	168.63	ND	6.91	ND	161.72	161.72
RW-3	9/22/2010	168.63	ND	7.82	ND	160.81	160.81
RW-3	1/19/2011	168.63	ND	7.11	ND	161.52	161.52
RW-3	5/24/2011	168.63	ND	4.03	ND	164.60	164.60
RW-3	10/21/2011	168.63	ND	5.66	ND	162.97	162.97
RW-3	12/6/2011	168.63	ND	6.19	ND	162.44	162.44
RW-3	3/20/2012	168.63	ND	3.68	ND	164.95	164.95
RW-3	6/25/2012	168.63	ND	5.34	ND	163.29	163.29
RW-3	9/13/2012	168.63	ND	6.93	ND	161.70	161.70
RW-3	12/3/2012	168.63	ND	8.26	ND	160.37	160.37
RW-3	3/8/2013	168.63	ND	2.99	ND	165.64	165.64
RW-3	6/17/2013	168.63	ND	3.41	ND	165.22	165.22
RW-3	12/11/2013	168.63	ND	2.95	ND	165.68	165.68
RW-3	6/18/2014	168.63	ND	4.43	ND	164.20	164.20
RW-3	12/1/2014	168.63	ND	2.59	ND	166.04	166.04
RW-3	6/9/2015	168.63	ND	2.85	ND	165.78	165.78
RW-3	12/8/2015	168.63	ND	1.61	ND	167.02	167.02
RW-3	6/7/2016	168.19	ND	2.21	ND	165.98	165.98
RW-3	11/30/2016	168.19	ND	3.83	ND	164.36	164.36
SG-1	3/28/2007	158.10	ND	0.22	ND	157.88	157.88
SG-1	12/13/2007	158.10	ND	0.37	ND	157.73	157.73
SG-1	6/11/2008	158.10	DRY	DRY	DRY	DRY	DRY
SG-2	3/28/2007	157.67	ND	0.51	ND	157.16	157.16
SG-2	12/13/2007	157.67	ND	0.66	ND	157.01	157.01
SG-2	6/11/2008	157.67	DRY	DRY	DRY	DRY	DRY
SG-3	3/28/2007	158.56	ND	0.42	ND	158.14	158.14
SG-3	12/13/2007	158.56	ND	0.31	ND	158.25	158.25
SG-3	6/11/2008	158.56	DRY	DRY	DRY	DRY	DRY
SG-4	3/28/2007	158.71	ND	0.37	ND	158.34	158.34
SG-4	12/13/2007	158.71	ND	0.36	ND	158.35	158.35
SG-4	6/11/2008	158.71	DRY	DRY	DRY	DRY	DRY
WSW-1	3/28/2007	NM	NM	NM	NM	NM	NM

TABLE 3
HISTORICAL GROUNDWATER ANALYTICAL SUMMARY
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

	Analyte	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	Naphthalene
	Units	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
	NC DEQ 2L	1	600	600	500	20	6
Well ID	Date						
MW-1	03/14/05	< 0.18	< 0.49	< 0.55	< 0.76	< 0.69	< 0.65
	04/04/06	< 0.2	< 0.19	2.4 J	3.2 J	< 0.21	< 2.1 U
	10/30/06	< 0.2	< 0.51 U	< 0.16	< 0.24	< 0.21	< 0.25
	03/28/07	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	06/12/08	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	12/02/09	< 0.33	< 0.67	< 0.7	< 1.8	< 0.64	< 0.45
	05/25/11	< 0.19	< 0.26	< 0.33	< 0.2	< 0.18	< 0.39
	06/26/12	< 0.19 UJ	< 0.26 UJ	< 0.33 UJ	< 0.2 UJ	< 0.18 UJ	< 0.39 UJ
	06/19/13	< 0.21	< 0.27	< 0.2	< 0.2	< 0.2	< 0.47
MW-2	03/14/05	< 0.18	< 0.49	< 0.55	< 0.76	< 0.69	< 0.65
	04/04/06	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	10/30/06	< 0.2	< 0.46 U	< 0.16	< 0.24	< 0.21	< 0.36 U
	03/28/07	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	06/12/08	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	12/02/09	< 0.33	1.5 J	< 0.7	2 J	< 0.64	1.2 J
	05/25/11	< 0.19	1.6 J	<0.33	2.6 J	< 0.18	3.1 UJ
	06/26/12	< 0.19 UJ	< 0.26 UJ	< 0.33 UJ	< 0.2 UJ	< 0.18 UJ	< 0.39 UJ
	06/19/13	< 0.21	< 0.27	< 0.2	< 0.2	< 0.2	< 0.47
MW-3	03/15/05	< 0.18	< 0.49	< 0.55	< 0.76	< 0.69	< 0.65
	04/04/06	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	10/30/06	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	03/27/07	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	06/11/08	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	12/02/09	< 0.33	< 0.67	< 0.7	< 1.8	< 0.64	< 0.45
	05/24/11	< 0.19	< 0.26	< 0.33	< 0.2	< 0.18	< 0.39
	06/25/12	< 0.19 UJ	< 0.26 UJ	< 0.33 UJ	< 0.2 UJ	< 0.18 UJ	< 0.39 UJ
	06/18/13	< 0.21	< 0.27	< 0.2	< 0.2	< 0.2	< 0.47
MW-04	03/14/05	< 0.18	< 0.49	< 0.55	< 0.76	< 0.69	< 0.65
	04/05/06	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	10/30/06	< 0.2	< 0.48 U	< 0.16	< 0.24	< 0.21	< 0.25
	03/27/07	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	06/12/08	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	12/03/09	< 0.33	< 0.67	< 0.7	< 1.8	< 0.64	< 0.45
	05/24/11	< 0.19	< 0.26	< 0.33	< 0.2	< 0.18	< 0.39
	06/27/12	< 0.19	< 0.26	< 0.33	< 0.2	< 0.18	< 0.39
	06/19/13	< 0.21	< 0.27	< 0.2	< 0.2	< 0.2	< 0.47
	06/10/15	< 0.21	< 0.21	< 0.27	< 0.39	< 0.28	< 0.34

TABLE 3
HISTORICAL GROUNDWATER ANALYTICAL SUMMARY
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

	Analyte	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	Naphthalene
	Units	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
	NC DEQ 2L	1	600	600	500	20	6
Well ID	**Date**						
MW-5	03/15/05	**14,000**	**17,000**	**4,900**	**20,700**	**14,000**	**280**
	04/05/06	**17,000**	**18,000**	**5,200**	**26,400**	**8,900**	**380**
	10/30/06	**4,300**	**14,000**	**2,600**	**14,600**	**500**	< 690 U
	03/28/07	**7,200**	**11,000**	**2,800**	**10,800**	**6,400**	**430**
	06/12/08	**1,900**	**4,400**	**1,400**	**11,900**	**590**	**750**
	03/17/09	**100**	**810**	310	**3,000**	6.4 J	**240**
	06/17/09	**250**	**2,400**	**750**	**6,200**	< 2.1	**700**
	09/10/09	**8,200**	**5,400**	**2,700**	**10,600**	**1,100**	**500**
	12/03/09	**7,800**	330	**1,800**	**4,765**	**6,300**	**260**
	09/23/10	**12**	< 0.2	4.7 J	26.5	**180**	2.6 J
	05/25/11	< 2.9 U	31	12	**660**	**730**	< 3.3 UJ
	12/06/11	< 0.96	5.8 J	1.9 J	33	**540**	< 2
	06/27/12	0.55 J	5 J	3.4 J	420	**590**	< 0.39
	12/04/12	< 0.21	< 0.27	0.28 J	0.83 J	8.8	< 0.47
	06/20/13	< 0.21	< 0.27	0.95 J	1.4 J	1.9 J	< 2 U
	12/12/13	< 0.21	< 0.27	< 0.2	< 0.2	6	< 0.47
	06/19/14	< 0.21	< 0.21	< 0.27	< 0.63	0.86 J	< 0.34
	12/02/14	< 0.21	< 0.21	< 0.27	< 0.63	< 0.28	< 0.34
	06/10/15	< 0.21	< 0.21	< 0.27	< 0.39	< 0.28	< 0.34
	12/09/15	< 0.21	< 0.21	< 0.27	< 0.39	0.51 J	< 0.34
	06/09/16	< 0.21	< 0.21	0.53 J	0.56 J	< 0.28	< 0.55 U
	12/01/16	<0.21	<0.21	<0.27	<0.39	1.1	<0.34
MW-06	05/26/11	**110**	150	11	**1,140**	**29**	**27**
	06/28/12	**61**	49	7.6 J	112	**29**	< 2
	06/20/13	0.84 J	2.6 J	0.47 J	51	9	< 0.47
	06/08/16	< 0.21	< 0.21	< 0.27	< 0.39	< 0.28	< 0.34
MW-7	03/15/05	**49**	77	100	229	3.6	**6.2**
	04/05/06	**1,100**	510	290	**620**	**840**	**22**
	10/30/06	**63**	53	35	162	**32**	< 6.1 U
	03/28/07	**34**	10	39	88	< 0.21	5.5
	06/12/08	**450**	390	150	**520**	**160**	**11**
	12/03/09	**2**	< 0.67	0.96 J	3.2 J	0.92 J	3 J
	05/25/11	**170**	180	12	**800**	**610**	1.7 UJ
	06/25/12	**1.9 J**	51 J	11 J	220 J	**290 J**	< 0.39 UJ
	06/20/13	**2.9 J**	120	22 J	**1,990**	**42**	< 2.4
	06/08/16	< 0.21	< 0.21	< 0.27	< 0.39	0.74 J	< 0.34
	12/01/16	<0.21	<0.21	<0.27	<0.39	0.32 J	<0.34

TABLE 3
HISTORICAL GROUNDWATER ANALYTICAL SUMMARY
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

	Analyte	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	Naphthalene
	Units	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
	NC DEQ 2L	1	600	600	500	20	6
Well ID	**Date**						
	05/05/05	0.85 J	< 0.19	< 0.16	< 0.76	8.7	< 0.25
	04/04/06	< 0.2	0.5 J	< 0.16	< 0.24	< 0.21	< 0.59 U
	10/30/06	< 0.2	< 0.61 U	< 0.16	0.86 J	< 0.21	< 1.6 U
	03/28/07	**2.5**	< 0.19	0.3 J	2.41 J	< 0.21	5
MW-8	06/12/08	< 0.2	< 0.19	< 0.16	< 0.24	0.98 J	< 0.25
	12/02/09	< 0.33	< 0.67	< 0.7	< 1.8	< 0.64	< 0.45
	05/26/11	< 0.19	< 0.26	< 0.33	0.21 J	0.26 J	< 0.39
	06/26/12	< 0.19 UJ	< 0.26 UJ	< 0.33 UJ	< 0.2 UJ	< 0.18 UJ	< 0.39 UJ
	06/20/13	< 0.21	< 0.27	0.33 J	1.1 J	< 0.2	< 0.47
	03/14/05	**7.6**	< 0.49	23	< 0.76	8.3	**11**
	04/05/06	< 0.2	< 0.19	1.7 J	< 0.24	< 0.21	< 2.3 U
	10/30/06	**3**	< 1.8 U	15	2.56 J	1 J	< 11 U
	03/28/07	0.48 J	0.47 J	6.9	8.09	< 0.21	1.6 J
MW-9	06/12/08	**3.1 J**	5.2	110	27	0.81 J	**39**
	12/03/09	< 0.33	< 0.67	< 0.7	< 1.8	< 0.64	< 0.45
	05/26/11	< 0.19	< 0.26	< 0.33	< 0.2	< 0.18	< 0.39
	06/27/12	< 0.19	< 0.26	1.7 J	< 0.2	< 0.18	< 0.39
	06/19/13	< 0.21	< 0.27	< 0.2	< 0.2	< 0.2	< 0.47
	03/14/05	< 0.18	< 0.49	< 0.55	< 0.76	< 0.69	< 0.65
	04/04/06	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	10/30/06	< 0.2	< 1 U	< 0.16	0.78 J	< 0.21	< 1.8 U
	03/28/07	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
MW-11D	06/12/08	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	12/02/09	< 0.33	< 0.67	< 0.7	< 1.8	< 0.64	< 0.45
	05/25/11	< 0.19	0.65 J	< 0.33	2.5 J	3 J	< 0.74 UJ
	06/26/12	< 0.19 UJ	< 0.26 UJ	< 0.33 UJ	< 0.2 UJ	< 0.18 UJ	< 0.39 UJ
	06/19/13	< 0.21	< 0.27	< 0.2	< 0.2	0.24 J	< 0.47
	03/14/05	< 0.18	< 0.49	< 0.55	< 0.76	< 0.69	< 0.65
	04/05/06	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	10/30/06	< 0.2	< 0.75 U	< 0.16	< 0.24	< 0.21	< 0.81 U
	03/27/07	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
MW-12D	06/12/08	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	12/03/09	< 0.33	< 0.67	< 0.7	< 1.8	< 0.64	3.3 J
	05/24/11	< 0.19	< 0.26	< 0.33	< 0.2	< 0.18	< 0.39
	06/27/12	< 0.19	< 0.26	< 0.33	< 0.2	< 0.18	< 0.39
	06/20/13	< 0.21	< 0.27	< 0.2	< 0.2	< 0.2	< 0.47

TABLE 3
HISTORICAL GROUNDWATER ANALYTICAL SUMMARY
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

	Analyte	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	Naphthalene
	Units	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
	NC DEQ 2L	1	600	600	500	20	6
Well ID	Date						
MW-13	03/14/05	**110**	1.4 J	260	460	< 0.69	**66**
	04/05/06	**7,600**	**14,000**	**1,600**	**7,600**	**71,000**	**320 J**
	10/30/06	**3,800**	**7,500**	**1,900**	**6,800**	**43,000**	**480**
	03/27/07	**3,800**	**6,400**	**1,700**	**6,400**	**58,000**	**240 J**
	06/12/08	**7,200**	**3,300**	**3,400**	**11,200**	**64,000**	**620 J**
	03/25/09	**5,600**	**6,000**	**2,100**	**6,700**	**47,000**	**320**
	06/17/09	**3,600**	**1,100**	**2,000**	**6,220**	**38,000**	**540**
	09/10/09	**3,100**	**1,600**	**1,500**	**4,910**	**48,000**	**510**
	12/03/09	**280**	40	150	272	**740**	**21**
	09/22/10	**2,000**	**660**	**1,000**	**3,290**	**20,000**	**340 J**
	05/26/11	**370**	94 J	200	321	**10,000**	< 57 U
	12/06/11	**210**	54	170	**545**	**1,700**	**36**
	06/27/12	**200**	46 J	270	**530 J**	**2,700**	**59**
	12/04/12	**350**	8.9	**690**	**1,216**	**4,900**	**210**
	06/19/13	**21**	3.4 J	36	59	**320**	**19**
	12/12/13	0.64 J	< 0.27	1.5 J	0.8 J	**160**	1.4 J
	06/19/14	**31**	39	160	**950**	**1,200**	**92**
	06/19/14	**31**	39	160	**950**	**1,200**	**92**
	06/10/15	< 0.21	< 0.21	9.5	13.4	**21.4**	**8.7**
	12/08/15	**13.1**	2.2	134	72.2	**70.5**	**60.1**
	06/09/16	**11.6**	2.1	84	67.2	**50.7**	**40.3**
	12/01/16	**5.7**	<0.37 U	5.9	28.9	**13.6**	**28.5**
MW-14	03/14/05	**9.9**	< 0.49	7.1	3.1 J	**21**	**80**
	04/05/06	**1.6**	< 0.19	2.4 J	< 0.24	**35**	**35**
	10/30/06	**5.2**	< 0.19	6.6	1.47 J	7.7	**42**
	03/27/07	**1.3**	< 0.19	2.3 J	0.25 J	< 0.21	**9.2**
	06/12/08	< 0.2	< 0.19	< 0.16	< 0.24	2.4 J	5.5
	12/03/09	0.55 J	< 0.67	< 0.7	< 1.8	3.5 J	3.6 J
	05/24/11	< 0.19	< 0.26	< 0.33	< 0.2	0.99 J	< 0.39
	06/27/12	< 0.19	< 0.26	< 0.33	< 0.2	0.78 J	< 0.39
	06/19/13	< 0.21	< 0.27	0.33 J	2.14 J	0.62 J	< 0.47
MW-15	03/14/05	< 0.18	< 0.49	< 0.55	< 0.76	< 0.69	4.1 J
	04/05/06	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.89 U
	10/30/06	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 2.3 U
	03/28/07	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	06/12/08	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	12/02/09	< 0.33	< 0.67	< 0.7	< 1.8	< 0.64	< 0.45
	05/25/11	< 0.19	0.33 J	< 0.33	< 0.66 U	< 0.18	< 0.39 UJ
	06/26/12	< 0.19 UJ	< 0.26 UJ	< 0.33 UJ	< 0.2 UJ	< 0.18 UJ	< 0.39 UJ

TABLE 3
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KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

	Analyte	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	Naphthalene
	Units	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
	NC DEQ 2L	1	600	600	500	20	6
Well ID	**Date**						
MW-16	02/21/07	**7.3**	1.1 J	4.8 J	1.52 J	**170**	0.96 J
	06/12/08	< 0.2	< 0.19	< 0.16	< 0.24	7.9	< 0.25
	12/02/09	< 0.33	< 0.67	< 0.7	< 1.8	1.7 J	< 0.45
	05/26/11	< 0.19	42	< 0.33	< 0.2	< 0.18	< 0.39
	06/26/12	< 0.19 UJ	< 0.26 UJ	< 0.33 UJ	< 0.2 UJ	< 0.18 UJ	< 0.39 UJ
	06/20/13	< 0.21	< 0.27	< 0.2	1 J	< 0.2	< 0.47
MW-18	02/21/07	**440**	26 J	540	**1,315**	< 2.1	**200**
	06/12/08	**370**	32	570	**1,412**	< 0.21	**250**
	12/02/09	**520**	26	**610**	**1,433**	1.7 J	**280**
	05/26/11	**100**	3.3 J	87	22.4	< 0.18	**35**
	06/26/12	**70 J**	0.47 J	62 J	< 0.2 UJ	0.52 J	**42 J**
	06/20/13	**2.3**	< 0.27	0.79 J	1.41 J	0.49 J	5.7
	06/08/16	0.27 J	< 0.21	< 0.27	< 0.39	0.36 J	< 0.34
	12/01/16	0.35 J	<0.21	<0.27	<0.39	0.51 J	<0.34
MW-19	03/15/05	**1,500**	260	350	**800**	**1,800**	**98**
	04/05/06	**1,200**	110	150	185	**660**	**59**
	10/30/06	**1,200**	240	330	**820**	**530**	**320**
	03/28/07	**2,700**	450	570	**1,800**	**1,200**	**93 J**
	06/12/08	**1,100**	120	340	**680**	**350**	**110**
	03/17/09	**350**	53	86	240	**83**	**17**
	06/17/09	**330**	49	76	125	**72**	**25**
	09/10/09	**320**	120	150	293	**79**	**49**
	12/03/09	**43**	3.5 J	9.7	16.6	8.4	3 J
	09/23/10	**6.4 J**	< 0.98	2.1 J	12.5 J	**460**	< 2.2
	05/24/11	< 0.96	< 1.3	< 2.3 U	< 4.1 U	**700**	< 2
	12/06/11	< 0.19	< 0.26	< 0.33	< 0.2	**250**	< 0.39
	06/25/12	< 0.19 UJ	< 0.26 UJ	< 0.33 UJ	< 0.2 UJ	0.61 J	< 0.39 UJ
	12/04/12	< 0.21	< 0.27	< 0.2	< 0.2	0.51 J	< 0.47
	06/20/13	< 0.21	< 0.27	< 0.2	1.71 J	< 0.2	4.1 J
	12/12/13	< 0.21	< 0.27	< 0.2	< 0.2	< 0.2	< 0.47
	06/19/14	< 0.21	< 0.21	< 0.27	1.81 J	< 0.28	0.89 J
	12/02/14	< 0.21	< 0.21	< 0.27	< 0.63	< 0.28	< 0.34
	06/10/15	< 0.21	< 0.21	< 0.27	< 0.39	< 0.28	< 0.34
	12/09/15	< 0.21	< 0.21	< 0.27	< 0.39	< 0.28	< 0.34
	06/09/16	< 0.21	< 0.21	0.48 J	0.45 J	< 0.28	< 1.4 U

TABLE 3
HISTORICAL GROUNDWATER ANALYTICAL SUMMARY
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

	Analyte	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	Naphthalene
	Units	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
	NC DEQ 2L	1	600	600	500	20	6
Well ID	Date						
MW-20	11/16/05	**3,100**	77	**900**	**1,280**	**390**	**120**
	04/05/06	**700**	26	160	123	**760**	**9.8**
	10/30/06	**1,100**	< 8.1 U	210	416	**230**	< 77 U
	03/27/07	**370**	19 J	83	172	**240**	5.1 J
	06/11/08	**440**	6.5 J	12 J	57	**180**	**22 J**
	03/17/09	**390**	8.6	48	30.3	**87**	**12**
	06/17/09	**830**	16	3.4 J	151.1	**79**	**32**
	09/10/09	**1,600**	30	17	**570.77**	**51**	**75**
	12/02/09	**320**	4.4 J	4.9 J	27	**22**	**8.1**
	09/23/10	**990**	< 0.98	8.2 J	194.8	16 J	**51**
	05/25/11	**600**	10 J	< 4.4 U	120	**65**	< 25 U
	12/07/11	**190**	1.4 J	< 0.33	4.6 J	17	**11**
	06/26/12	< 0.19 UJ	0.3 J	< 0.33 UJ	< 0.2 UJ	1.7 J	< 0.39 UJ
	12/04/12	**140**	1.1 J	< 0.2	2.1 J	3.6 J	**7.1**
	06/17/13	< 0.21	< 0.27	< 0.2	< 0.2	3.6 J	< 0.47
	12/11/13	< 0.21	< 0.27	< 0.2	< 0.2	3.5 J	< 0.47
	06/19/14	< 0.21	< 0.21	< 0.27	< 0.63	0.74 J	< 0.34
	12/02/14	< 0.21	< 0.21	< 0.27	< 0.63	4.1 J	< 0.58 U
	06/10/15	< 0.21	< 0.21	< 0.27	< 0.39	1	< 0.34
	12/08/15	< 0.21	< 0.21	< 0.27	< 0.39	1.3	< 0.34
	06/09/16	< 0.21	< 0.21	0.3 J	< 0.39	0.71 J	< 0.34
	11/30/16	<0.21	<0.21	<0.27	<0.39	0.67 J	<0.34
MW-21	04/05/06	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	10/30/06	0.88 J	< 0.94 U	< 0.16	1.1 J	0.76 J	< 3.8 U
	03/27/07	0.5 J	< 0.19	0.45 J	1.24 J	0.29 J	1.6 J
	06/11/08	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	12/02/09	< 0.33	< 0.67	< 0.7	< 1.8	< 0.64	< 0.45
	05/25/11	< 0.19	< 0.26	< 0.33	< 0.2	< 0.18	< 0.39
	06/26/12	< 0.19	< 0.26	< 0.33	1.74 J	< 0.18	< 0.39
	06/19/13	< 0.21	< 0.27	< 0.2	< 0.2	0.57 J	< 0.47
MW-24	05/26/11	**20**	260	69	**3,100**	**95**	**31**
	12/06/11	**31**	47	11 J	**4,100**	**49**	**95**
	06/27/12	**53**	50	2.4 J	**1,120**	**41**	< 0.39
	12/04/12	0.96 J	2.3 J	1.7 J	18.6	4.8 J	< 0.47
	06/20/13	**9**	11	2 J	89	3.7 J	< 0.47
	12/12/13	**4.5**	2.3 J	< 0.2	6.3 J	0.84 J	< 0.47
	12/12/13	**4.5**	2.3 J	< 0.2	6.3 J	0.84 J	< 0.47
	06/19/14	**2**	1.2 J	< 0.27	6.0 J	< 0.28	< 0.34
	12/02/14	< 0.21	< 0.21	< 0.27	< 0.63	< 0.28	< 0.34
	06/10/15	< 0.21	< 0.21	< 0.27	11.4	< 0.28	< 0.34
	12/09/15	< 0.21	< 0.21	< 0.27	1.8 J	< 0.28	< 0.34
	06/09/16	< 0.21	< 0.21	< 0.27	< 0.39	< 0.28	< 0.34

TABLE 3
HISTORICAL GROUNDWATER ANALYTICAL SUMMARY
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

Well ID	Date	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	Naphthalene
	Units	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
	NC DEQ 2L	1	600	600	500	20	6
MW-25	04/05/06	< 100	**19,000**	**1,900 J**	**9,000**	< 100	**590 J**
	05/26/11	< 4.3 U	15 J	< 1.7	**1,080**	< 0.9	< 3.5 U
	12/06/11	**1.2**	3 J	0.55 J	412	3.4 J	< 0.39
	06/27/12	0.8 J	2.3 J	0.38 J	41	< 0.18	3.3 J
	12/04/12	< 0.21	0.78 J	< 0.2	1.51 J	< 0.2	< 0.47
	06/20/13	< 0.21	< 0.27	< 0.2	2.6 J	< 0.2	< 0.47
	12/12/13	< 0.21	< 0.27	< 0.2	0.43 J	< 0.2	< 0.47
	12/12/13	< 0.21	< 0.27	< 0.2	0.43 J	< 0.2	< 0.47
	06/19/14	< 0.21	< 0.21	< 0.27	< 0.63	< 0.28	< 0.34
	12/02/14	< 0.21	< 0.21	< 0.27	< 0.63	< 0.28	< 0.34
	06/10/15	< 0.21	< 0.21	< 0.27	< 0.39	< 0.28	< 0.34
	12/09/15	< 0.21	< 0.21	< 0.27	< 0.39	< 0.28	< 0.34
MW-26	05/26/11	**100**	210	3.3 J	**580**	**120**	**8.6**
	12/06/11	**1,600**	**670**	< 1.7	**2,600**	**350**	**18 J**
	06/27/12	**1,600**	**3,100**	88	**4,600**	**160**	**20**
	12/04/12	0.50 J	0.58 J	0.33 J	2.35 J	**140**	< 0.47
	06/20/13	**78**	**1,900**	76 J	**19,600**	**120**	**91 J**
	12/12/13	**28**	57	3.7 J	**720**	**68**	2.4 J
	06/19/14	**18**	29	84	280	**49**	0.81 J
	12/02/14	< 0.21	< 0.21	< 0.27	< 0.63	< 0.28	< 0.34
	06/10/15	**4.2**	0.79 J	< 0.27	5.4	1.1	< 0.34
	12/09/15	< 0.21	< 0.21	< 0.27	< 0.39	< 0.28	< 0.34
	06/09/16	< 0.21	< 0.21	< 0.27	< 0.39	0.62 J	< 0.34
	12/01/16	<0.21	<0.21	<0.27	<0.39	<0.28	<0.34
MW-27	03/15/05	**1.3**	0.62 J	0.99 J	2.6 J	< 0.69	**11**
	04/04/06	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	10/30/06	< 0.2	< 0.19	< 0.16	0.7 J	< 0.21	< 1.5 U
	03/27/07	0.22 J	< 0.19	0.94 J	1.43 J	< 0.21	0.57 J
	06/11/08	< 0.2	< 0.19	0.99 J	2.03 J	< 0.21	< 0.25
	12/03/09	< 0.33	< 0.67	< 0.7	< 1.8	< 0.64	< 0.45
	05/24/11	< 0.19	< 0.26	< 0.33	< 0.2	< 0.18	< 0.39 UJ
	06/26/12	< 0.19 UJ	< 0.26 UJ	< 0.33 UJ	1 J	< 0.18 UJ	< 0.39 UJ
	06/18/13	< 0.21	< 0.27	< 0.2	< 0.2	< 0.2	< 0.47
MW-28	03/15/05	< 0.18	< 0.49	< 0.55	< 0.76	< 0.69	0.71 J
	04/04/06	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	10/30/06	< 0.2	< 0.65 U	< 0.16	0.55 J	< 0.21	< 0.84 U
	03/27/07	< 0.2	< 0.19	< 0.16	0.32 J	< 0.21	< 0.25
	06/11/08	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	12/03/09	0.38 J	0.9 J	< 0.7	< 1.8	< 0.64	< 0.45
	05/24/11	< 0.19	1.2 J	< 0.33	< 0.2	< 0.18	< 0.39 UJ
	06/26/12	< 0.19 UJ	< 0.26 UJ	< 0.33 UJ	< 0.2 J	< 0.18 UJ	< 0.39 UJ
	06/18/13	< 0.21	4.2 J	< 0.2	< 0.2	< 0.2	< 0.47

TABLE 3
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Selma, Johnston County, North Carolina

	Analyte	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	Naphthalene
	Units	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
	NC DEQ 2L	1	600	600	500	20	6
Well ID	**Date**						
MW-29	03/14/05	< 0.18	< 0.49	< 0.55	< 0.76	< 0.69	1.1 J
	04/05/06	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	10/30/06	0.26 J	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	03/27/07	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	06/12/08	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 1.5 U
	12/03/09	0.44 J	< 0.67	< 0.7	< 1.8	< 0.64	0.58 J
	05/24/11	< 0.19	< 0.26	< 0.33	< 0.2	< 0.18	< 0.39 UJ
	06/27/12	< 0.19	< 0.26	< 0.33	< 0.2	< 0.18	< 0.39
	06/20/13	< 0.21	< 0.27	< 0.2	1.22 J	< 0.2	< 2.8 U
MW-30	03/14/05	**1,600**	**5,400**	**1,800**	**8,600**	< 14	**550**
	04/05/06	**1,200**	**3,900**	**1,000**	**5,900**	< 4.2	**320**
	10/30/06	**1,600**	**6,300**	**1,400**	**7,200**	< 10	< 410 U
	03/28/07	**2,700**	**13,000**	**2,000**	**9,400**	< 4.2	**470**
	06/12/08	**2,700**	**8,200**	**1,900**	**9,900**	< 4.2	**660**
	12/02/09	**240**	**810**	200	**1,090**	< 0.64	**76**
	05/25/11	**140**	390	83	420	< 0.18	**26**
	06/27/12	**110**	340	150	**520**	< 0.18	**55**
	06/08/16	**268**	**737**	379	**2,280**	< 1.4	**127**
	12/01/16	**158**	**1,150**	237	**1920**	<2.8	**97**
MW-31	03/15/05	< 0.18	< 0.49	< 0.55	< 0.76	5.9	< 0.65
	04/05/06	< 0.2	< 0.19	< 0.16	< 0.24	3 J	< 0.25
	10/30/06	**9.6**	< 0.19	< 0.16	< 0.24	< 0.21	< 1.8 U
	03/27/07	< 0.2	< 0.19	< 0.16	< 0.24	1.2 J	< 0.25
	06/11/08	**5.8**	< 0.19	< 0.16	< 0.24	< 0.21	< 0.57 U
	12/03/09	**11**	< 0.67	0.85 J	3.5 J	0.67 J	1.6 J
	05/24/11	< 3.9 U	18	0.83 J	4.8 J	< 0.18	< 0.39
	06/26/12	**11 J**	0.77 J	< 0.33 UJ	4.03 J	< 0.18 UJ	< 0.39 UJ
	06/19/13	< 0.21	< 0.27	< 0.2	< 0.2	< 0.2	< 0.47
	06/08/16	< 0.21	0.34 J	0.27 J	1.1 J	< 0.28	< 0.34
	12/01/16	<0.21	<0.21	<0.27	<0.39	<0.28	<0.34

TABLE 3
HISTORICAL GROUNDWATER ANALYTICAL SUMMARY
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

	Analyte	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	Naphthalene
	Units	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
	NC DEQ 2L	1	600	600	500	20	6
Well ID	**Date**						
MW-32	03/15/05	**2.1**	2.2	16	31.1	1.5	**6.5**
	04/05/06	< 0.2	< 0.19	0.97 J	0.51 J	< 0.21	< 0.25
	10/30/06	0.51 J	< 0.19	< 0.16	3.46 J	< 0.21	< 1.2 U
	03/28/07	0.2 J	0.23 J	3.8 J	6.8	< 0.21	3.2 J
	06/12/08	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.73 U
	03/17/09	< 0.2	< 0.37	< 0.16	< 0.24	< 0.21	< 0.45
	06/17/09	0.3 J	< 0.37	< 0.16	< 0.24	< 0.21	< 0.45
	09/10/09	< 0.2	< 0.37	0.21 J	< 0.24	< 0.21	< 0.45
	12/03/09	< 0.33	< 0.67	< 0.7	< 1.8	< 0.64	< 0.45
	09/23/10	**8.4**	47	19	72	< 0.2	1.9 J
	05/24/11	< 0.19	< 0.26	< 0.33	< 0.2	< 0.18	< 0.39 UJ
	12/06/11	< 0.19	< 0.26	< 0.33	< 0.2	< 0.18	< 0.39
	06/25/12	< 0.19 UJ	< 0.26 UJ	< 0.33 UJ	< 0.2 J	< 0.18 UJ	< 0.39 UJ
	12/04/12	< 0.21	< 0.27	< 0.2	< 0.2	< 0.2	< 0.47
	06/20/13	< 0.21	< 0.27	< 0.2	< 0.2	< 0.2	**6.1**
	12/12/13	< 0.21	< 0.27	< 0.2	0.65 J	< 0.2	< 0.47
	06/19/14	< 0.21	< 0.21	< 0.27	< 0.63	< 0.28	< 0.34
	12/02/14	< 0.21	< 0.21	< 0.27	< 0.63	< 0.28	< 0.34
	06/10/15	< 0.21	< 0.21	< 0.27	< 0.39	< 0.28	< 0.34
	12/09/15	< 0.21	< 0.21	< 0.27	< 0.39	< 0.28	< 0.34
	06/09/16	< 0.21	< 0.21	< 0.27	< 0.39	< 0.28	< 0.34
	12/01/16	<0.21	<0.21	<0.27	<0.39	<0.28	<0.34
MW-33	03/15/05	**6.5**	0.51 J	2	< 0.76	3.3	2.1
	04/05/06	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	10/30/06	< 0.2	< 0.19	< 0.16	1.2 J	< 0.21	< 1.4 U
	03/28/07	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	06/12/08	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	12/03/09	< 0.33	< 0.67	< 0.7	< 1.8	< 0.64	< 0.45
	05/24/11	< 0.19	< 0.26	< 0.33	< 0.2	1.9 J	< 0.39 UJ
	06/25/12	< 0.19 UJ	0.67 J	< 0.33 UJ	9.75 J	2.1 J	< 0.39 UJ
	06/20/13	< 0.21	< 0.27	< 0.2	< 0.2	< 0.2	< 3 U

TABLE 3
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KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

	Analyte	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	Naphthalene
	Units	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
	NC DEQ 2L	1	600	600	500	20	6
Well ID	Date						
MW-34	03/24/06	**9,500**	**3,000**	**1,200**	**1,780**	**5,800**	**210 J**
	10/30/06	**7,400**	**910**	**1,700**	**1,620**	**5,600**	**280**
	03/27/07	**3,800**	170 J	**820**	260 J	**1,800**	**110 J**
	06/11/08	**7,200**	**1,600**	**1,800**	**3,800**	**4,600**	**310**
	03/17/09	**7,200**	**710**	**1,600**	**2,570**	**4,000**	**350**
	06/17/09	**3,200**	320	**850**	**970**	**1,500**	**170**
	09/10/09	**2,500**	170	**600**	456	**1,100**	**110**
	12/02/09	**2,000**	**620**	450	**1,190**	**1,300**	**110**
	09/23/10	**5,400**	**670**	**1,400**	**3,060**	**2,200**	**240**
	05/25/11	**1,100**	2.2 J	120	86.3	**770**	**41**
	12/07/11	**100**	9.1 J	33	67	**390**	< 2
	06/27/12	**4.1**	< 0.26	4.9 J	0.74 J	**260**	0.49 J
	12/04/12	**5.4**	0.89 J	4.1 J	5.4 J	**1,500**	5.7
	06/17/13	**2.6**	0.59 J	1.3 J	< 0.2	**180**	< 0.77 U
	12/11/13	< 0.21	< 0.27	< 0.2	< 0.2	7.6	< 0.47
	06/19/14	< 0.21	< 0.21	< 0.27	< 0.63	9.6	< 0.34
	12/02/14	0.39 J	< 0.21	< 0.27	< 0.63	9.9	< 0.34
	06/10/15	< 0.21	< 0.21	< 0.27	0.51 J	1.6	< 0.34
	12/08/15	< 0.21	< 0.21	< 0.27	< 0.39	2.4	< 0.34
	06/09/16	< 0.21	< 0.21	< 0.27	< 0.39	0.53 J	< 0.34
	11/30/16	<0.21	<0.21	<0.27	<0.39	0.88 J	<0.34
MW-35	03/24/06	**2,000**	23	470	106	**2,800**	**55**
	10/30/06	**1,700**	< 40 U	360	209	**2,200**	< 110 U
	03/27/07	**2,700**	130	540	350	**2,900**	**42 J**
	06/11/08	**2,100**	64 J	510	400	**1,800**	**82 J**
	03/17/09	**1,900**	200	**750**	**830**	**2,100**	**120**
	06/17/09	**2,900**	140	540	**574**	**1,500**	**98**
	09/10/09	**73**	< 0.37	4.8 J	4.03 J	**69**	< 3.6 U
	12/02/09	**1,700**	32	140	187.3	**410**	**58**
	09/23/10	< 0.19	< 0.2	< 0.18	< 0.49	0.52 J	< 0.45
	05/25/11	**67**	< 1.3	< 2.6 U	1.5 J	**440**	< 2.0
	12/07/11	< 0.19	< 0.26	< 0.33	< 0.2	**43**	< 0.39
	06/27/12	< 0.19	< 0.26	< 0.33	< 0.2	**260**	< 0.39
	12/03/12	< 0.21	< 0.27	< 0.2	< 0.2	1.4 J	< 0.47
	06/17/13	< 0.21	< 0.27	< 0.2	< 0.2	**22**	< 0.47
	12/01/13	< 0.21	< 0.27	< 0.2	< 0.2	0.69 J	< 0.47
	06/19/14	< 0.21 UJ	< 0.21 UJ	< 0.27 UJ	< 0.63 UJ	0.57 J	< 0.34
	12/02/14	< 0.21	< 0.21	< 0.27	< 0.63	< 0.28	< 0.34
	06/10/15	< 0.21	< 0.21	< 0.27	< 0.39	< 0.28	< 0.34
	12/08/15	< 0.21	< 0.21	< 0.27	< 0.39	< 0.28	< 0.34
	06/09/16	< 0.21	< 0.21	< 0.27	< 0.39	< 0.28	< 0.34
	11/30/16	<0.21	<0.21	<0.27	<0.39	0.31 J	<0.34

TABLE 3
HISTORICAL GROUNDWATER ANALYTICAL SUMMARY
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

	Analyte	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	Naphthalene
	Units	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
	NC DEQ 2L	1	600	600	500	20	6
Well ID	Date						
MW-36	03/24/06	**3,700**	99	**610**	290	**3,600**	**77**
	10/30/06	**5,500**	260	**1,200**	**1,540**	**3,900**	**410**
	03/27/07	**4,600**	480	**1,100**	**1,690**	**3,800**	**89 J**
	06/11/08	**5,200**	230	**1,300**	**1,730**	**1,400**	**82 J**
	03/17/09	**4,600**	180	**960**	**1,224**	**2,900**	**140**
	06/17/09	**5,500**	270	**1,100**	**2,021**	**2,200**	**160**
	09/10/09	**2,000**	25 J	42 J	440	**130**	**63**
	12/02/09	**1,500**	44 J	110	369.7	**170**	**48 J**
	09/23/10	**3.4 J**	< 0.2	0.41 J	1.1 J	15	< 0.45
	05/25/11	**1,200**	40	140	94.8	**450**	**31**
	12/07/11	**1.5**	< 0.26	< 0.33	< 0.2	17	< 0.39
	06/27/12	0.4 J	< 0.26	< 0.33	< 0.2	**22**	< 0.39
	12/03/12	< 0.21	< 0.27	< 0.2	< 0.2	2.4 J	< 0.47
	06/17/13	< 0.21	< 0.27	< 0.2	< 0.2	0.62 J	< 0.47
	12/11/13	< 0.21	< 0.27	< 0.2	< 0.2	0.94 J	< 0.47
	06/19/14	< 0.21	< 0.21	< 0.27	< 0.63	1.5 J	< 0.34
	12/02/14	< 0.21	< 0.21	< 0.27	< 0.63	0.54 J	< 0.34
	06/10/15	< 0.21	< 0.21	< 0.27	< 0.39	< 0.28	< 0.34
	12/08/15	< 0.21	< 0.21	< 0.27	< 0.39	< 0.28	< 0.34
	06/09/16	< 0.21	< 0.21	< 0.27	< 0.39	0.47 J	< 0.34
	11/30/16	<0.21	<0.21	<0.27	<0.39	0.64 J	<0.34
MW-37	03/24/06	**4,000**	180	590	410	**3,800**	**87**
	10/30/06	**610**	20	140	54	**920**	**27**
	03/27/07	**290**	7.1	67	22.7	**1,100**	**19**
	06/11/08	**820**	43 J	190	127	**940**	**56**
	03/17/09	**200**	5.4	44	26.7	**98**	**8.2**
	06/17/09	0.22 J	< 0.37	< 0.16	< 0.24	0.98 J	< 0.45
	09/10/09	**9.7**	< 0.37	3.8 J	< 0.24	**35**	< 0.79 U
	12/02/09	0.71 J	< 0.67	< 0.7	< 1.8	2 J	< 0.45
	09/23/10	**370**	0.48 J	98	5.6 J	**400**	**20**
	05/25/11	**9.9**	< 0.26	2.9 J	< 0.2	**140**	< 0.39
	12/07/12	0.64 J	< 0.26	0.67 J	< 0.2	**38**	< 0.39
	06/26/12	< 0.19 UJ	< 0.26 UJ	0.54 J	< 0.2 J	**47 J**	< 0.39 UJ
	12/04/12	< 0.21	< 0.27	< 0.2	0.52 J	**23**	< 0.47
	06/17/13	< 0.21	< 0.27	< 0.2	< 0.2	0.27 J	< 0.47
	12/11/13	< 0.21	< 0.27	< 0.2	< 0.2	0.38 J	< 0.47
	06/19/14	< 0.21	< 0.21	< 0.27	< 0.63	2.0 J	1.1 J
	12/02/14	< 0.21	< 0.21	< 0.27	< 0.63	< 0.28	< 0.34
	06/10/15	< 0.21	< 0.21	< 0.27	< 0.39	< 0.28	< 0.34
	12/08/15	< 0.21	< 0.21	< 0.27	< 0.39	< 0.28	< 0.34
	06/09/16	< 0.21	< 0.21	< 0.27	0.58 J	< 0.28	< 0.34
	11/30/16	<0.21	<0.21	<0.27	<0.39	0.56 J	<0.34

TABLE 3
HISTORICAL GROUNDWATER ANALYTICAL SUMMARY
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

	Analyte	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	Naphthalene
	Units	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
	NC DEQ 2L	1	600	600	500	20	6
Well ID	**Date**						
MW-38	03/28/07	0.23 J	0.44 J	< 0.16	< 0.24	1.1 J	1.2 J
	06/12/08	< 0.2	< 0.19	< 0.16	< 0.24	**22**	< 0.25
	12/02/09	< 0.33	< 0.67	< 0.7	< 1.8	< 0.64	< 0.45
	05/26/11	< 0.19	< 0.26	< 0.33	< 0.2	0.69 J	< 0.39
	06/26/12	< 0.19 UJ	1.1 J	< 0.33 UJ	< 0.2 J	0.89 J	< 0.39 UJ
	06/18/13	< 0.21	< 0.27	< 0.2	5.1 J	2.3 J	< 0.47
MW-39	03/28/07	**3,700**	**7,700**	**1,000**	**4,300**	**34,000**	**180**
	06/11/08	**2,200**	**4,000**	**950**	**4,100**	**9,800**	**200**
	03/17/09	**670**	**2,000**	440	**1,960**	**530**	**100**
	06/17/09	**1,700**	**3,100**	**940**	**4,700**	**1,900**	**190**
	09/10/09	**1,600**	**2,900**	**1,200**	**5,000**	**1,400**	**250**
	12/02/09	**1,600**	**2,200**	**1,400**	**6,000**	**1,900**	**230**
	09/23/10	**3.1 J**	< 0.2	0.96 J	1.1 J	13	< 0.45
	05/26/11	< 0.19	< 0.26	< 0.33	< 0.2	**81**	< 0.39
	12/06/11	< 0.19	< 0.26	< 0.33	< 0.2	0.67 J	< 0.39
	06/26/12	< 0.19 UJ	< 0.26 UJ	< 0.33 UJ	< 0.2 J	< 0.18 UJ	< 0.39 UJ
	12/03/12	< 0.21	0.40 J	< 0.2	< 0.2	< 0.2	< 0.47
	06/20/13	< 0.21	< 0.27	< 0.2	< 0.2	0.42 J	3.8 J
	12/11/13	< 0.21	< 0.27	< 0.2	< 0.2	< 0.2	< 0.47
	06/19/14	< 0.21	< 0.21	< 0.27	< 0.63	15	< 0.34
	12/02/14	< 0.21	< 0.21	< 0.27	< 0.63	4.1 J	< 0.34
	06/10/15	< 0.21	< 0.21	< 0.27	< 0.39	3.3	< 0.34
	12/08/15	< 0.21	< 0.21	0.8 J	< 0.39	< 0.28	< 2.5 U
	06/09/16	< 0.21	< 0.21	< 0.27	0.48 J	< 0.28	< 0.79 U
	11/30/16	<0.21	<0.21	<0.27	<0.39	<0.28	<0.34
MW-39D	12/13/07	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	06/11/08	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	12/02/09	< 0.33	< 0.67	< 0.7	< 1.8	< 0.64	< 0.45
	05/26/11	< 0.33 U	0.35 J	< 0.33	0.97 J	< 0.18	< 0.39
	06/26/12	< 0.19 UJ	< 0.26 UJ	< 0.33 UJ	< 0.2 J	< 0.18 UJ	< 0.39 UJ
	06/20/13	< 0.21	< 0.27	< 0.2	< 0.2	< 0.2	< 3 U
MW-39I	03/28/07	**780**	**1,200**	280	**740 J**	**8,300**	**27**
	06/11/08	**11**	< 0.19	< 0.16	< 0.24	**600**	< 0.25
	12/02/09	< 0.33	< 0.67	< 0.7	< 1.8	**37**	< 0.45
	05/26/11	< 0.19	< 0.26	< 0.33	< 0.2	< 0.18	< 0.39
	06/26/12	< 0.19 UJ	< 0.26 UJ	< 0.33 UJ	< 0.2 J	< 0.18 UJ	< 0.39 UJ
	06/20/13	< 0.21	< 0.27	< 0.2	< 0.2	< 0.2	< 0.47
	12/01/16	<0.21	<0.21	<0.27	<0.39	<0.28	<0.34

TABLE 3
HISTORICAL GROUNDWATER ANALYTICAL SUMMARY
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

	Analyte	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	Naphthalene
	Units	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
	NC DEQ 2L	1	600	600	500	20	6
Well ID	**Date**						
MW-40	03/27/07	0.78 J	1.7 J	0.51 J	1.62 J	5	1.8 J
	06/11/08	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	12/03/09	< 0.33	0.88 J	< 0.7	1.9 J	< 0.64	< 0.45
	05/24/11	< 0.19	< 0.26	< 0.33	< 0.2	< 0.18	< 0.39
	06/26/12	< 0.19 UJ	< 0.26 UJ	< 0.33 UJ	< 0.2 J	< 0.18 UJ	< 0.39 UJ
	06/19/13	< 0.21	< 0.27	< 0.2	1.66 J	< 0.2	< 1 U
MW-41	03/27/07	**5,500**	**14,000**	**1,900**	**9,200**	< 21	**290 J**
	03/17/09	**2,100**	**10,000**	**1,500**	**10,100**	< 10	**560**
	06/17/09	**620**	**4,300**	410	**10,800**	< 4.2	**440**
	09/10/09	**2,700**	**8,800**	**1,200**	**10,600**	< 4.2	**580**
	12/03/09	**910**	**3,800**	240	**6,100**	< 13	**200**
	09/23/10	**2,100**	**6,500**	**1,000**	**8,200**	< 9.8	**470**
	05/24/11	**1,500**	**6,000**	**610**	**6,600**	< 0.18	**370**
	12/06/11	**2,200**	**7,400**	**790 J**	**7,800**	< 1.8	**280**
	06/26/12	**620 J**	**4,300 J**	**690 J**	**9,000 J**	< 0.18 UJ	**350 J**
	12/04/12	**1,900**	**9,000**	**1,500**	**8,400**	< 1	**230**
	06/20/13	**100**	**2,400**	160	**2,450**	< 1	**60**
	12/12/13	**120**	**1,000**	200	**2,590**	< 1	**86**
	06/19/14	**19**	43	11	86	< 0.28	2.0 J
	12/02/14	< 0.21	1.2 J	0.61 J	5.7 J	< 0.28	< 0.34
	06/10/15	**12.8**	1.1	0.84 J	12.2	< 0.28	< 0.34
	12/09/15	**44.1**	60.4	7.9	225	< 0.28	< 1 U
	06/09/16	**68**	109	69	429	< 0.28	**18.5**
	12/01/16	**18.7**	6.4	24.5	80	<0.28	<4.5 U
MW-42	03/28/07	**17,000**	**25,000**	**3,700**	**16,800**	< 42	**460 J**
	12/03/09	**2,600**	**5,400**	**870**	**5,700**	< 6.4	**280**
	05/25/11	< 4 U	25	53	277	< 0.18	**25**
	06/25/12	< 0.19 UJ	< 0.26 UJ	< 0.33 UJ	0.74 J	< 0.18 UJ	< 0.39 UJ
	06/20/13	< 0.21	1.5 J	0.42 J	4.1 J	< 0.2	3.8 J
	06/08/16	< 0.21	< 0.21	< 0.27	0.67 J	< 0.28	< 0.34
	12/01/16	<0.21	<0.26 U	<0.27	<0.39	<0.28	<0.34

TABLE 3
HISTORICAL GROUNDWATER ANALYTICAL SUMMARY
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

	Analyte	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	Naphthalene
	Units	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
	NC DEQ 2L	1	600	600	500	20	6
Well ID	Date						
MW-43	03/28/07	**6,700**	**1,300**	**1,900**	**6,150**	**5,700**	**130 J**
	06/12/08	**6,000**	**4,800**	**1,800**	**6,800**	**2,200**	**200**
	03/17/09	< 0.2	< 0.37	< 0.16	< 0.24	< 0.21	< 0.45
	06/17/09	**11**	21	21	72	0.77 J	< 0.45
	09/10/09	**3,200**	**860**	**960**	**2,560**	**1,100**	**170**
	12/03/09	< 0.33	< 0.67	< 0.7	< 1.8	< 0.64	< 0.45
	09/23/10	**750**	**980**	150	**1,850**	**3,400**	**20 J**
	05/25/11	**390**	**1,600**	63	**2,340**	**300**	< 0.39
	12/06/11	**380**	**9,300**	**1,500**	**22,700**	**630**	**63**
	06/25/12	< 0.19 UJ	350 J	150 J	**6,400 J**	**380 J**	**52 J**
	12/04/12	< 0.21	< 0.27	< 0.2	< 0.2	12	< 0.47
	06/18/13	**1.4 J**	14 J	16 J	**1,440**	**44**	< 6.8 U
	12/12/13	< 0.21	10	12	**1,150**	5	**24**
	06/19/14	< 0.21	6.2	250	**640**	< 0.28	4.7 J
	12/02/14	< 0.21	0.77 J	< 0.27	380	< 0.28	< 2.7 U
	06/10/15	< 0.21	< 0.21	< 0.27	14	< 0.28	< 0.34
	12/09/15	< 0.21	< 0.21	< 0.27	2.4	< 0.28	< 0.34
	06/09/16	< 0.21	< 0.21	< 0.27	4.6	< 0.28	< 0.34
	12/01/16	<0.21	<0.21	<0.27	<0.39	<0.28	<0.34
MW-43D	12/13/07	< 0.2	< 0.19	< 0.16	< 0.24	0.84 J	< 0.25
	06/12/08	**1.7**	1.2 J	0.57 J	2.89	2.2 J	< 0.25
	12/03/09	0.89 J	< 0.67	< 0.7	< 1.8	**39**	< 0.45
	05/25/11	< 3 U	0.51 J	< 1.2 U	0.27 J	**56**	< 0.39
	06/25/12	**14 J**	0.49 J	< 0.33 UJ	< 0.2 UJ	**28 J**	< 0.39 UJ
	06/18/13	**10**	< 0.27	< 0.2	< 0.2	**35**	< 0.47
	06/08/16	0.34 J	< 0.21	< 0.27	0.47 J	**38.3**	< 0.34
	12/01/16	**4.2**	<0.21	2.7	<1.2 U	**25.4**	<0.34
MW-43I	03/28/07	**7,000**	520	**1,200**	**3,300**	**13,000**	**81 J**
	06/12/08	**9,000**	**650**	**1,800**	**4,540**	**9,100**	**240 J**
	12/03/09	**8,400**	380	**2,300**	**5,567**	**5,900**	**310**
	05/25/11	< 5.8 U	< 5.2	< 6.6	8.1 J	**6,200**	< 7.9
	06/25/12	0.71 J	0.32 J	< 0.33 UJ	10.7 J	**170 J**	< 0.39 UJ
	06/18/13	< 0.21	< 0.27	< 0.2	< 0.2	**1,700**	< 0.47
	06/08/16	< 0.21	< 0.21	< 0.27	0.4 J	1.2	< 0.34
	12/01/16	<0.21	<0.21	<0.27	<0.39	3.1	<0.34
MW-44	05/26/11	< 1.3 U	3 J	10	11.5	0.34 J	< 3.1 U
	06/27/12	0.54 J	24	5.4	470	0.71 J	< 0.39
	06/19/13	< 0.21	< 0.27	< 0.2	2.42 J	< 0.2	< 0.83 U

TABLE 3
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KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

	Analyte	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	Naphthalene
	Units	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
	NC DEQ 2L	1	600	600	500	20	6
Well ID	**Date**						
MW-45	03/28/07	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	06/12/08	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	12/02/09	< 0.33	< 0.67	< 0.7	< 1.8	< 0.64	< 0.45
	05/25/11	< 0.19	< 0.26	< 0.33	< 0.2	< 0.18	< 0.39
	06/27/12	< 0.19	< 0.26	< 0.33	1.33 J	< 0.18	< 0.39
	06/19/13	< 0.21	< 0.27	< 0.2	1.3 J	< 0.2	< 0.47
MW-46	03/28/07	< 0.2	< 0.19	0.92 J	0.38 J	< 0.21	1.3 J
	06/12/08	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 1.1 U
	12/02/09	< 0.33	< 0.67	< 0.7	< 1.8	< 0.64	< 0.45
	05/25/11	< 0.19	< 0.26	< 0.33	< 0.2	< 0.18	< 0.39
	06/27/12	< 0.19	< 0.26	< 0.33	< 0.2	< 0.18	< 0.39
	06/19/13	< 0.21	< 0.27	< 0.2	1.2 J	< 0.2	< 0.47
MW-47	12/13/07	< 0.2	< 0.19	< 0.16	< 0.24	**63**	< 0.74 U
	06/11/08	< 0.2	< 0.19	< 0.16	< 0.24	**25**	< 0.25
	12/02/09	< 0.33	< 0.67	< 0.7	< 1.8	2.3 J	< 0.45
	05/25/11	< 0.19	0.55 J	< 0.33	< 0.2	0.92 J	< 0.39
	06/28/12	0.42 J	0.73 J	0.34 J	0.95 J	2.7 J	1.1 J
	06/19/13	< 0.21	< 0.27	< 0.2	1.37 J	0.57 J	< 0.47
MW-48	12/13/07	**290**	< 1.9	75	19.6 J	**2,200**	< 31 U
	06/11/08	< 0.2	< 0.19	0.61 J	< 0.24	**210**	< 0.25
	12/02/09	0.94 J	< 0.67	< 0.7	< 1.8	**140**	< 0.45
	05/25/11	< 0.19	< 0.26	< 0.33	< 0.2	**35**	< 0.39
	06/28/12	< 0.19	< 0.26	< 0.33	< 0.2	**36**	< 0.39
	06/19/13	< 0.21	< 0.27	< 0.2	1.1 J	1.2 J	< 0.47
MW-49	12/13/07	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	06/11/08	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	2.6 J
MW-50	12/13/07	**410**	22 J	200	33 J	**360**	**82**
	06/11/08	**1,100**	360	410	**622**	**400**	**200**
MW-51	12/13/07	**350**	25	170	183	**460**	**71**
	06/11/08	**450**	13	250	161	**470**	**120**
MW-B	03/14/05	< 0.18	< 0.49	< 0.55	< 0.76	< 0.69	1.5 J
MW-C	03/14/05	**540**	**1,100**	**1,900**	**7,400**	< 6.9	**630**
	04/05/06	**130**	320	**1,000**	**3,930**	< 4.2	**350**
	10/30/06	**20**	< 1.8 U	290	1.8 J	< 0.21	**92**
	03/28/07	**940**	**1,300**	**1,300**	**4,200**	< 4.2	**320**
	06/12/08	**36**	63	270	**760**	< 0.21	**62**
	12/03/09	**16**	32	120	**780**	< 0.64	**92**
	05/25/11	< 7.7 U	3 J	2.1 J	24	< 0.18	< 0.39
	06/27/12	**3.4**	< 0.26	< 0.33	1.42 J	< 0.18	< 0.39
	06/19/13	< 0.21	< 0.27	< 0.2	1.2 J	< 0.2	< 0.47
	06/08/16	< 0.21	< 0.21	< 0.27	< 0.39	< 0.28	< 0.34
	12/01/16	<0.21	<0.21	<0.27	<0.39	<0.28	<0.34
MW-D	10/30/06	**200**	170	**780**	**2,430**	5.5 J	**580**

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Selma, Johnston County, North Carolina

	Analyte	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	Naphthalene
	Units	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
	NC DEQ 2L	1	600	600	500	20	6
Well ID	Date						
MW-E	03/14/05	**7**	1.6 J	240	4.4 J	< 0.69	**110**
	04/05/06	**20**	1.8 J	270	2.1 J	< 0.21	**120**
	03/28/07	**24**	1.8 J	300	4.57 J	< 0.21	**120**
	06/12/08	**40**	< 0.19	290	18	< 0.21	**62**
	12/02/09	**42**	1.1 J	100	2.8 J	< 0.64	**48**
	05/25/11	**51**	2.1 J	250 J	5.3 J	< 0.18	**110**
	06/27/12	**71**	3.2 J	420	18.51	< 0.18	**120**
	06/19/13	**39**	4 J	310	50.65	< 0.2	**73**
	06/08/16	**77.6**	9.6	**737**	453	< 0.28	**61.5**
	12/01/16	**311**	16.3	**993**	**553**	<2.8	**54**
MW-F	03/14/05	**45 J**	**620**	**2,900**	**9,700**	< 6.9	**880**
	04/05/06	< 4	410	**2,300**	**10,460**	< 4.2	**480**
	10/30/06	**35 J**	390	**2,300**	**6,800**	< 10	**970**
	03/28/07	**93**	560	**2,800**	**9,300**	**86 J**	**610**
	06/12/08	**15**	53	540	**3,970**	< 2.1	**630**
	12/03/09	**3.4**	53	580	**2,520**	< 0.64	**220**
	05/24/11	< 3.9 U	22	**760**	**2,580**	< 0.18	**340 J**
	06/27/12	**2.8**	5.5	240	**586**	< 0.18	**71**
	06/20/13	**1.1**	2.8 J	73	284	< 0.2	**8.9**
	06/08/16	**9.8 J**	11.4	**1,330**	**2,540**	< 2.8	**406**
	12/01/16	**11.6 J**	27.6	**1,740**	**4,700**	<5.6	**555**
OS-01-12	11/20/07	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
OS-02-12	11/20/07	< 0.2	< 0.19	< 0.16	< 0.24	0.95 J	< 2.5 U
OS-03-12	11/20/07	**750**	50	310	74	**590**	**110**
OS-04-12	11/20/07	**1,100**	72	340	**582**	**690**	**130**
OS-05-12	11/20/07	**42**	0.6 J	9.5	0.94 J	**1,300**	**7.7**
OS-06-12	11/20/07	**1.7**	< 0.19	< 0.16	< 0.57 U	**1,000**	< 1.7 U
OS-07-12	11/20/07	< 0.2	< 0.19	< 0.16	< 0.24	**48**	< 0.25
OS-08-12	11/20/07	< 0.2	< 0.19	< 0.16	< 0.24	14	< 0.25
OS-09-12	11/20/07	**2.1**	< 0.19	< 0.83 U	< 0.24	8.1	< 0.25
OS-10-12	11/20/07	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
OS-11-12	11/20/07	< 0.2	< 0.19	< 0.16	< 0.24	**28**	< 0.25
OS-12-12	11/20/07	< 0.2	< 0.19	< 0.16	< 0.24	0.56 J	< 0.25
PZ-1	02/22/07	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.25
	06/11/08	< 0.2	< 0.19	< 0.16	< 0.24	< 0.21	< 0.95 U
	12/02/09	< 0.33	< 0.67	< 0.7	< 1.8	< 0.64	< 0.45
	05/26/11	< 0.19	< 0.26	< 0.33	< 0.2	< 0.18	< 0.39
	06/26/12	< 0.19 UJ	< 0.26 UJ	< 0.33 UJ	< 0.2 UJ	< 0.18 UJ	< 0.39 UJ
	06/18/13	< 0.21	< 0.27	< 0.2	< 0.2	< 0.2	< 0.47

TABLE 3
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KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

	Analyte	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	Naphthalene
	Units	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
	NC DEQ 2L	1	600	600	500	20	6
Well ID	**Date**						
PZ-2	02/22/07	**3.6**	7.9	< 0.16	< 0.24	1.9 J	< 0.25
	06/11/08	**24**	1.6 J	11	9.31	9.1	**10**
	03/17/09	< 0.2	< 0.37	< 0.16	0.35 J	0.97 J	< 0.45
	06/17/09	**22**	< 0.37	0.49 J	7.29	10	**8.1**
	09/10/09	**11**	< 0.37	< 0.16	2 J	8.8	**6.2**
	12/02/09	**9.3**	< 0.67	0.89 J	2.7 J	8.1	3 J
	09/22/10	**19**	< 0.2	0.23 J	9	9.6	**8**
	05/26/11	**12**	0.26 J	< 0.33	2.9 J	12	< 3.4 U
	12/06/11	**4.4**	< 0.26	< 0.33	0.27 J	11	0.83 J
	06/26/12	**5.3 J**	0.96 J	< 0.33 UJ	2.8 J	11 J	< 0.39 UJ
	12/03/12	**2.2**	0.47 J	< 0.2	1.05 J	10	< 0.47
	06/18/13	**4.7**	< 0.27	< 0.2	1.73 J	8.2	< 0.91 U
	12/11/13	< 0.21	< 0.27	< 0.2	< 0.2	5.7	< 0.47
	06/19/14	< 0.21	< 0.21	< 0.27	< 0.63	5.6	< 0.34
	12/02/14	< 0.21	< 0.21	< 0.27	< 0.63	5.7	< 0.34
	06/10/15	< 0.21	< 0.21	< 0.27	< 0.39	5.1	< 0.34
	12/08/15	< 0.21	< 0.21	< 0.27	< 0.39	2.4	< 0.47 U
	06/09/16	< 0.21	< 0.21	< 0.27	< 0.39	0.72 J	< 0.34
	11/30/16	<0.21	<0.21	<0.27	<0.39	0.48 J	<0.34
PZ-3	02/22/07	< 0.2	0.61 J	< 0.16	1.9 J	**71**	1.5 J
	06/11/08	< 0.2	< 0.19	0.77 J	< 0.24	**420**	4.5 J
	03/17/09	< 0.2	< 0.37	0.27 J	< 0.24	7.4	< 0.45
	06/17/09	< 0.2	< 0.37	0.53 J	< 0.24	**25**	< 0.45
	09/10/09	**120**	7.9	100	137.8	**200**	**19**
	12/02/09	**2.1**	< 0.67	4.3 J	< 1.8	**64**	3.3 J
	09/22/10	< 0.19	< 0.2	< 0.18	< 0.49	1.7 J	< 0.45
	05/26/11	< 0.19	< 0.26	< 0.33	< 0.2	1 J	< 0.39
	12/06/11	< 0.19	< 0.26	< 0.33	< 0.2	3.2 J	< 0.39
	06/26/12	< 0.19 UJ	< 0.26 UJ	< 0.33 UJ	< 0.2 UJ	< 0.18 UJ	< 0.39 UJ
	12/03/12	< 0.21	< 0.27	< 0.2	< 0.2	0.55 J	< 0.47
	06/20/13	< 0.21	< 0.27	0.2 J	0.69 J	1.3 J	4 J
	12/11/13	< 0.21	< 0.27	< 0.2	< 0.2	0.62 J	< 0.47
	06/19/14	< 0.21	< 0.21	< 0.27	< 0.63	< 0.28	< 0.34
	12/02/14	< 0.21	< 0.21	< 0.27	< 0.63	< 0.28	< 0.34
	06/10/15	< 0.21	< 0.21	< 0.27	< 0.39	0.41 J	< 0.34
	12/08/15	< 0.21	< 0.21	< 0.27	< 0.39	< 0.28	< 0.34
	06/09/16	< 0.21	< 0.21	< 0.27	< 0.39	< 0.28	< 0.34
	11/30/16	<0.21	<0.21	<0.27	<0.39	0.5 J	<0.34

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KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

	Analyte	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	Naphthalene
	Units	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
	NC DEQ 2L	1	600	600	500	20	6
Well ID	Date						
PZ-04	03/28/07	**78**	11	28	31	**4,000**	4 J
	06/11/08	< 0.2	< 0.19	< 0.16	< 0.24	**1,200**	< 0.25
	03/17/09	< 2	< 3.7	< 1.6	9.1 J	**990**	**11 J**
	06/17/09	**1.8**	< 0.37	14	4.31 J	**66**	2.6 J
	09/10/09	0.35 J	< 0.37	0.6 J	0.82 J	**50**	< 3 U
	12/02/09	< 0.33	< 0.67	0.75 J	< 1.8	9.5	2.7 J
	09/22/10	**2,200**	93	370	496	**280**	**52**
	05/26/11	< 0.43 U	0.49 J	< 0.33	< 0.2	**42**	< 0.39
	12/06/11	0.22 J	< 0.26	0.54 J	0.23 J	**22**	2.1 J
	06/26/12	< 0.19 UJ	< 0.26 UJ	< 0.33 UJ	< 0.2 UJ	7.1 J	< 0.39 UJ
	12/03/12	< 0.21	< 0.27	< 0.2	< 0.2	13	< 0.47
	06/20/13	< 0.21	< 0.27	< 0.2	1.32 J	11	< 0.47
	12/11/13	< 0.21	< 0.27	< 0.2	< 0.2	6.6	< 0.47
	06/19/14	< 0.21	< 0.21	< 0.27	< 0.63	2.3 J	< 0.34
	12/02/14	< 0.21	< 0.21	< 0.27	< 0.63	8.2	< 0.34
	06/10/15	< 0.21	< 0.21	< 0.27	< 0.39	2.2	< 0.34
	12/08/15	< 0.21	< 0.21	< 0.27	< 0.39	3.6	< 0.34
	06/09/16	< 0.21	< 0.21	< 0.27	< 0.39	1.7	< 1.1 U
	11/30/16	<0.21	<0.21	<0.27	<0.39	6.9	<0.34
PZ-5	06/17/13	< 0.21	< 0.27	< 0.2	< 0.2	< 0.2	< 0.47
PZ-6	06/17/13	< 0.21	< 0.27	< 0.2	< 0.2	1.3 J	< 0.47
PZ-7	06/17/13	< 0.21	< 0.27	< 0.2	< 0.2	< 0.2	< 0.47
PZ-8	06/17/13	0.28 J	< 0.27	< 0.2	< 0.2	< 0.2	< 0.47
PZ-9	06/17/13	**48**	< 0.27	< 0.2	< 0.2	**110**	< 0.47
	06/08/16	< 0.21	< 0.21	< 0.27	< 0.39	1.3	< 0.34
SB-01	03/23/06	**8,500**	**22,000**	**2,300**	**13,900**	**110 J**	**470**
SB-03	03/23/06	**260**	24	85	57	**140**	**130**
SB-04	03/22/06	**21**	2.5 J	9.5	35	6.8	**13**
SB-05	03/22/06	**640**	24	130	236.6	**380**	**6.4**
SB-06	03/22/06	**100**	1.1 J	13	1.84 J	**370**	2.4 J
SB-07	03/23/06	**880**	11	12	14.2	**660**	< 2.5
SB-08	03/22/06	< 0.2	< 0.19	< 0.16	< 0.24	**22**	< 0.25
SB-09	03/22/06	**1,400**	5.7	210	13.2	**300**	**9.4**
SB-10	03/24/06	**23,000**	**56,000**	**11,000**	**74,000**	< 100	**5,300**
SB-11	03/24/06	**4**	3.6 J	2.3 J	5 J	9.2	2.7 J

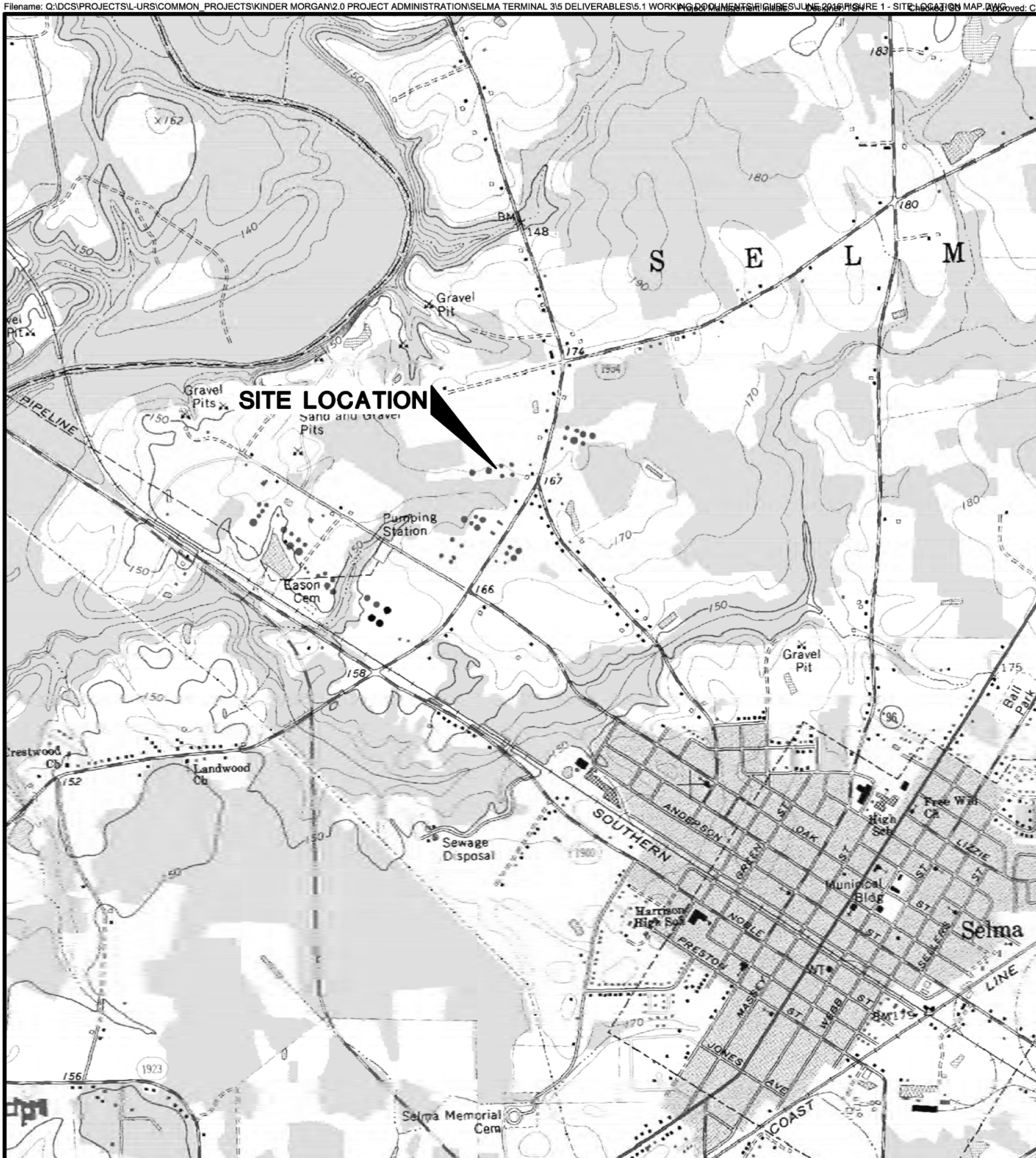
TABLE 3
HISTORICAL GROUNDWATER ANALYTICAL SUMMARY
KMST Selma 3 Terminal
Selma, Johnston County, North Carolina

	Analyte	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	Naphthalene
	Units	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
	NC DEQ 2L	1	600	600	500	20	6
Well ID	**Date**						
WSW-01	11/16/05	< 0.2	< 0.19	< 0.16	1.8 J	12	2 J
	04/05/06	< 0.2	< 0.19	< 0.16	< 0.24	15	< 0.25
	10/03/06	< 0.2	< 0.19	< 0.16	0.43 J	**55**	3 J
	03/27/07	< 0.2	< 0.19	< 0.16	< 0.24	**57**	1.3 J
	11/16/07	< 0.2	< 0.19	< 0.16	< 0.24	**47**	< 0.25
	12/13/07	< 0.2	< 0.19	< 0.16	< 0.24	7.3	< 0.25
	01/18/08	< 0.2	< 0.19	< 0.16	< 0.24	7.3	< 0.25
	02/21/08	< 0.2	< 0.19	< 0.16	< 0.24	**24**	< 0.25
	03/11/08	< 0.2	< 0.19	< 0.16	< 0.24	**28**	< 0.25
	04/28/08	< 0.2	< 0.19	< 0.16	< 0.24	**46**	< 0.25
	05/23/08	< 0.2	< 0.19	< 0.16	< 0.56 U	**85**	< 0.7 U
	06/25/08	< 0.2	< 0.19	< 0.16	< 0.24	**71**	< 0.25
	07/14/08	< 0.2	< 0.19	< 0.16	< 0.24	**90**	< 0.25

Notes:
MTBE - Methyl tert-butyl ether
µg/L - micrograms per liter
NC DEQ 2L - NCAC 2L Groundwater Quality Standard
Bolded and highlighted results indicate exceedence of 2L standard
< - Not detected above the method detection limit
J - Estimated value
U - Not present above the associated level; blank contamination exists
UJ - Not detected and the detection limit is an estimated value

FIGURES

Filename: Q:\DCS\PROJECTS\L-URS\COMMON_PROJECTS\KINDER MORGAN\2.0 PROJECT ADMINISTRATION\SELMA TERMINAL 3\5 DELIVERABLES\5.1 WORKING DOCUMENTS\FIGURES\JUNE 2016\FIGURE 1 - SITE LOCATION MAP.DWG   Approved: CK



SOURCE: USGS 7.5' TOPOGRAPHIC QUADRANGLE
SELMA, NC – DATED 2013, PHOTOINSPECTED 2013

N.C.

QUADRANGLE LOCATION

SCALE IN FEET
0 2000

N

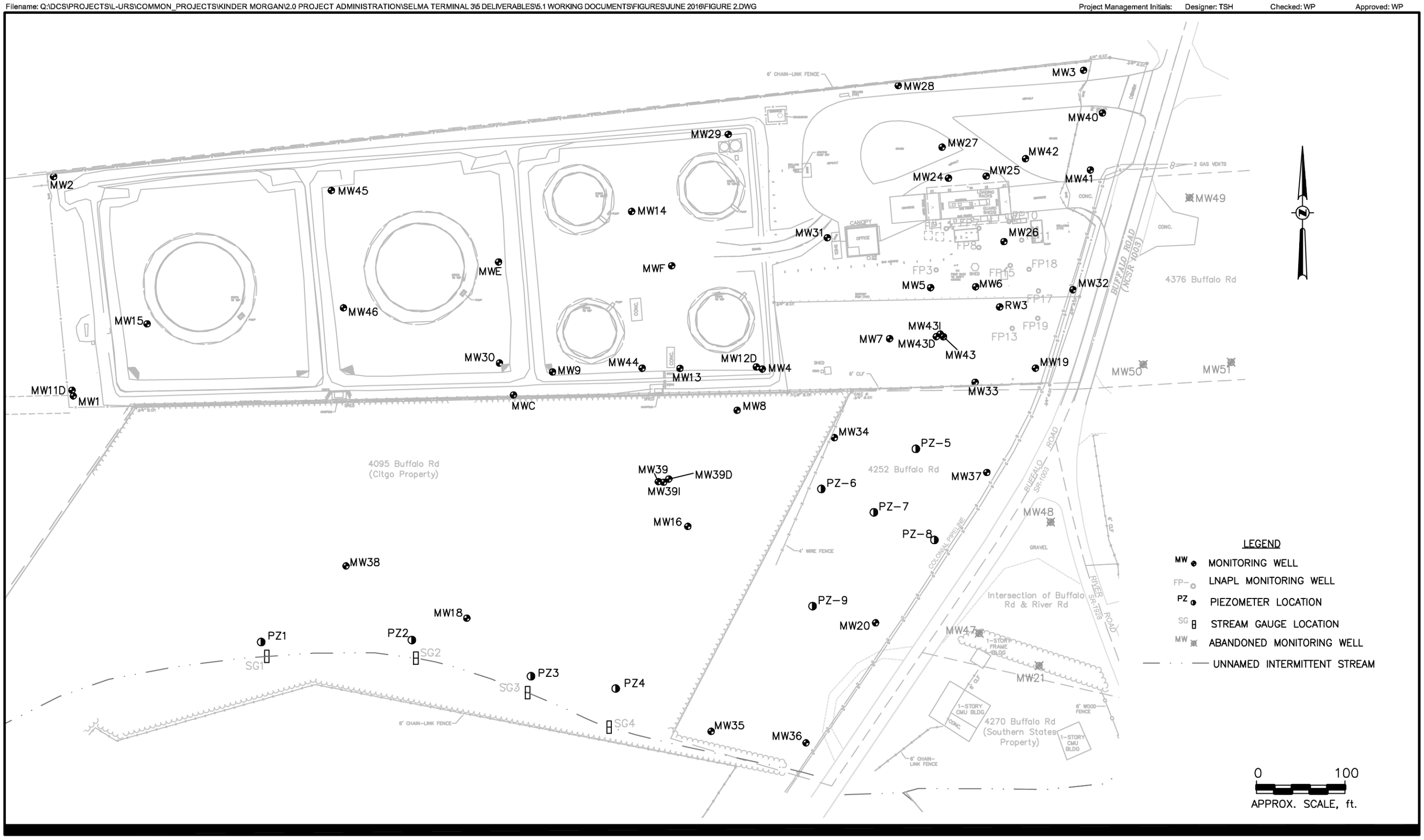
ANNUAL GROUNDWATER MONITORING REPORT - 2016
KINDER MORGAN - SELMA TERMINAL 3
SELMA, NORTH CAROLINA
Project No.: 60482935 Date: 2016-07-21

SITE LOCATION MAP

AECOM

Figure: 1

Filename: Q:\DCS\PROJECTS\L-URS\COMMON_PROJECTS\KINDER MORGAN\2.0 PROJECT ADMINISTRATION\SELMA TERMINAL 3\5 DELIVERABLES\5.1 WORKING DOCUMENTS\FIGURES\JUNE 2016\FIGURE 2.DWG Project Management Initials: Designer: TSH Checked: WP Approved: WP



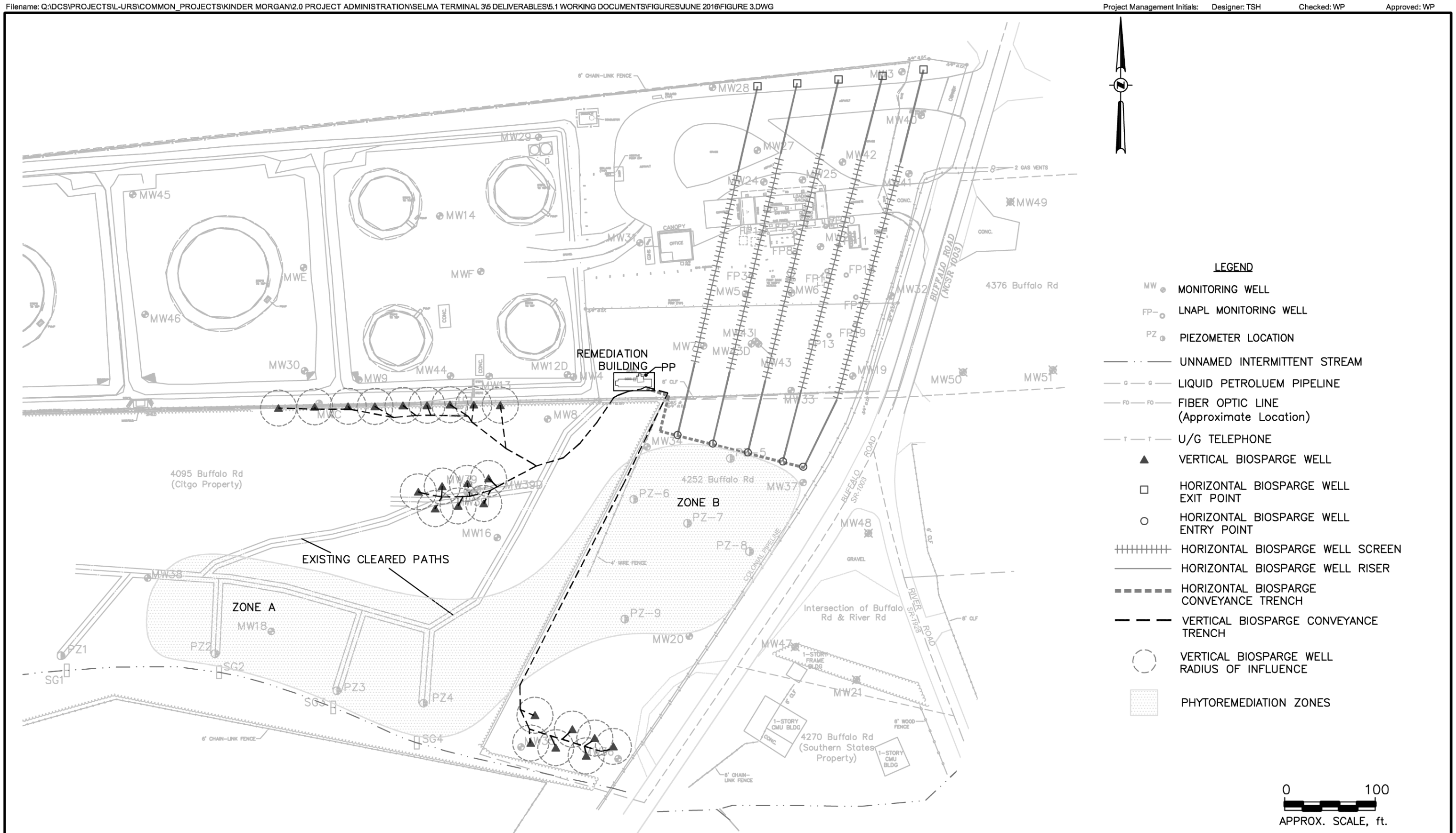
ANNUAL GROUNDWATER MONITORING REPORT - 2016
KINDER MORGAN - SELMA TERMINAL 3
SELMA, NORTH CAROLINA
Project No.: 60482935 Date: 2016-08-01

SITE MAP

AECOM
Figure: 2

Filename: Q:\DCS\PROJECTS\L-URS\COMMON_PROJECTS\KINDER MORGAN\2.0 PROJECT ADMINISTRATION\SELMA TERMINAL 3\5 DELIVERABLES\5.1 WORKING DOCUMENTS\FIGURES\JUNE 2016\FIGURE 3.DWG

Project Management Initials: Designer: TSH Checked: WP Approved: WP

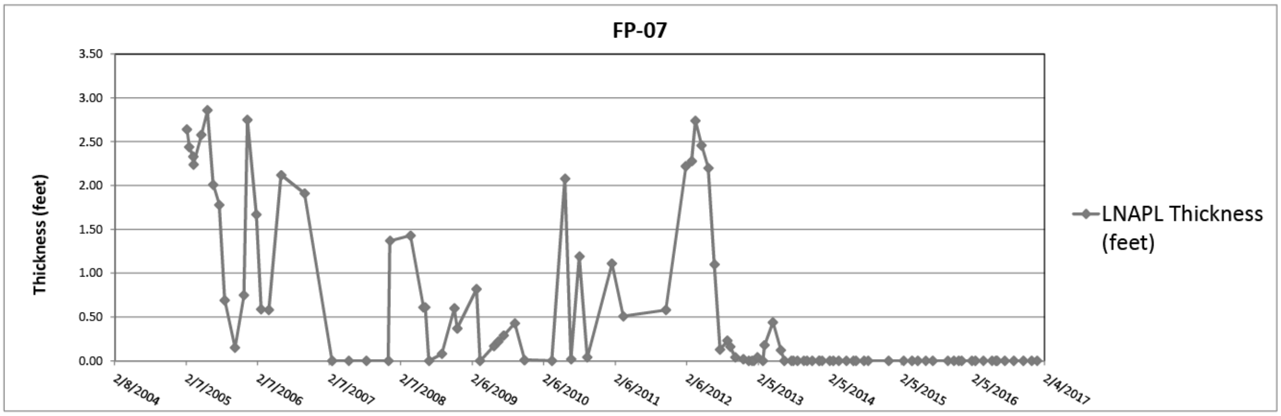


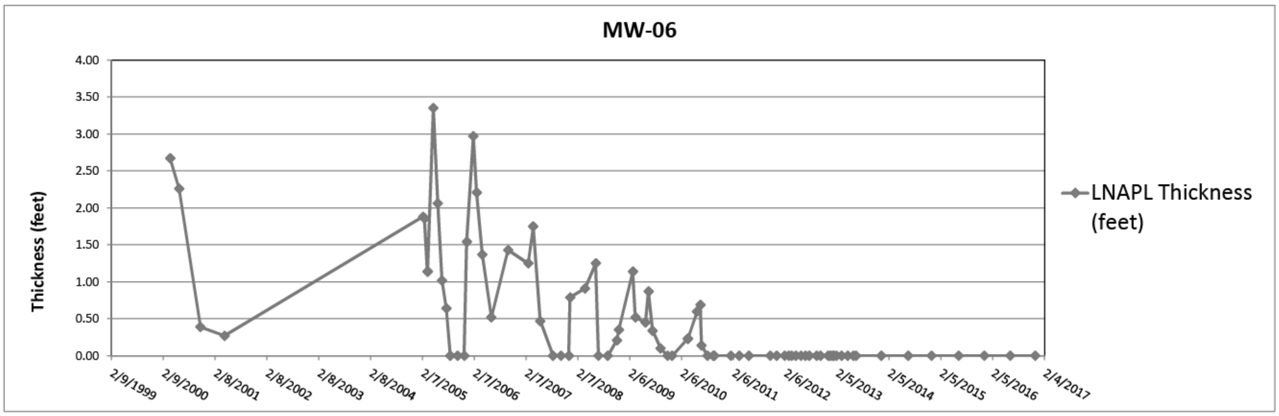
ANNUAL GROUNDWATER MONITORING REPORT - 2016
KINDER MORGAN - SELMA TERMINAL 3
SELMA, NORTH CAROLINA
Project No.: 60482935 Date: 2016-08-01

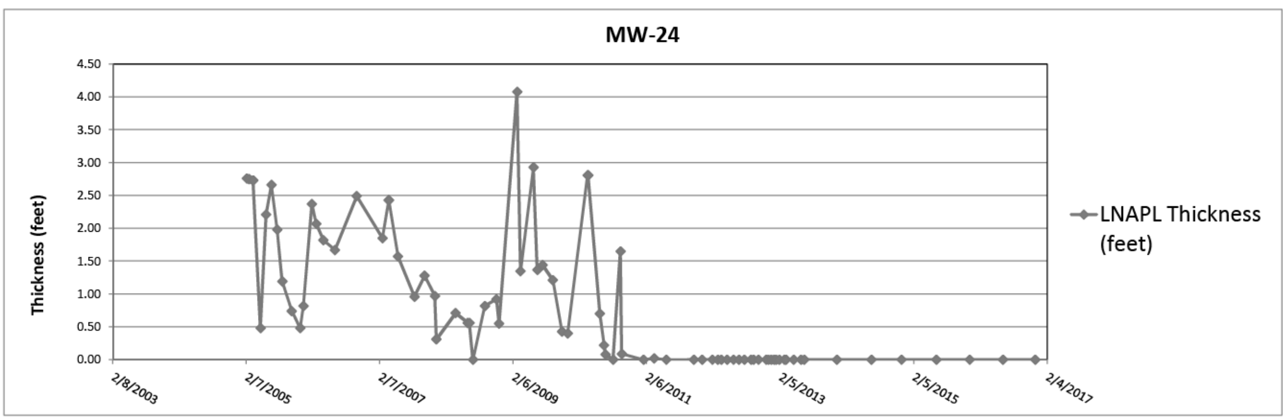
REMEDIATION SYSTEM LAYOUT

AECOM
Figure: 3

Figure 4
LNAPL Thickness vs. Time







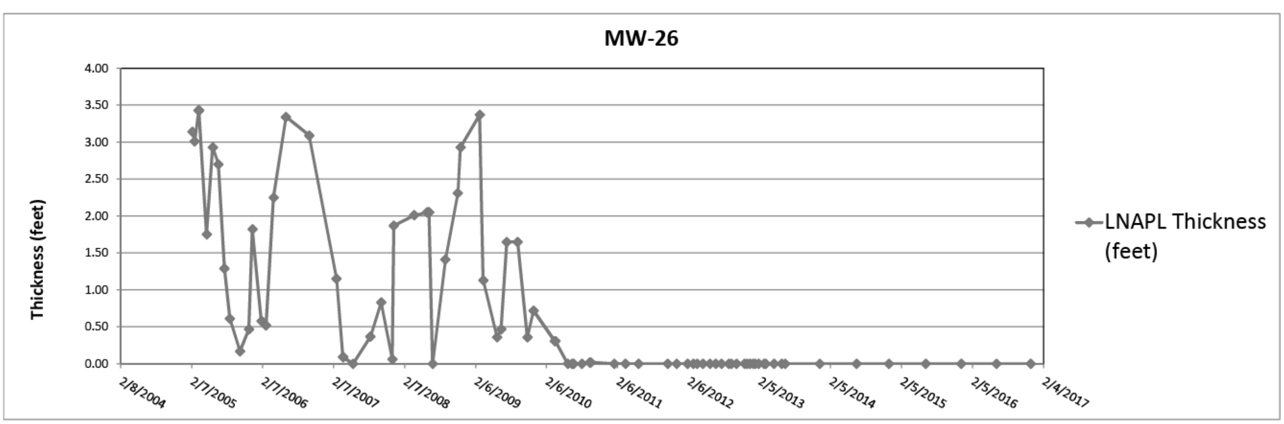
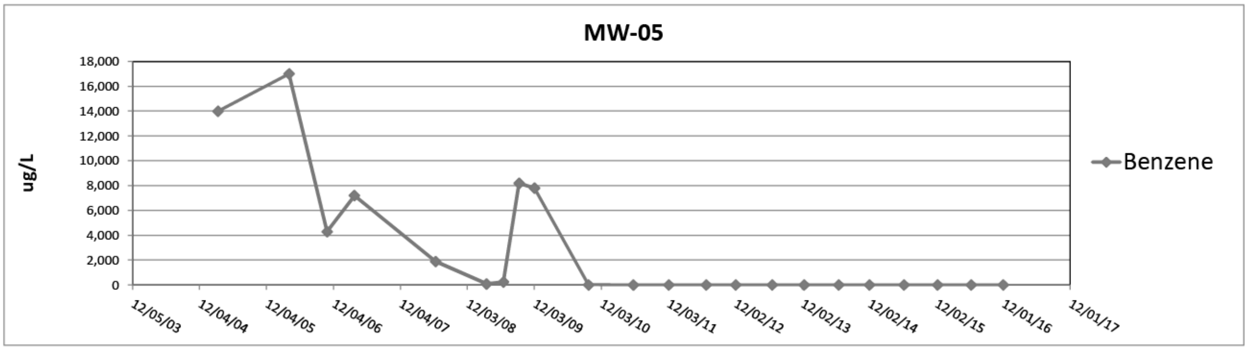
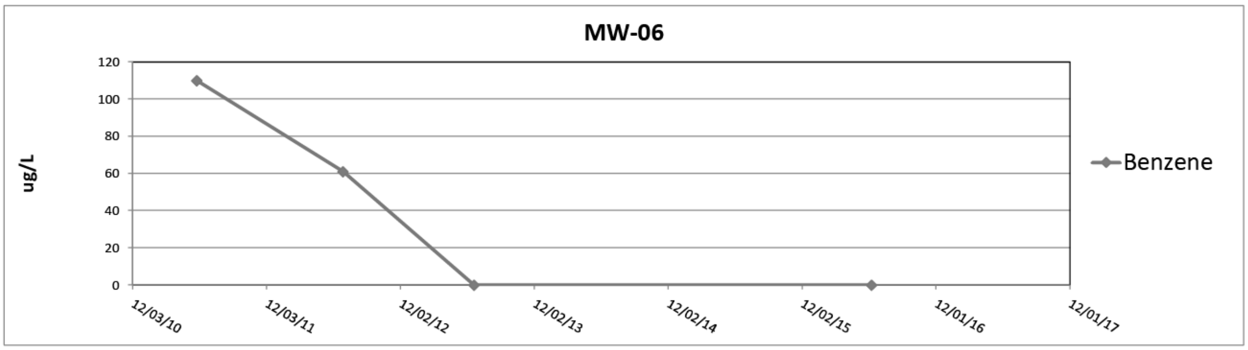
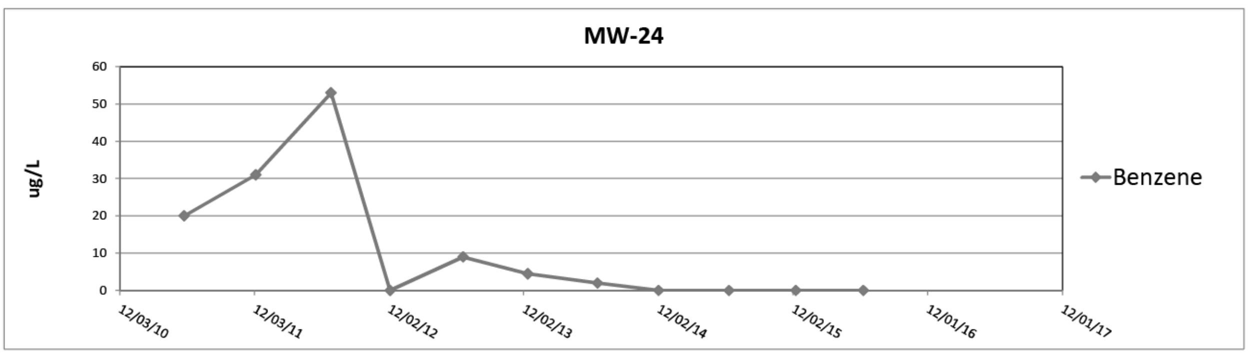
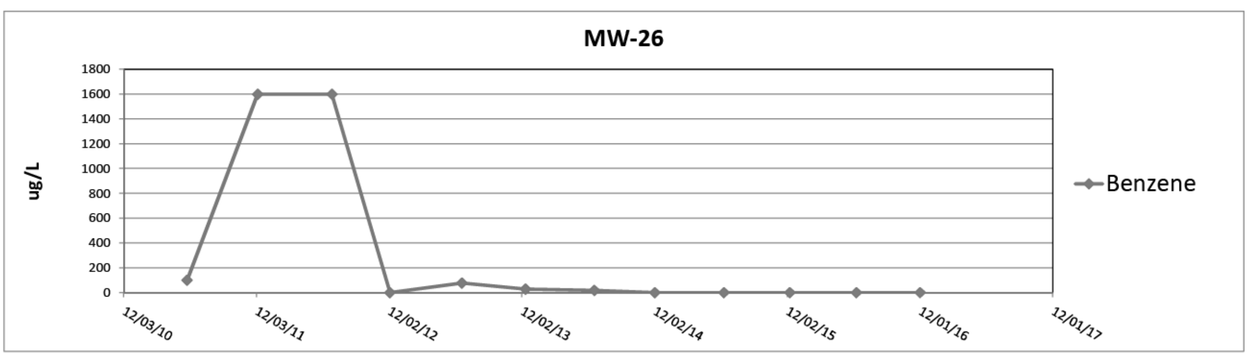


Figure 5
Benzene Concentrations vs. Time









Advancements in Horizontal Directional Drilling in the Kinder Morgan Remediation Program

Presented by:
Bob Lunardini, PE

Kinder Morgan Technical Working Group
April 24, 2014

URS

KINDER MORGAN

HDD in KM Program

- Installed
  - 2006 Peairs Road (silty sand, continuous)
  - 2007 Charlotte 2 (saprolite, blind bore)
  - 2010 Selma 3 (silty sand, continuous)
  - 2013 GN2 (fractured rock, blind bore)
  - 2014 Orlando Terminal SW (silty sand, blind bore)
  - 2014 Tenneco 151-09 (saprolite, blind bore)
- Planning Stage
  - Norwalk
  - Hartman
  - Elementis
  - Orlando SE

Horizontal Drilling Overview

What is Horizontal Directional Drilling?

KINDER MORGAN

URS

Horizontal Drilling Benefits

- Minimal impacts to above-ground operations
- Can bore underneath shallow utilities
- Fewer number of wells to cover same surface area versus traditional vertical wells
- Larger ROI than vertical wells

KINDER MORGAN URS

Drill Head Navigation

- Walkover
  - Use earth's electromagnetic field
  - Battery powered sonde (transmitter): 80 ft depth
- Wireline
  - Create an artificial EM field
  - Sonde with wireline and coil: 200 ft depth
  - Pro: Cost Con: Interference
- Gyro Steering Tool (GST)
  - Cruise missile guidance technology: No depth limit
  - Pro: No interference Con: Cost

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Slanted Paddle Drill Head

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Walkover Device

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URS

Ported Reamer

KINDER MORGAN

URS

KINDER MORGAN

URS

Air Sparge Screen

KINDER MORGAN

URS

Air Sparge Screen

KINDER MORGAN

URS

KINDER MORGAN

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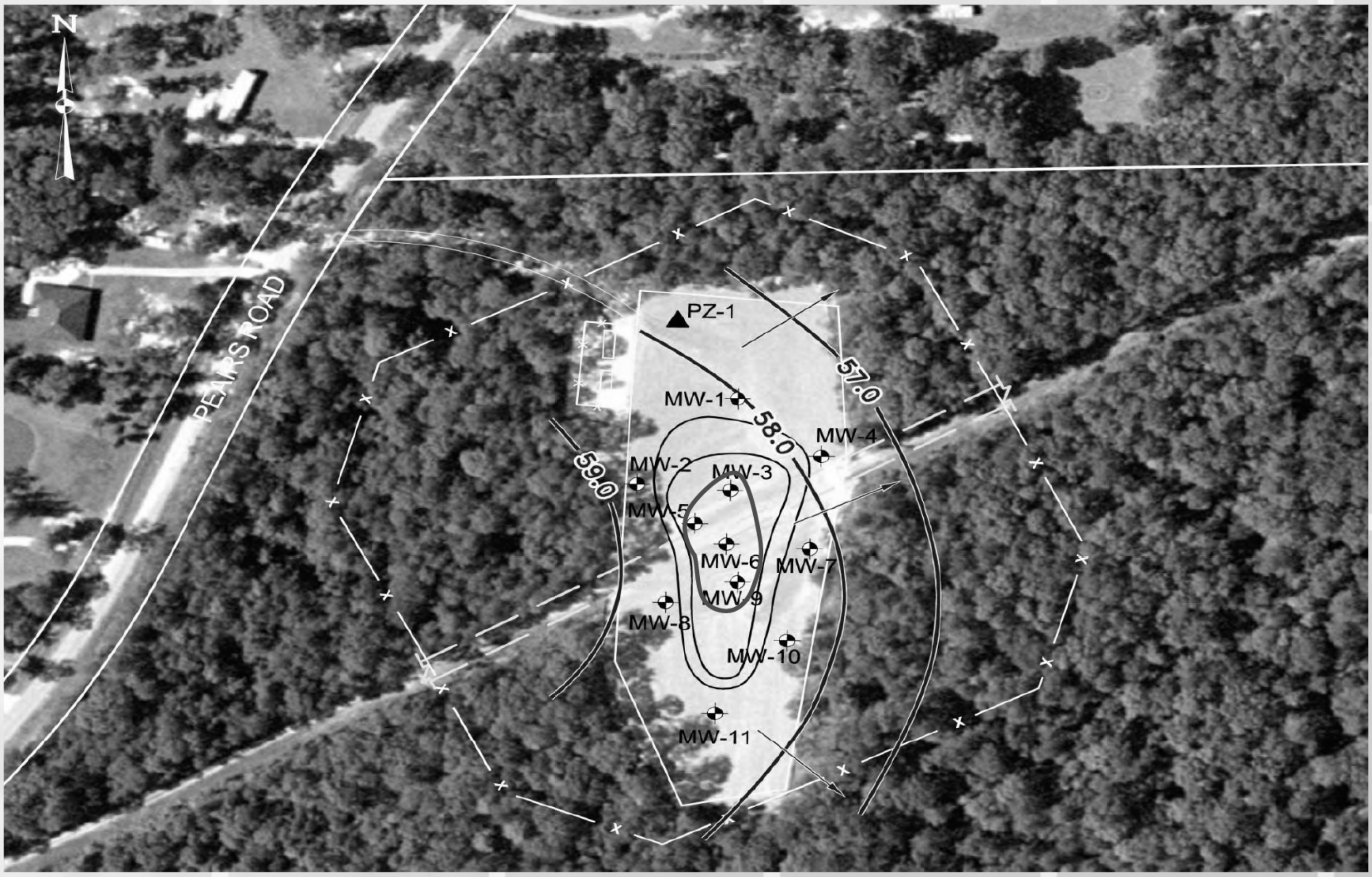
Well Seal

KINDER MORGAN

URS

Peairs Road – Site Map



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Peairs Road – Results

LNAPL chronology

Date	MW-3	MW-5	MW-9
August 2006	1.1 ft	1.2 ft	1.1 ft
April 2007	System Startup		
June 2007	0.3 ft	0.2 ft	0.1 ft
October 2008	No LNAPL in any site monitoring well		

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Peairs Road – Lessons Learned

- 12 horizontal wells replaced 150 vertical wells
- Radius of influence larger than expected
- Successful in removing LNAPL

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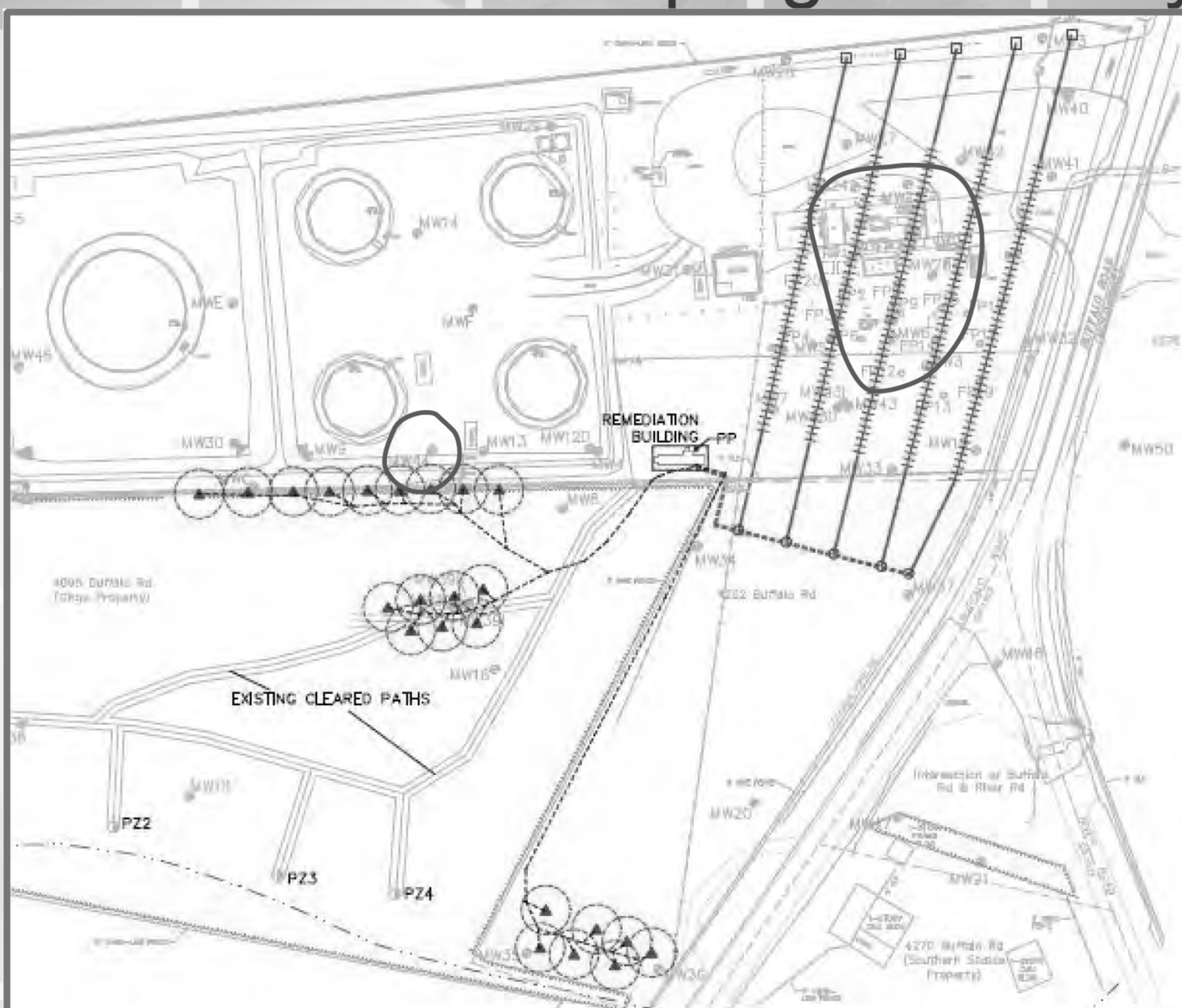
Selma Terminal - Site Layout

Selma Terminal –Biosparge Well Layout



Selma Terminal - Site Photos

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Selma Terminal – Results

- LNAPL chronology

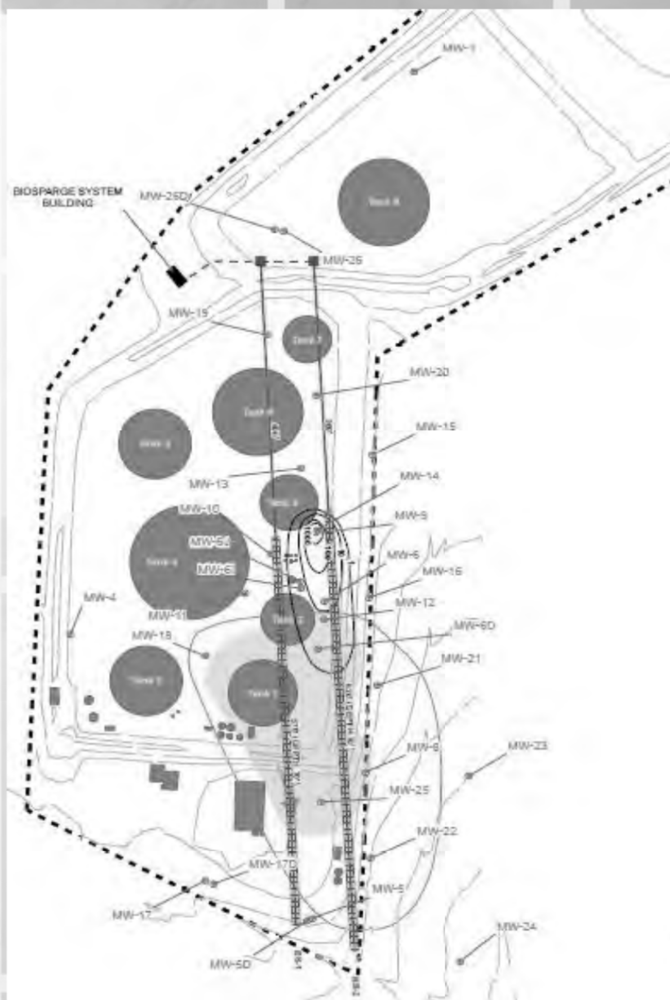
Date	MW-24	MW-25	MW-26
February 2009	4.08 ft	0.13 ft	3.37 ft
May 2010	System Startup		
September 2010	1.65 ft	ND	0.02 ft
May 2011	No LNAPL in any site monitoring well		

Selma Terminal – Lessons Learned

- Larger ROI = 5 horizontal wells
- Successful in removing LNAPL
- Drilling costs decreased from Peairs Road project (2007) to Selma project (2010)
  - Peairs ~ $90/ft
  - Selma ~ $55/ft
- Direct push soil borings along the well paths allow the driller to pinpoint target depths

KMST GN2

- 2 Biosparge wells
- 70 ft depth
- Fractured rock
- 4” HDPE
- Blind bores



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KMST GN2 – Lessons Learned

- Lost communication with drill head: x,y
- Had to abandon borehole
- Change from walkover method to GST ($175k)

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KMST GN2 – Lessons Learned

- Frac-outs in the loading rack 80 ft away and 50 ft below grade
- Check for secondary pathways, UST/OWS
- Require a Frac-out plan
- Understand drilling parameters

Orlando Terminal SW

- 7 air sparge wells to 35 ft depth
- 3" HDPE blind bores

Orlando Terminal SW– Lessons Learned

- Lost communication with drill head under power substation
- Change from walkover to wireline with coil ($350K)
- Used bentonite based mud for first time

KINDER MORGAN URS

Tenneco 151-09 – Atlanta, Georgia

KINDER MORGAN

URS

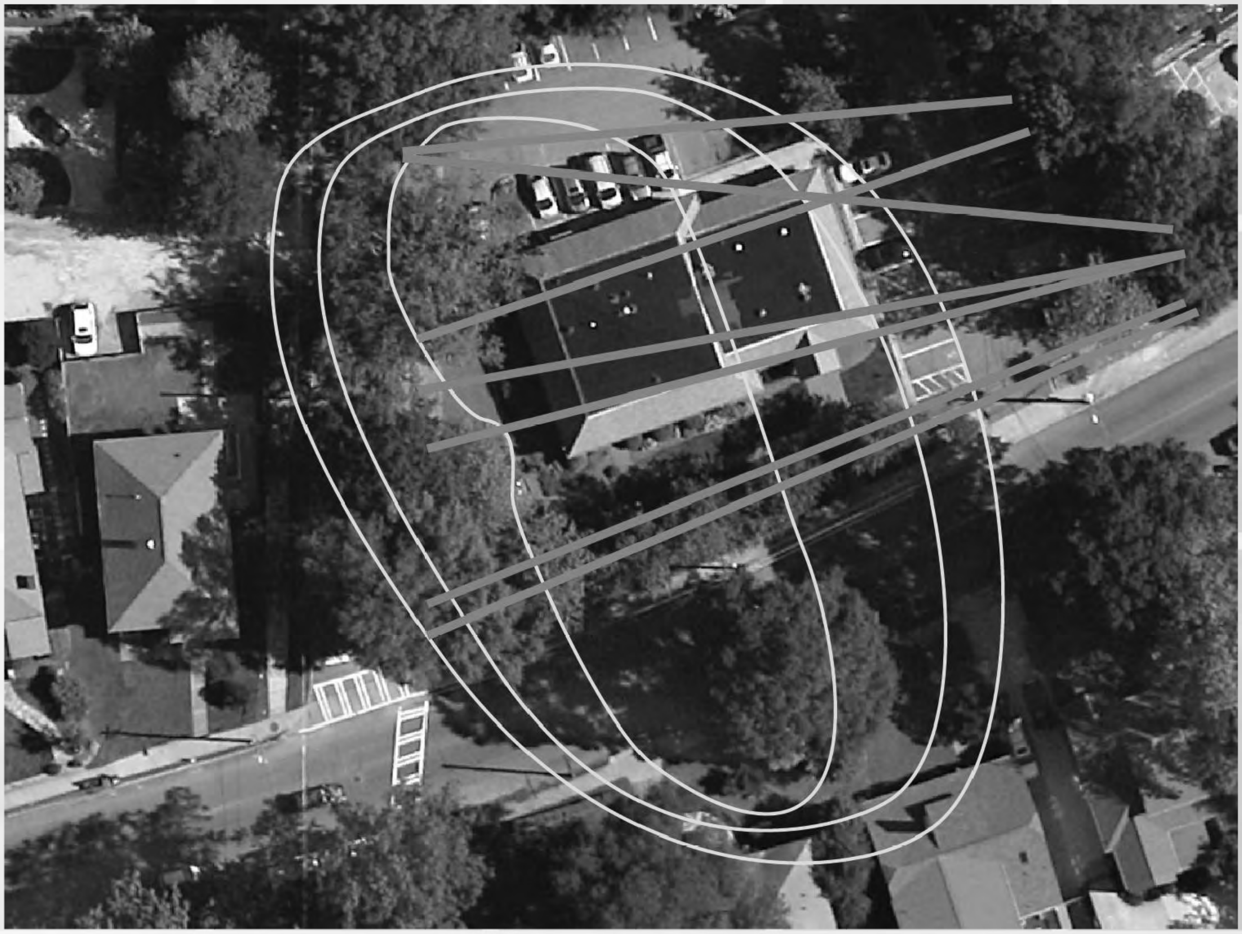
Tenneco 151-09 – 1970’s

Tenneco 151-09 – Current

KINDER MORGAN

URS

Tenneco 151-09 – Horizontal Well Layout



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Tenneco 151-09 – Equipment and Setup

KINDER MORGAN

URS

Tenneco 151-09 – Equipment and Setup

KINDER MORGAN

URS

Tenneco 151-09 – Lessons Learned

- 7 HDD wells replaced 50+ vertical wells
- Installation possible on small footprint
- Order well materials early - Custom SVE HDPE not available. Used PVC with longitudinal slots.
- Encountered abandoned discharge line
- IDW is liquid with some suspended solids –Plan T&D accordingly
- Drilling cost ~$80/ft

References on SharePoint

- Remediation Manual 6.10 Horizontal Well Installation (coming soon)
- KM Environmental HDD Cost/Spec Summary.xls
- Project Lessons Learned
  - Horizontal Well Installation – Peairs Rd
  - Horizontal Well Installation – Selma 3
  - Mitigating Mud Frac-outs - GN2
  - Orlando SW (in development)

Questions

DRAFT

ANNUAL REMEDIATION REPORT FOR 2015

PEAIRS ROAD SITE
ZACHARY, LOUISIANA
PLANTATION PIPE LINE COMPANY
AGENCY INTEREST #99878

Prepared for:

Plantation Pipe Line Company
1100 Alderman Drive, Suite 200
Alpharetta, Georgia 30005

January 19, 2016

File No. 19230915.00001

URS

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Baton Rouge, Louisiana 70806
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APPENDICES

URS Corporation (URS), under contract to Plantation Pipe Line Company (Plantation), is currently implementing interim corrective measures at the Peairs Road site located near Zachary, Louisiana to address a release from Plantation's pipeline that occurred on November 2, 2001. URS has been implementing remediation at the site since April 2007 by operating an air sparge and soil vapor extraction (AS/SVE) system. In March 2010, the SVE system was shut down due to the extremely low levels of VOCs being recovered and soil data collected in October 2009 indicated that projected soil cleanup levels had been achieved. On March 23, 2015 the AS system was shutdown. To date, remediation has progressed very well at the site.

Plantation owns an interstate common carrier pipeline system which transports refined petroleum products from the Gulf Coast's oil producing and refining centers to petroleum distribution centers throughout most of the southeastern United States. As part of this system, Plantation owns and operates one 12-inch and two 18-inch pipelines within the right-of-way at the site. A site location map is presented as **Figure 1**. On November 2, 2001, Plantation responded to a landowner's observation of distressed vegetation along the pipeline right-of-way near Peairs Road. As follow-up to the landowner's call, it was determined by Plantation personnel that a release had occurred. Repair and mitigation activities were initiated immediately. Since discovery of the release, Plantation conducted corrective measures and site investigation activities following the Louisiana Department of Environmental Quality (LDEQ) Risk Evaluation/Corrective Action Program (RECAP) Self-Implementation process to delineate the impacted area and to evaluate potential remedial options for the site. Several remedial options were evaluated and an air sparge and soil vapor extraction (AS/SVE) system was selected as the interim remedial option for the site.

This report presents a brief background of activities completed at the site since the discovery of the release, site geology and hydrogeology, an overview of the AS/SVE system, operation and maintenance activities conducted in 2015, system performance, groundwater monitoring activities conducted in 2015 and a summary of current site conditions. Plantation is currently evaluating additional remedial options to address residual levels of hydrocarbons in the vicinity of MW-5R1.

The Peairs Road site is located in the northeastern portion of East Baton Rouge Parish in a rural wooded area southeast of Peairs Road and west of Wind Bayou. The property is privately owned and has not had any known commercial uses. The land immediately adjacent to the right-of-way is an undeveloped wooded area. There are residences located along Peairs Road. The closest residence is approximately 500 feet north of the release site on the south side of Peairs Road. The site is more than one mile from the nearest drinking water well and is approximately 600 feet from the nearest surface water body (Wind Bayou). The geographical coordinates of the release point at the site are latitude 30° 38′ 43.4" north and longitude 90° 59′ 38.5" west.

The following is a summary of key activities completed at the site since discovery of the release.

Initial Corrective Actions:

- An area of impacted soils approximately 115 feet by 115 feet was excavated to a depth of 3 feet and disposed at a permitted offsite facility.
- The excavation was approximately 5 feet deep in the immediate area of the leak in order to facilitate repair of the pipeline.
- Approximately 967 gallons of product was recovered in December 2001 during four vacuum recovery events completed at recovery wells RW-1 and RW-2 installed near the release.

Assessment activities completed prior to installation of the AS/SVE system:

- Temporary monitor wells TMW-1 through TMW-9 and recovery wells RW-1 and RW-2 were installed in November 2001.
- Four surface water samples were collected from Wind Bayou in November 2001.
- Eleven additional temporary monitor wells, TWM-10 through TMW-20, were installed in December 2002.
- Two surface water samples were collected from Wind Bayou in December 2002.

- A Site Investigation Report (Shaw Environmental, Inc., April 5, 2004) was submitted to the LDEQ that documented the initial corrective action and site investigation activities completed in 2001 and 2002.

- Light non-aqueous phase liquid (LNAPL) measurements and groundwater samples were collected from TMW-1 through TMW-20 in November 2004. Results indicated the plume had spread beyond the extent identified in 2002.

- Temporary monitor wells TMW-21 through TMW-27 were installed in December 2004 to define the extent of the hydrocarbon plume.

- Temporary monitor wells TMW-28 through TMW-37 were installed in March 2006 to confirm the extent of the hydrocarbon plume and to determine if a deeper permeable zone was impacted with petroleum hydrocarbons.

The Area of Impact (AOI) for soil and groundwater based on the assessments completed through 2006 was approximately 0.94 acres. The identified groundwater and soil AOI warranted corrective action following LDEQ's RECAP guidelines. The historical groundwater monitoring data and LNAPL measurement data is summarized in the Peairs Road Site Annual Remedial Monitoring Report for 2007 submitted to the LDEQ on April 11, 2008.

The following timeline highlights key events leading up to startup of the AS/SVE system.

- A Notification of Remediation Activities letter was submitted to the LDEQ at a meeting on June 10, 2005.

- The remedial approach for the site was approved by the LDEQ in a letter to Plantation dated September 26, 2005. The approval letter included a request that a Corrective Action Implementation Form be submitted to the LDEQ within 60 days of receipt of the LDEQ approval letter.

- An extension for submitting the Corrective Action Implementation Form was requested in a letter dated November 23, 2005 due to delays associated with negotiating a long-term access agreement with the Peairs Road site property owner.

- A long term access agreement was granted by the property owner on January 14, 2006. The agreement included access to an area of approximately 11 acres to provide access, construction of an AS/SVE system and installation of a monitoring network to monitor remediation progress.

- The LDEQ approved the extension in a letter dated January 26, 2006.

- The Corrective Action Implementation Form was submitted to the LDEQ on February 27, 2006 and included a proposed schedule for system installation and startup activities.

- The AS/SVE system was constructed in 2006. The SVE system began operation permanently in April 2007 when installation of a three-phase power supply to the site was complete. The AS system began operation in conjunction with the SVE system in August 2007. The site layout is shown on Figure 2.

- The AS/SVE system site preparation, system installation and system startup details are summarized in the Peairs Road Site Air Sparge/Soil Vapor Extraction System Installation Report submitted to LDEQ on April 11, 2008.

Additional assessment of the soils at the Peairs Road site was conducted in October 2009 to evaluate current concentrations in the soils in the area of the 2001 release. Soil data had not been collected since the air sparge and soil vapor extraction system began operation in 2007. On March 10, 2010, the SVE system was shut down because very minimal VOCs were being recovered by the SVE system and the results of the soil assessment indicated that current concentrations in the surface soil and subsurface soil intervals were below projected MO-1 RECAP standards. The data from the 2009 soil assessment were submitted to the LDEQ in a RECAP Input Parameter Form submittal package dated October 15, 2010 requesting a determination of site-specific parameters, including groundwater classification, so that final remedial goals could be established for the site. The LDEQ indicated the information in the submittal was acceptable as presented in a letter to Plantation dated December 20, 2010.

Fifty-seven soil borings, 37 temporary monitor wells, two recovery wells, 12 horizontal air sparge wells, 25 soil vapor extraction wells, 11 monitor wells and one piezometer have been completed to depths ranging from 17 feet below ground surface (bgs) to 50 feet bgs at the site since November 2001. The stratigraphy at the site generally consists of silt, clayey silt and silty clay extending to an average depth of 11 feet bgs. A sandy layer consisting of silty sand, clayey sand and sand was encountered at depths ranging from approximately 8 to 15 feet bgs and to depths of 22 to 23 feet bgs in the northern portion of the site and to depths of approximately 50 feet bgs in the southern portion of the site. Below the sand layer are fine-grained clayey silt, silty clay and clays. The sandy zone encountered from approximately 8 to 15 feet bgs is considered the shallow water table aquifer (shallow zone). Water levels measured in the wells completed in this shallow zone indicate that the uppermost permeable zone at the site is under unconfined conditions.

The groundwater surface is relatively flat across the site with flow toward the northeast, east and southeast. Prior to construction of a clay cap installed in order to fill in low-lying wetland areas at the site and provide a base to install the remedial system, there was a more predominant southerly and southeasterly groundwater flow component observed at the site. This is evident by the shape of the dissolved phase plume at the site. Using the average (geometric mean) hydraulic conductivity value of 2.7 feet per day derived from the slug test data, an estimated porosity of 0.3 (30%), and the potentiometric surface gradients of 0.003 to 0.02 feet/foot, the average linear velocity of groundwater flow ranges from approximately 0.027 feet/day (10 feet/year) to 0.18 feet/day (67 feet/year).

Slug tests were conducted in recovery wells RW-1 and RW-2 on December 20, 2004 and included both slug-in and slug-out phases of testing. The slug-test data were evaluated with the Bouwer and Rice analysis for unconfined hydraulic conditions. The following values of hydraulic conductivity were derived from the slug testing:

Tested Well	Hydraulic Conductivity (Slug-Test Derived)	
	Feet per day (feet/day)	**Centimeters per second (cm/sec)**
RW-1 (Slug In)	3.3	1.1×10^{-3}
RW-1 (Slug Out)	2.8	9.8×10^{-4}
RW-2 (Slug In)	2.4	8.4×10^{-4}
RW-2 (Slug Out)	2.5	8.7×10^{-4}
Geometric Mean	2.7	9.4×10^{-4}

Based on stratigraphic data and the results of the slug tests, the estimated maximum sustainable yield for the shallow groundwater zone ranges from 316 to 556 gallons per day. The average total dissolved solids (TDS) content of the groundwater in the shallow zone is 346 mg/l. This would classify this shallow groundwater zone as Class 3A according to LDEQ's RECAP guidelines.

The surface water bodies located closest to the site are Wind Bayou, which is located approximately 600 feet east of the AOI, and a tributary to Little Sandy Creek, which is located approximately 2,000 feet west of the AOI. The waters of both Wind Bayou and Little Sandy Creek discharge to the Amite River, which is located approximately 4.5 miles east of the Peairs Road site. The Amite River is used for primary and secondary recreation, agriculture, and fish and wildlife propagation but not as a drinking water source.

The remediation system which was operated through March 2015 consisted of air sparging using the 12 horizontal AS wells (HW-1 through HW-12). The well locations are shown on **Figure 2**. The construction details for the AS wells are summarized in **Table 1**. Key components of the remediation system include: an air sparge module and a telemetric monitoring and control module. The SVE portion of the system was presented in previous reports. It will not be discussed herein because it did not operate in 2014.

The air sparge system is designed to deliver air to the 12 horizontal air sparge wells. The average screened interval depth of the horizontal wells range from approximately 21.9 to 23.9 feet bgs and just above a clayey interval beneath the dissolved phase groundwater plume. Air to the sparge system is provided by a Kaeser ASD-40ST rotary screw compressor. The compressor unit includes a refrigerated air dryer and is capable of delivering 166 cfm of air at a pressure of 125 psi.

A 480V motor control center (MCC) and a programmable logic control (PLC) control panel are mounted in the office of the remediation building. The PLC is used to control and operate the system. A personal computer (PC) based Operator Interface is also located in the remediation building for process equipment control, monitoring and remote off-site access to the system.

Operation and maintenance activities are conducted on a regular basis to maintain efficient operation of the system. The Kaeser air compressor was serviced during the First Quarter of 2015 by Trio Compressed Air Systems (Trio). Trio is a certified Kaeser maintenance representative. Trio mothballed the air compressor after it was shutdown on March 23, 2015. Troubleshooting of the PLC and other components of the system are performed by URS and Chemtech Engineering, Inc. as needed. System operation parameters such as temperatures, pressures, flow rates, etc. are collected on data sheets and filed at the site.

In addition to the system data collected manually during field visits, the PLC periodically logs system operating data. The data collected by the PLC includes system flow rates, temperatures, cycle times, pressures and valves positions. The operation data are used by the system Operator-in-Charge (OIC) to maintain efficient operation of the system.

An activity log of system repairs and troubleshooting is provided as **Table 2**. No significant repair activities were performed in 2015 other than mothballing the air compressor.

Throughout the First Quarter of 2015, the system operated in air sparge only mode. The air sparge system was operated by pulsing air to the horizontal wells in cycles. The purpose of the pulsing was to influence groundwater agitation and enhance the mixing zone for distribution of dissolved oxygen.

From January through March 2015, the system was operated 24 hours a day by sparging wells HW-3 through HW-8 which focused on the center of the original plume where constituent concentrations are still observed. A summary of runtime for the AS system is provided in **Table 3**. During the period the system was in operational mode, the system runtime was approximately 65% based on a screen analysis for the air sparge compressor run time of the SCADA system for the remediation system.

Eleven monitor wells, MW-1R1, MW-2 through MW-11, and piezometer PZ-1 are included in the approved groundwater monitoring program for the site. The monitor well locations are shown on Figure 2. The monitoring program includes semiannual groundwater elevation measurements, inspection for LNAPL and sampling of 11 monitor wells and piezometer PZ-1. The semiannual sampling events were conducted on March 5, 2015 and September 2, 2015. The monitor well construction details are presented in **Table 4**.

7.1 GROUNDWATER LEVEL AND LNAPL MEASUREMENTS

Groundwater level measurements in the monitor wells were performed on the same day as sampling and immediately prior to purging if sampling was performed during the level measurement event. A second measurement was made from the top of casing to the bottom of the well to determine the volume of water in the well. Groundwater levels were measured with an electronic water level indicator. Each well was inspected for LNAPL by direct observation with a clear disposable bailer. The water level measuring device was decontaminated prior to use and between wells. The measuring device was lowered down the well casing and the reading was taken to the nearest 0.01 foot. The water levels and LNAPL inspection results were recorded on Groundwater Collection Report Forms and are summarized in **Table 5**. The Groundwater Collection Report Forms are included as **Appendix A**.

7.2 MONITOR WELL SAMPLING

Each monitor well was purged and sampled in general accordance with the LDEQ RECAP guidelines. In order to obtain a representative sample of groundwater, the standing water in the well casing was purged using methods described below. During the purging process, field measurements were taken for temperature, pH and specific conductance and recorded on the Groundwater Collection Report Forms. When the subsequent measurements showed less than 10 percent variation in these parameters and at least three well volumes were evacuated, the well was determined to be adequately purged. A submersible pump or disposable bailer was used to purge each monitoring well during the 2015 monitoring events. In March 2015 and September 2015, monitor well MW-1R1 went dry after purging one well volume and was sampled immediately after purging when sufficient groundwater had recharged the well.

All groundwater samples collected for laboratory analysis were placed in clean unused sample containers provided by the analytical laboratory. Each sample container was properly labeled. Each sample label included: sample number, sample location, date, time, sampler's initials, method of preservation, and analyses to be performed. All samples were properly preserved and were placed on ice upon collection.

Groundwater samples were collected and analyzed in accordance with *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (SW-846, 3rd Edition and subsequent updates), for the following list of constituents:

- Benzene, toluene, ethylbenzene and xylenes – Method 8260B
- Methyl tertiary-butyl ether – Method 8260B
- Specific conductance (field measurement)
- pH (field measurement)
- Temperature (field measurement)

The groundwater samples that were collected were analyzed by Gulf Coast Analytical Laboratories in Baton Rouge, Louisiana. The analytical laboratory reports are included as **Appendix B**.

Quality Assurance/Quality Control (QA/QC) samples were collected to assess the potential for contamination of samples due to field activities and/or handling and transport, and also to evaluate the precision and accuracy of the analytical data from the laboratory. The QA/QC samples included a field duplicate sample to evaluate sample-to-sample analytical precision and trip blanks to evaluate potential cross-contamination of samples. One field duplicate sample was collected during each sampling event and one trip blank was included in each ice chest containing VOC samples.

7.3 SUMMARY OF GROUNDWATER RESULTS

Groundwater level measurements and inspection for LNAPL were performed semiannually in all 11 monitor wells and one piezometer in 2015. The depths to groundwater, groundwater elevations, LNAPL measurements and other field parameters are listed in **Table 5**. **Table 5** also includes the historical groundwater and LNAPL measurements for the existing monitor wells and piezometer at the site. Potentiometric maps of the shallow zone in March 2015 and

September 2015 are presented as **Figure 3** and **Figure 4**, respectively. No LNAPL was observed during quarterly monitoring events in 2015.

The analytical results are summarized in **Table 6**. The groundwater analytical results and the approximate extent of the dissolved hydrocarbon plume are shown on **Figure 5**. The following is a summary of the results of the 2015 groundwater monitoring data.

- The groundwater surface is relatively flat across the site with flow toward the northeast, east, and southeast as indicated by the potentiometric maps. This is consistent with previous interpretations since the clay cap was placed prior to system installation.

- No LNAPL has been detected at the site since August 23, 2007 except that a trace amount was observed in monitor well MW-5 during the August 2008 monitoring event. No LNAPL was observed during monitoring events conducted in 2015.

- Concentrations of benzene, toluene, ethylbenzene, toluene, and MTBE were not observed above the respective projected MO-1 RECAP Standard (RS) in any of the monitor wells or PZ-1 during the semiannual sampling events.

The groundwater surface is relatively flat across the site with flow towards the northeast, east, and southeast. No LNAPL was detected at the site in 2015. BTEX and MTBE were not detected above the respective MO-1 RS in any monitor wells during either semiannual monitoring event.

Due to the observed concentrations of BTEX and MTBE in the site monitor wells, Plantation recommends the following for 2016.

- Continue to not operate the AS system because concentrations of site constituents were below projected MO-1 RS for all sampling events in 2015.

- Continue period of post-remedial action monitoring to consist of at least four successive monitoring events, currently conducted semiannually.

- Provide data transmittal of monitoring data of semiannual groundwater sampling events.

- When four successive monitoring events are conducted since the system was shutdown and all site constituents remain below the respective projected MO-1 RS, Plantation will request closure of the site.

- Continue groundwater monitoring activities to include semiannual groundwater level measurements, LNAPL inspections and sampling of all 11 monitor wells and piezometer PZ-1. The monitor wells will be analyzed for TPH-GRO by the current Method 8015 and BTEX and MTBE by Method 8260B.

TABLES

TABLE 1

HORIZONTAL AIR SPARGE WELL CONSTRUCTION DETAILS
PLANTATION PIPE LINE COMPANY
PEAIRS ROAD SITE
ZACHARY, LOUISIANA

Monitoring Well	Installation Date	Well Construction Material	Casing Slot Size	Casing Total Length (ft bgs)	Top of Casing Elevation (ft NGVD)	Screen Length (feet)	Average Screen Depth (ft bgs)
HW-1 IN	June 23, 2006	3" HDPE	0.010"	144	78.78	120	22.3
HW-1 OUT				106	77.88		
HW-2 IN	June 22, 2006	3" HDPE	0.010"	114	79.04	180	22.7
HW-2 OUT				118	77.70		
HW-3 IN	June 22, 2006	3" HDPE	0.010"	104	79.00	260	22.0
HW-3 OUT				107	77.63		
HW-4 IN	June 21, 2006	3" HDPE	0.010"	104	79.06	340	23.4
HW-4 OUT				104	77.38		
HW-5 IN	June 20, 2006	3" HDPE	0.010"	104	78.96	360	23.6
HW-5 OUT				102	76.98		
HW-6 IN	June 17, 2006	3" HDPE	0.010"	104	79.16	360	23.4
HW-6 OUT				105	76.97		
HW-7 IN	June 16, 2006	3" HDPE	0.010"	104	79.45	360	23.8
HW-7 OUT				104	77.17		
HW-8 IN	June 16, 2006	3" HDPE	0.010"	104	79.40	360	23.2
HW-8 OUT				104	76.98		
HW-9 IN	June 15, 2006	3" HDPE	0.010"	102	79.26	340	23.9
HW-9 OUT				96	77.11		
HW-10 IN	June 14, 2006	3" HDPE	0.010"	113.5	79.37	280	23.4
HW-10 OUT				115	77.14		
HW-11 IN	June 13, 2006	3" HDPE	0.010"	121	79.59	160	21.9
HW-11 OUT				112	77.74		
HW-12 IN	June 14, 2006	3" HDPE	0.010"	130	79.58	80	22.2
HW-12 OUT				112	78.21		

NOTES:

ft bgs = feet below ground surface.

ft NGVD = feet above National Geodetic Vertical Datum 1929.

TABLE 2

2015 TROUBLESHOOTING AND REPAIR LOG
PLANTATION PIPE LINE COMPANY
PEAIRS ROAD SITE
ZACHARY, LOUISIANA

DATE	ACTIVITY
05/12/15	TRIO mothballed the air compressor after the system was shut down on March 23, 2015.

TABLE 3

2015 MONTHLY REMEDIAL SYSTEM UPTIME SUMMARY
PLANTATION PIPE LINE COMPANY
PEAIRS ROAD SITE
ZACHARY, LOUISIANA

Month	Days in Month	Available Uptime (hrs)	Actual Uptime (hrs)	Monthly Uptime %	Comments
January	31	744	744	100%	
February	28	672	672	100%	
March	23	539	539	100%	System was shut down on March 23, 2015
April				System OFF	System OFF
May				System OFF	System OFF
June				System OFF	System OFF
July				System OFF	System OFF
August				System OFF	System OFF
September				System OFF	System OFF
October				System OFF	System OFF
November				System OFF	System OFF
December				System OFF	System OFF
Total	**82**	**1,955**	**1,955**	**100%**	

TABLE 4

MONITOR WELL CONSTRUCTION DETAILS
PLANTATION PIPE LINE COMPANY
PEAIRS ROAD SITE
ZACHARY, LOUISIANA

Monitoring Well	Installation Date	Well Construction Material	Casing Slot Size	Total Depth (ft bgs)	Top of Casing Elevation (ft NGVD)	Ground Surface Elevation (ft NGVD)	Screen Interval (ft bgs)
MW-1	July 28, 2006	2" PVC	0.010"	25.0	79.25	79.5	15.0 - 25.0
MW-1R1	June 29, 2010	2" PVC	0.010"	25.0	79.36	79.5	17.0 - 25.0
MW-2	July 26, 2006	2" PVC	0.010"	24.0	78.55	78.9	14.0 - 24.0
MW-3	August 1, 2006	2" PVC	0.010"	25.0	79.09	79.2	15.0 - 25.0
MW-4	July 28, 2006	2" PVC	0.010"	26.0	79.45	79.4	16.0 - 26.0
MW-5	August 1, 2006	2" PVC	0.010"	24.0	78.44	78.3	14.0 - 24.0
MW-5R1	October 21, 2013	2" PVC	0.010"	24.0	78.44	78.3	14.0 - 24.0
MW-6	August 1, 2006	2" PVC	0.010"	24.0	78.90	79.0	14.0 - 24.0
MW-7	July 27, 2006	2" PVC	0.010"	25.0	79.08	79.2	15.0 - 25.0
MW-8	July 26, 2006	2" PVC	0.010"	25.0	78.53	78.7	15.0 - 25.0
MW-9	August 1, 2006	2" PVC	0.010"	25.0	78.42	78.5	15.0 - 25.0
MW-10	July 31, 2006	2" PVC	0.010"	25.0	78.37	78.5	15.0 - 25.0
MW-11	July 27, 2006	2" PVC	0.010"	25.0	77.99	78.0	15.0 - 25.0
PZ-1	July 28, 2006	2" PVC	0.010"	25.0	79.14	79.6	15.0 - 25.0

NOTES:

ft bgs = feet below ground surface.

ft NGVD = feet above National Geodetic Vertical Datum 1929

Monitor well MW-1 was plugged and abandoned on June 29, 2010 and replacement well MW-1R1 was installed.

Monitor well MW-5 was plugged and abandoned on October 21, 2013 and replacement well MW-5R1 was installed.

TABLE 5

GROUNDWATER ELEVATIONS AND FIELD MEASUREMENTS
PLANTATION PIPE LINE COMPANY
PEAIRS ROAD SITE
ZACHARY, LOUISIANA

Monitor Well ID	Date Sampled	Top of Casing Elevation (ft msl)	Depth to Groundwater (ft bTOC)	Groundwater Elevation (ft msl)	LNAPL Thickness (feet)	pH[3]	Specific Conductance (µS/cm)	Temperature (°F)	Dissolved Oxygen (mg/l)	ORP (mV)
PZ-1	August 7, 2006	79.14	22.00	57.14	NP[4]	5.88	950	71.1	NS[5]	NS
	January 31, 2007		21.21	57.93	NP	NS	NS	NS	NS	NS
	August 23, 2007		21.06	58.08	NP	NS	NS	NS	NS	NS
	November 8, 2007		21.36	57.78	NP	NS	NS	NS	NS	NS
	February 21, 2008		21.38	57.76	NP	5.73	790	69.4	0.40	NS
	April 29, 2008		20.95	58.19	NP	NS	NS	NS	NS	NS
	August 12, 2008		20.91	58.23	NP	8.51	830	72.7	0.10	-33.5
	October 3, 2008		20.95	58.19	NP	NS	NS	NS	NS	NS
	March 12, 2009		20.65	58.49	NP	5.79	860	74.0	0.87	97.6
	May 20, 2009		20.89	58.25	NP	NS	NS	NS	NS	NS
	August 14, 2009		20.90	58.24	NP	NS	NS	NS	NS	NS
	October 1, 2009		21.15	57.99	NP	4.94	890	79.7	0.70	14.2
	March 24, 2010		20.75	58.39	NP	5.83	950	68.8	0.11	48
	June 30, 2010		20.71	58.43	NP	NS	NS	NS	NS	NS
	October 1, 2010		20.60	58.54	NP	6.61	960	71.1	NS	NS
	October 25, 2010		20.85	58.29	NP	NS	NS	NS	NS	NS
	March 30, 2011		20.75	58.39	NP	NS	NS	NS	NS	NS
	April 7, 2011		20.90	58.24	NP	5.92	678	81.0	0.25	122
	August 22, 2011		21.10	58.04	NP	6.10	850	74.7	0.38	155
	October 20, 2011		21.25	57.89	NP	6.09	802	72.0	1.58	27.5
	March 15, 2012		21.24	57.90	NP	5.75	744	70.3	1.75	153.2
	March 20, 2012		21.07	58.07	NP	NS	NS	NS	NS	NS
	September 5, 2012		21.21	57.93	NP	5.89	822	72.1	1.10	-59.9
	November 8, 2012		21.19	57.95	NP	NS	NS	NS	NS	NS
	May 14, 2013		20.77	58.37	NP	5.87	910	70.4	NS	NS
	September 26, 2013		20.80	58.34	NP	3.15	910	73.9	NS	NS
	September 22, 2014		20.61	58.53	NP	6.11	800	71.8	NS	NS
	March 5, 2015		20.30	58.84	NP	5.57	920	64.4	NS	NS
	September 2, 2015		20.55	58.59	NP	6.96	760	71.4	NS	NS
MW-1	August 7, 2006	79.25	20.36	58.89	NP	6.25	0.29	71.6	NS	NS
	January 31, 2007		20.68	58.57	NP	6.64	0.03	67.2	NS	NS
	June 19, 2007		20.09	59.16	NP	NS	NS	NS	NS	NS
	August 23, 2007		19.58	59.67	NP	5.16	300	76.0	NS	NS
	November 8, 2007		20.06	59.19	NP	NS	NS	NS	NS	NS
	February 20, 2008		20.10	59.15	NP	4.85	580	71.4	5.50	NS
	April 29, 2008		21.02	58.23	NP	NS	NS	NS	NS	NS
	August 12, 2008		20.14	59.11	NP	8.54	970	72.9	0.80	-36.4
	October 3, 2008		21.12	58.13	NP	NS	NS	NS	NS	NS
	March 12, 2009		21.31	57.94	NP	3.70	780	77.0	1.78	216
	May 20, 2009		21.38	57.87	NP	NS	NS	NS	NS	NS
	August 14, 2009		20.22	59.03	NP	NS	NS	NS	NS	NS
	October 1, 2009		18.65	60.60	NP	3.22	1080	76.1	7.37	404.9
	March 24, 2010		21.05	58.20	NP	NS	NS	NS	NS	NS

TABLE 5

GROUNDWATER ELEVATIONS AND FIELD MEASUREMENTS
PLANTATION PIPE LINE COMPANY
PEAIRS ROAD SITE
ZACHARY, LOUISIANA

Monitor Well ID	Date Sampled	Top of Casing Elevation (ft msl)	Depth to Groundwater (ft bTOC)	Groundwater Elevation (ft msl)	LNAPL Thickness (feet)	pH[3]	Specific Conductance (µS/cm)	Temperature (°F)	Dissolved Oxygen (mg/l)	ORP (mV)
MW-1R1	June 30, 2010	79.25	22.88	55.67	NP	NS	NS	NS	NS	NS
	July 1, 2010		22.02	56.53	NP	7.59	350	75.8	9.75	NS
	October 1, 2010		20.50	58.05	NP	5.37	500	71.1	NS	NS
	October 25, 2010		20.46	58.09	NP	NS	NS	NS	NS	NS
	March 30, 2011		22.64	55.91	NP	NS	NS	NS	NS	NS
	April 7, 2011		22.51	56.04	NP	4.82	177	82.8	0.38	404
	August 23, 2011		22.85	55.70	NP	7.80	750	77.5	NS	NS
	October 20, 2011		23.51	55.04	NP	NS	NS	NS	NS	NS
	March 14, 2012		21.80	56.75	NP	NS	NS	NS	NS	NS
	March 20, 2012		19.98	58.57	NP	NS	NS	NS	NS	NS
	September 5, 2012		21.54	57.01	NP	NS	NS	NS	NS	NS
	November 8, 2012		19.88	58.67	NP	NS	NS	NS	NS	NS
	May 14, 2013		18.42	60.13	NP	NM[6]	NM	NM	NM	NM
	September 27, 2013		17.28	61.27	NP	3.01	290	76.9	NS	NS
	April 23, 2014		20.75	57.80	NP	3.93	320	69.0	NS	NS
	September 22, 2014		18.71	59.84	NP	NM	NM	NM	NS	NS
	March 5, 2015		14.20	64.35	NP	3.94	350	59.9	NS	NS
	September 2, 2015		18.71	59.84	NP	4.23	470	72.3	NS	NS
MW-2	August 7, 2006	78.55	19.79	58.76	NP	5.40	800	71.3	NS	NS
	January 31, 2007		19.78	58.77	NP	5.70	820	67.1	NS	NS
	June 19, 2007		19.16	59.39	NP	NS	NS	NS	NS	NS
	August 23, 2007		19.71	58.84	NP	5.40	78	72.1	NS	NS
	November 8, 2007		19.72	58.83	NP	NS	NS	NS	NS	NS
	February 20, 2008		19.64	58.91	NP	4.08	1240	72.5	0.70	NS
	April 29, 2008		19.57	58.98	NP	NS	NS	NS	NS	NS
	August 11, 2008		19.99	58.56	NP	4.91	NS	75.7	0.70	-86.6
	October 3, 2008		19.82	58.73	NP	NS	NS	NS	NS	NS
	March 12, 2009		19.13	59.42	NP	3.57	1270	65.5	1.71	222
	May 20, 2009		19.37	59.18	NP	NS	NS	NS	NS	NS
	August 14, 2009		19.87	58.68	NP	NS	NS	NS	NS	NS
	October 1, 2009		20.03	58.52	NP	3.84	1710	73.8	5.33	290.6
	March 24, 2010		19.48	59.07	NP	3.17	2260	68.2	0.08	406
	June 30, 2010		19.94	58.61	NP	NS	NS	NS	NS	NS
	September 30, 2010		19.95	58.60	NP	1.70	2720	70.8	NS	NS
	October 25, 2010		20.11	58.44	NP	NS	NS	NS	NS	NS
	March 30, 2011		20.48	58.07	NP	NS	NS	NS	NS	NS
	April 7, 2011		20.41	58.14	NP	3.93	1380	66.0	1.82	423
	August 23, 2011		20.65	57.90	NP	3.70	2600	71.4	3.60	181
	October 20, 2011		20.82	57.73	NP	3.26	2170	73.5	2.76	216.7
	March 14, 2012		21.02	57.53	NP	3.58	2634	78.1	3.70	198.7
	March 20, 2012		20.74	57.81	NP	NS	NS	NS	NS	NS
	September 5, 2012		20.91	57.64	NP	3.78	2311	75.0	3.09	-30.1
	November 8, 2012		20.70	57.85	NP	NS	NS	NS	NS	NS
	May 13, 2013		20.14	58.41	NP	3.72	2470	70.8	NS	NS
	September 26, 2013		20.09	58.46	NP	3.27	2610	73.1	NS	NS
	April 22, 2014		20.40	58.15	NP	3.33	2590	68.3	NS	NS
	September 22, 2014		19.89	58.66	NP	4.24	2400	71.4	NS	NS
	March 5, 2015		20.20	58.35	NP	2.82	4080	62.6	NS	NS
	September 2, 2015		19.78	58.77	NP	4.07	2780	72.5	NS	NS

TABLE 5

GROUNDWATER ELEVATIONS AND FIELD MEASUREMENTS
PLANTATION PIPE LINE COMPANY
PEAIRS ROAD SITE
ZACHARY, LOUISIANA

Monitor Well ID	Date Sampled	Top of Casing Elevation (ft msl)	Depth to Groundwater (ft bTOC)	Groundwater Elevation (ft msl)	LNAPL Thickness (feet)	pH[3]	Specific Conductance (µS/cm)	Temperature (°F)	Dissolved Oxygen (mg/l)	ORP (mV)
MW-3	August 7, 2006	79.09	20.96	58.94	1.08	NS	NS	75.7	NS	NS
	January 31, 2007		21.11	58.90	1.22	NS	NS	NS	NS	NS
	June 19, 2007		20.03	59.07	0.01	NS	NS	NS	NS	NS
	August 23, 2007		19.95	59.15	0.01	NS	NS	NS	NS	NS
	November 8, 2007		20.22	58.87	NP	NS	NS	NS	NS	NS
	February 21, 2008		20.60	58.49	NP	4.58	1170	69.6	0.20	NS
	April 29, 2008		20.52	58.57	NP	NS	NS	NS	NS	NS
	August 12, 2008		20.55	58.54	NP	7.85	1830	74.8	0.8	-13.6
	October 3, 2008		20.82	58.27	NP	NS	NS	NS	NS	NS
	March 12, 2009		20.45	58.64	NP	2.66	3310	74.0	1.27	276
	May 20, 2009		20.52	58.57	NP	NS	NS	NS	NS	NS
	August 14, 2009		20.72	58.37	NP	NS	NS	NS	NS	NS
	October 1, 2009		20.98	58.11	NP	4.44	3750	79.0	0.83	352.9
	March 24, 2010		21.34	57.75	NP	2.60	5105	68.5	0.16	415
	June 30, 2010		21.28	57.81	NP	NS	NS	NS	NS	NS
	October 1, 2010		19.60	59.49	NP	4.43	5040	76.2	NS	NS
	October 25, 2010		21.22	57.87	NP	NS	NS	NS	NS	NS
	March 30, 2011		22.01	57.08	NP	NS	NS	NS	NS	NS
	April 7, 2011		21.90	57.19	NP	2.79	5010	77.5	0.10	385
	August 23, 2011		21.80	57.29	NP	2.80	5700	72.0	0.50	181
	October 21, 2011		22.02	57.07	NP	4.22	5920	73.5	0.97	350.4
	March 15, 2012		22.39	56.70	NP	2.81	7469	70.5	0.95	320.8
	March 20, 2012		21.97	57.12	NP	NS	NS	NS	NS	NS
	September 5, 2012		21.51	57.58	NP	2.49	6403	71.6	1.43	399.7
	November 8, 2012		21.20	57.89	NP	NS	NS	NS	NS	NS
	May 14, 2013		21.05	58.04	NP	2.51	6970	71.1	NS	NS
	September 27, 2013		20.29	58.80	NP	3.45	6640	72.2	NS	NS
	April 23, 2014		21.04	58.05	NP	1.56	7140	68.6	NS	NS
	September 24, 2014		19.67	59.42	NP	2.94	6030	72.1	NS	NS
	March 5, 2015		20.24	58.85	NP	1.96	8610	61.3	NS	NS
	September 3, 2015		20.25	58.84	NP	2.64	5230	73.8	NS	NS

TABLE 5

GROUNDWATER ELEVATIONS AND FIELD MEASUREMENTS
PLANTATION PIPE LINE COMPANY
PEAIRS ROAD SITE
ZACHARY, LOUISIANA

Monitor Well ID	Date Sampled	Top of Casing Elevation (ft msl)	Depth to Groundwater (ft bTOC)	Groundwater Elevation (ft msl)	LNAPL Thickness (feet)	pH[3]	Specific Conductance (µS/cm)	Temperature (°F)	Dissolved Oxygen (mg/l)	ORP (mV)
MW-4	August 7, 2006	79.45	20.76	58.69	NP	5.95	700	71.6	NS	NS
	January 31, 2007		21.73	57.72	NP	6.43	220	65.7	NS	NS
	June 19, 2007		21.58	57.87	NP	NS	NS	NS	NS	NS
	August 23, 2007		20.81	58.64	NP	5.10	33	74.9	NS	NS
	November 8, 2007		20.86	58.59	NP	NS	NS	NS	NS	NS
	February 20, 2008		20.90	58.55	NP	5.21	300	69.8	2.20	NS
	April 29, 2008		22.19	57.26	NP	NS	NS	NS	NS	NS
	August 12, 2008		21.83	57.62	NP	8.48	50	74.3	0.70	-27.5
	October 3, 2008		20.84	58.61	NP	NS	NS	NS	NS	NS
	March 12, 2009		20.89	58.56	NP	5.02	40	70.3	1.78	139.8
	May 20, 2009		22.74	56.71	NP	NS	NS	NS	NS	NS
	August 14, 2009		22.18	57.27	NP	NS	NS	NS	NS	NS
	October 1, 2009		22.75	56.70	NP	4.90	40	78.4	4.31	-902.8
	March 24, 2010		22.98	56.47	NP	5.07	610	69.0	0.09	74.2
	June 30, 2010		23.26	56.19	NP	NS	NS	NS	NS	NS
	October 1, 2010		23.15	56.30	NP	5.39	30	69.5	NS	NS
	October 25, 2010		24.16	55.29	NP	NS	NS	NS	NS	NS
	March 30, 2011		22.53	56.92	NP	NS	NS	NS	NS	NS
	April 7, 2011		24.45	55.00	NP	6.31	43	72.5	5.80	138
	August 22, 2011		23.86	55.59	NP	6.00	50	74.0	8.90	156
	October 20, 2011		23.38	56.07	NP	5.88	36	73.2	9.07	187
	March 15, 2012		DRY	NS	NP	NS	NS	NS	NS	NS
	March 20, 2012		23.06	56.39	NP	NS	NS	NS	NS	NS
	September 5, 2012		21.20	58.25	NP	5.66	47	71.8	6.71	-16.4
	November 8, 2012		21.73	57.72	NP	NS	NS	NS	NS	NS
	May 14, 2013		22.30	57.15	NP	5.65	10	69.0	NS	NS
	September 27, 2013		21.50	57.95	NP	3.57	30	71.3	NS	NS
	April 23, 2014		23.11	56.34	NP	6.35	10	68.1	NS	NS
	September 22, 2014		Dry[7]	Dry	NP	NS	NS	NS	NS	NS
	March 5, 2015		22.95	56.50	NP	5.85	20	NS	NS	NS
	September 2, 2015		21.22	58.23	NP	5.89	50	71.6	NS	NS

TABLE 5

GROUNDWATER ELEVATIONS AND FIELD MEASUREMENTS
PLANTATION PIPE LINE COMPANY
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Monitor Well ID	Date Sampled	Top of Casing Elevation (ft msl)	Depth to Groundwater (ft bTOC)	Groundwater Elevation (ft msl)	LNAPL Thickness (feet)	pH[3]	Specific Conductance (µS/cm)	Temperature (°F)	Dissolved Oxygen (mg/l)	ORP (mV)
MW-5	August 7, 2006	78.44	20.49	58.87	1.22	NS	NS	NS	NS	NS
	January 31, 2007		20.36	58.78	0.93	NS	NS	NS	NS	NS
	June 19, 2007		20.20	58.84	0.80	NS	NS	NS	NS	NS
	August 23, 2007		19.90	58.73	0.25	NS	NS	NS	NS	NS
	November 8, 2007		20.66	57.78	NP	NS	NS	NS	NS	NS
	February 21, 2008		21.02	57.42	NP	5.65	1010	69.4	0.10	NS
	April 29, 2008		20.03	58.41	NP	NS	NS	NS	NS	NS
	August 12, 2008		21.14	57.30	0.01	6.88	2650	75.4	1.30	34.1
	October 3, 2008		20.83	57.61	NP	NS	NS	NS	NS	NS
	March 12, 2009		20.45	57.99	NP	2.88	5080	75.9	2.41	266
	May 20, 2009		20.26	58.18	NP	NS	NS	NS	NS	NS
	August 14, 2009		20.25	58.19	NP	NS	NS	NS	NS	NS
	October 1, 2009		20.91	57.53	NP	4.12	3810	78.4	0.34	262.7
	March 24, 2010		21.12	57.32	NP	5.02	478	69.1	0.19	9.3
	June 30, 2010		20.68	57.76	NP	NS	NS	NS	NS	NS
	October 1, 2010		20.18	58.26	NP	4.74	1020	73.0	NS	NS
	October 25, 2010		20.63	57.81	NP	NS	NS	NS	NS	NS
	March 30, 2011		NM	NM	NP	NS	NS	NS	NS	NS
	April 7, 2011		21.10	57.34	NP	4.47	615	75.9	0.11	208
	August 23, 2011		21.28	57.16	NP	6.10	540	78.8	0.60	176
	October 21, 2011		21.40	57.04	NP	4.11	1500	71.2	1.26	277
	March 15, 2012		NS	NS	NP	NS	NS	NS	NS	NS
	March 20, 2012		21.72	56.72	NP	3.18	1520	72.4	NS	NS
	May 30, 2012		21.51	56.93	NP	3.21	2404	71.6	0.96	2017.1
	September 5, 2012		20.99	57.45	NP	2.94	3575	75.6	1.79	352.8
	November 8, 2012		21.53	56.91	NP	3.21	4240	72.0	NS	NS
	March 27, 2013		20.15	58.29	NP	2.06	7870	68.5	NS	NS
	May 14, 2013		22.72	55.72	NP	2.36	4850	79.8	NS	NS
	June 6, 2013		NS	NS	NP	1.48	6460	72.1	NS	NS
	September 27, 2013		21.87	56.57	NP	3.46	6020	77.3	NS	NS
MW-5-R1	November 12, 2013	78.44	20.59	57.85	NP	4.21	8260	73.0	NS	NS
	March 31, 2014		20.08	58.36	NP	4.45	1470	74.5	NS	NS
	April 23, 2014		20.69	57.75	NP	2.68	3040	70.7	NS	NS
	September 24, 2014		20.30	58.14	NP	2.72	6990	73.2	NS	NS
	March 5, 2015		22.07	56.37	NP	1.87	8390	63.3	NS	NS
	September 3, 2015		19.80	58.64	NP	2.90	7070	72.9	NS	NS

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Monitor Well ID	Date Sampled	Top of Casing Elevation (ft msl)	Depth to Groundwater (ft bTOC)	Groundwater Elevation (ft msl)	LNAPL Thickness (feet)	pH[3]	Specific Conductance (µS/cm)	Temperature (°F)	Dissolved Oxygen (mg/l)	ORP (mV)
MW-6	August 7, 2006	78.90	19.98	58.93	0.01	NS	NS	NS	NS	NS
	January 31, 2007		20.06	58.85	0.01	NS	NS	NS	NS	NS
	June 19, 2007		19.38	59.53	0.01	NS	NS	NS	NS	NS
	August 23, 2007		19.77	59.13	NP	5.58	469	74.9	NS	NS
	November 8, 2007		19.94	58.96	NP	NS	NS	NS	NS	NS
	February 21, 2008		20.10	58.80	NP	5.88	1180	72.1	0.50	NS
	April 29, 2008		20.59	58.31	NP	NS	NS	NS	NS	NS
	August 12, 2008		20.56	58.34	NP	7.97	1400	77.0	0.90	-16.4
	October 3, 2008		20.79	58.11	NP	NS	NS	NS	NS	NS
	March 12, 2009		21.53	57.37	NP	5.88	1310	75.0	2.07	92
	May 20, 2009		20.49	58.41	NP	NS	NS	NS	NS	NS
	August 14, 2009		20.75	58.15	NP	NS	NS	NS	NS	NS
	October 1, 2009		21.01	57.89	NP	4.07	1760	79.3	0.35	61.4
	March 24, 2010		21.15	57.75	NP	4.03	3719	70.1	0.17	238
	June 30, 2010		20.99	57.91	NP	NS	NS	NS	NS	NS
	October 1, 2010		21.05	57.85	NP	3.33	2540	72.7	NS	NS
	October 25, 2010		21.08	57.82	NP	NS	NS	NS	NS	NS
	March 30, 2011		21.65	57.25	NP	NS	NS	NS	NS	NS
	April 7, 2011		21.43	57.47	NP	4.18	1880	75.6	0.12	193
	August 23, 2011		21.59	57.31	NP	4.80	2000	75.6	2.30	180
	October 21, 2011		21.96	56.94	NP	5.33	1800	72.2	NS	NS
	March 15, 2012		22.12	56.78	NP	3.78	1872	74.1	1.73	270.3
	March 20, 2012		22.31	56.59	NP	NS	NS	NS	NS	NS
	May 30, 2012		21.03	57.87	NP	3.94	1792	71.6	1.50	84.3
	September 5, 2012		21.11	57.79	NP	3.83	2154	76.3	0.93	-11.4
	November 8, 2012		21.23	57.67	NP	NS	NS	NS	NS	NS
	May 14, 2013		20.71	58.19	NP	3.48	2800	73.6	NS	NS
	September 27, 2013		20.76	58.14	NP	3.26	3890	73.7	NS	NS
	April 23, 2014		20.41	58.49	NP	1.37	8750	69.4	NS	NS
	September 24, 2014		20.72	58.18	NP	3.82	2970	73.9	NS	NS
	March 5, 2015		22.73	56.17	NP	3.14	3150	63.7	NS	NS
	September 3, 2015		20.13	58.77	NP	3.26	2720	75.4	NS	NS

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Monitor Well ID	Date Sampled	Top of Casing Elevation (ft msl)	Depth to Groundwater (ft bTOC)	Groundwater Elevation (ft msl)	LNAPL Thickness (feet)	pH[3]	Specific Conductance (µS/cm)	Temperature (°F)	Dissolved Oxygen (mg/l)	ORP (mV)
MW-7	August 7, 2006	79.08	20.32	58.76	NP[4]	5.65	170	71.7	NS	NS
	January 31, 2007		20.18	58.90	NP	5.68	150	66.5	NS	NS
	June 19, 2007		20.15	58.93	NP	NS[5]	NS	NS	NS	NS
	August 23, 2007		20.22	58.86	NP	5.43	91	71.9	NS	NS
	November 8, 2007		20.62	58.46	NP	NS	NS	NS	NS	NS
	February 20, 2008		21.19	57.89	NP	5.58	110	69.6	0.80	NS
	April 29, 2008		20.49	58.59	NP	NS	NS	NS	NS	NS
	August 11, 2008		21.39	57.69	NP	4.41	150	75.0	0.80	-52.6
	October 3, 2008		20.70	58.38	NP	NS	NS	NS	NS	NS
	March 12, 2009		20.72	58.36	NP	5.48	140	68.3	0.98	114.8
	May 20, 2009		20.73	58.35	NP	NS	NS	NS	NS	NS
	August 14, 2009		20.95	58.13	NP	NS	NS	NS	NS	NS
	October 1, 2009		21.21	57.87	NP	5.56	160	71.2	0.94	-673.4
	March 24, 2010		20.98	58.10	NP	5.95	206	67.9	0.08	139
	June 30, 2010		20.72	58.36	NP	NS	NS	NS	NS	NS
	October 1, 2010		20.50	58.58	NP	4.61	260	69.9	NS	NS
	October 25, 2010		20.46	58.62	NP	NS	NS	NS	NS	NS
	March 30, 2011		21.28	57.80	NP	NS	NS	NS	NS	NS
	April 7, 2011		21.09	57.99	NP	5.66	188	70.9	2.37	164
	August 22, 2011		21.58	57.50	NP	5.20	220	71.4	4.10	152
	October 20, 2011		21.75	57.33	NP	NS	NS	NS	NS	NS
	March 15, 2012		21.86	57.22	NP	5.28	234	69.1	6.98	269.7
	March 20, 2012		21.30	57.78	NP	NS	NS	NS	NS	NS
	September 5, 2012		21.12	57.96	NP	5.52	136	71.1	4.95	62.9
	November 8, 2012		21.50	57.58	NP	NS	NS	NS	NS	NS
	May 14, 2013		20.38	58.70	NP	5.40	140	69.4	NS	NS
	September 26, 2013		20.18	58.90	NP	2.64	170	71.7	NS	NS
	April 22, 2014		20.78	58.30	NP	4.95	220	67.9	NS	NS
	September 22, 2014		20.82	58.26	NP	6.14	210	72.7	NS	NS
	March 5, 2015		21.09	57.99	NP	5.20	310	62.4	NS	NS
	September 2, 2015		20.35	58.73	NP	5.76	220	71.6	NS	NS

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Monitor Well ID	Date Sampled	Top of Casing Elevation (ft msl)	Depth to Groundwater (ft bTOC)	Groundwater Elevation (ft msl)	LNAPL Thickness (feet)	pH[3]	Specific Conductance (µS/cm)	Temperature (°F)	Dissolved Oxygen (mg/l)	ORP (mV)
MW-8	August 7, 2006	78.53	19.76	58.77	NP	5.74	180	71.7	NS	NS
	January 31, 2007		19.73	58.80	NP	5.65	180	67.2	NS	NS
	June 19, 2007		19.64	58.89	NP	NS	NS	NS	NS	NS
	August 23, 2007		19.60	58.93	NP	5.03	149	74.5	NS	NS
	November 8, 2007		20.46	58.07	NP	NS	NS	NS	NS	NS
	February 20, 2008		20.58	57.95	NP	3.04	550	71.2	2.20	NS
	April 29, 2008		19.97	58.56	NP	NS	NS	NS	NS	NS
	August 11, 2008		19.93	58.60	NP	4.49	350	76.1	0.60	-73.6
	October 3, 2008		20.06	58.47	NP	NS	NS	NS	NS	NS
	March 12, 2009		19.93	58.60	NP	3.17	560	66.8	1.18	244
	May 20, 2009		19.95	58.58	NP	NS	NS	NS	NS	NS
	August 14, 2009		19.93	58.60	NP	NS	NS	NS	NS	NS
	October 1, 2009		20.53	58.00	NP	3.19	650	75.2	0.71	438.9
	March 24, 2010		20.22	58.31	NP	3.58	572	69.4	0.08	359.6
	June 30, 2010		20.10	58.43	NP	NS	NS	NS	NS	NS
	September 30, 2010		20.17	58.36	NP	2.21	460	72.6	NS	NS
	October 25, 2010		20.14	58.39	NP	NS	NS	NS	NS	NS
	March 30, 2011		20.71	57.82	NP	NS	NS	NS	NS	NS
	April 7, 2011		20.37	58.16	NP	3.22	668	70.2	0.20	377
	August 22, 2011		20.90	57.63	NP	3.40	720	71.6	0.30	154
	October 20, 2011		21.06	57.47	NP	3.12	656	75.1	90	328.1
	March 14, 2012		21.11	57.42	NP	3.08	1032	72.7	0.77	259.2
	March 20, 2012		21.31	57.22	NP	NS	NS	NS	NS	NS
	September 5, 2012		20.71	57.82	NP	3.46	842	71.8	1.14	78.8
	November 8, 2012		20.79	57.74	NP	NS	NS	NS	NS	NS
	May 13, 2013		20.56	57.97	NP	3.15	1140	71.0	NS	NS
	September 26, 2013		19.58	58.95	NP	2.85	1090	73.0	NS	NS
	April 22, 2014		20.45	58.08	NP	3.04	730	68.5	NS	NS
	September 22, 2014		19.51	59.02	NP	3.71	750	74.3	NS	NS
	March 5, 2015		20.50	58.03	NP	2.97	960	62.6	NS	NS
	September 2, 2015		19.83	58.70	NP	3.74	970	72.9	NS	NS

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Monitor Well ID	Date Sampled	Top of Casing Elevation (ft msl)	Depth to Groundwater (ft bTOC)	Groundwater Elevation (ft msl)	LNAPL Thickness (feet)	pH[3]	Specific Conductance (µS/cm)	Temperature (°F)	Dissolved Oxygen (mg/l)	ORP (mV)
MW-9	August 7, 2006	78.42	20.68	58.51	1.02	NS	NS	NS	NS	NS
	January 31, 2007		20.55	58.67	1.07	NS	NS	NS	NS	NS
	June 19, 2007		19.78	58.75	0.15	NS	NS	NS	NS	NS
	August 23, 2007		19.75	58.68	0.01	NS	NS	NS	NS	NS
	November 8, 2007		20.44	57.98	NP	NS	NS	NS	NS	NS
	February 21, 2008		20.90	57.52	NP	2.01	3440	70.5	1.80	NS
	April 29, 2008		19.96	58.46	NP	NS	NS	NS	NS	NS
	August 12, 2008		20.92	57.50	NP	8.20	4970	74.1	0.50	-23.6
	October 3, 2008		19.94	58.48	NP	NS	NS	NS	NS	NS
	March 12, 2009		19.84	58.58	NP	2.14	6830	74.5	3.09	306
	May 20, 2009		19.89	58.53	NP	NS	NS	NS	NS	NS
	August 14, 2009		20.15	58.27	NP	NS	NS	NS	NS	NS
	October 1, 2009		20.35	58.07	NP	4.30	7600	76.1	1.09	519.9
	March 24, 2010		20.14	58.28	NP	2.18	7856	68.9	0.14	500.2
	June 30, 2010		20.12	58.30	NP	NS	NS	NS	NS	NS
	October 1, 2010		20.11	58.31	NP	1.12	1250	73.5	NS	NS
	October 25, 2010		20.67	57.75	NP	NS	NS	NS	NS	NS
	March 30, 2011		20.45	57.97	NP	NS	NS	NS	NS	NS
	April 7, 2011		20.51	57.91	NP	2.10	5340	77.4	2.09	533
	August 23, 2011		21.15	57.27	NP	1.80	6100	71.2	1.80	182
	October 20, 2011		21.30	57.12	NP	NS	NS	NS	NS	NS
	March 15, 2012		21.36	57.06	NP	2.22	6485	70.3	2.17	498.9
	March 20, 2012		20.96	57.46	NP	NS	NS	NS	NS	NS
	September 5, 2012		20.68	57.74	NP	3.31	822	72.5	1.03	110.7
	November 8, 2012		20.64	57.78	NP	NS	NS	NS	NS	NS
	May 14, 2013		20.31	58.11	NP	2.68	5660	71.6	NS	NS
	September 27, 2013		19.51	58.91	NP	3.30	5560	73.5	NS	NS
	April 23, 2014		20.20	58.22	NP	1.67	4950	68.2	NS	NS
	September 24, 2014		19.65	58.77	NP	2.98	4380	70.9	NS	NS
	March 5, 2015		20.50	57.92	NP	2.36	6910	51.4	NS	NS
	September 2, 2015		19.76	58.66	NP	2.93	4850	71.8	NS	NS

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Monitor Well ID	Date Sampled	Top of Casing Elevation (ft msl)	Depth to Groundwater (ft bTOC)	Groundwater Elevation (ft msl)	LNAPL Thickness (feet)	pH[3]	Specific Conductance (µS/cm)	Temperature (°F)	Dissolved Oxygen (mg/l)	ORP (mV)
MW-10	August 7, 2006	78.37	19.65	58.72	NP	5.67	0.44	71.4	NS	NS
	January 31, 2007		19.65	58.72	NP	5.69	0.26	67.4	NS	NS
	June 19, 2007		19.61	58.76	NP	NS	NS	NS	NS	NS
	August 23, 2007		19.96	58.41	NP	5.39	152	73.9	NS	NS
	November 8, 2007		20.22	58.15	NP	NS	NS	NS	NS	NS
	February 20, 2008		20.61	57.76	NP	4.93	360	70.0	0.4	NS
	April 29, 2008		19.92	58.45	NP	NS	NS	NS	NS	NS
	August 11, 2008		20.41	57.96	NP	4.12	1140	75.9	0.60	-56.5
	October 3, 2008		19.59	58.78	NP	NS	NS	NS	NS	NS
	March 12, 2009		19.92	58.45	NP	3.51	1280	68.1	0.50	225
	May 20, 2009		19.89	58.48	NP	NS	NS	NS	NS	NS
	August 14, 2009		20.45	57.92	NP	NS	NS	NS	NS	NS
	October 1, 2009		20.47	57.90	NP	5.74	3040	71.8	0.16	147.4
	March 24, 2010		19.77	58.60	NP	2.46	5490	68.8	0.11	338.9
	June 30, 2010		19.86	58.51	NP	NS	NS	NS	NS	NS
	September 30, 2010		19.91	58.46	NP	2.03	3210	71.0	NS	NS
	October 25, 2010		20.01	58.36	NP	NS	NS	NS	NS	NS
	March 30, 2011		20.31	58.06	NP	NS	NS	NS	NS	NS
	April 7, 2011		20.01	58.36	NP	2.23	4710	70.5	0.21	359
	August 23, 2011		20.72	57.65	NP	1.60	7400	70.8	0.20	182
	October 20, 2011		20.89	57.48	NP	2.16	8110	73.7	0.44	386.7
	March 14, 2012		20.82	57.55	NP	2.30	7410	71.6	0.80	361.4
	March 20, 2012		20.55	57.82	NP	NS	NS	NS	NS	NS
	September 5, 2012		20.54	57.83	NP	2.31	4173	70.7	1.11	359.8
	November 8, 2012		20.60	57.77	NP	NS	NS	NS	NS	NS
	May 13, 2013		19.73	58.64	NP	2.45	3050	70.7	NS	NS
	September 26, 2013		19.88	58.49	NP	3.02	2990	71.5	NS	NS
	April 22, 2014		20.13	58.24	NP	2.16	1720	67.2	NS	NS
	September 22, 2014		19.90	58.47	NP	3.18	2000	70.7	NS	NS
	March 5, 2015		20.27	58.10	NP	1.75	3420	61.7	NS	NS
	September 2, 2015		19.81	58.56	NP	3.07	2140	71.2	NS	NS

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MW-11	August 7, 2006	77.99	19.34	58.65	NP	6.00	250	71.8	NS	NS
	January 31, 2007		19.28	58.71	NP	6.22	250	67.2	NS	NS
	June 19, 2007		19.31	58.68	NP	NS	NS	NS	NS	NS
	August 23, 2007		19.62	58.37	NP	5.78	134	71.9	NS	NS
	November 8, 2007		20.22	57.77	NP	NS	NS	NS	NS	NS
	February 20, 2008		19.81	58.18	NP	6.08	160	70.9	0.10	NS
	April 29, 2008		19.62	58.37	NP	NS	NS	NS	NS	NS
	August 11, 2008		19.93	58.06	NP	4.55	310	74.1	0.50	-88.5
	October 3, 2008		19.69	58.30	NP	NS	NS	NS	NS	NS
	March 12, 2009		19.68	58.31	NP	5.55	240	67.4	0.42	108.8
	May 20, 2009		19.51	58.48	NP	NS	NS	NS	NS	NS
	August 14, 2009		19.90	58.09	NP	NS	NS	NS	NS	NS
	October 1, 2009		20.20	57.79	NP	6.33	290	74.5	0.17	-259.1
	March 24, 2010		19.28	58.71	NP	4.59	427	68.8	0.13	208.7
	June 30, 2010		19.53	58.46	NP	NS	NS	NS	NS	NS
	September 30, 2010		19.61	58.38	NP	4.08	500	71.0	NS	NS
	October 25, 2010		19.82	58.17	NP	NS	NS	NS	NS	NS
	March 30, 2011		20.31	57.68	NP	NS	NS	NS	NS	NS
	April 7, 2011		19.81	58.18	NP	5.06	392	70.2	0.70	265
	August 23, 2011		20.33	57.66	NP	5.00	600	70.7	2.00	182
	October 20, 2011		20.51	57.48	NP	4.92	451	74.8	2.59	124.5
	March 14, 2012		20.34	57.65	NP	5.09	487	70.9	5.01	167.4
	March 20, 2012		20.17	57.82	NP	NS	NS	NS	NS	NS
	September 5, 2012		20.21	57.78	NP	4.94	482	71.6	4.06	25.1
	November 8, 2012		20.28	57.71	NP	NS	NS	NS	NS	NS
	May 13, 2013		19.33	58.66	NP	3.93	720	71.6	NS	NS
	September 26, 2013		19.73	58.26	NP	2.95	500	72.1	NS	NS
	April 22, 2014		19.89	58.10	NP	3.46	570	68.8	NS	NS
	September 22, 2014		19.43	58.56	NP	4.43	650	74.1	NS	NS
	March 5. 2015		19.56	58.43	NP	3.25	640	62.2	NS	NS
	September 2, 2015		19.48	58.51	NP	4.22	730	71.8	NS	NS

NOTES:

ft msl = feet above mean sea level.
ft bTOC = feet below top of casing.
pH is standard units.
µS/cm = microsiemens per centimeter
°F = degrees Farenheit
mg/l = milligrams per liter
mV = millivolts
NP = No free product (LNAPL) observed in well.
NS = No sample collected.

TABLE 6

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS FOR TPH-GRO, BTEX AND MTBE PLANTATION PIPE LINE COMPANY PEAIRS ROAD SITE ZACHARY, LOUISIANA

Monitor Well Location	Sample Date	BTEX and MTBE by Method 8021B or Method 8260B (mg/l)					TPH-GRO by Method 8015B (mg/l)
		Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE	
MW-1	August 7, 2006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.1
	January 31, 2007	<0.001	<0.001	<0.001	<0.001	<0.008	<0.1
	August 23, 2007	<0.001	<0.001	<0.001	<0.001	<0.008	NA
	February 20, 2008	<0.001	<0.001	<0.001	<0.001	0.0021	NA
	August 12, 2008	<0.001	<0.001	<0.001	<0.001	<0.008	NA
	March 12, 2009	<0.001	<0.001	<0.001	<0.001	<0.008	NA
	October 8, 2009	<0.005	<0.005	<0.005	<0.005	<0.005	NA
	March 24, 2010	NS	NS	NS	NS	NS	NS
MW-1R1	July 1, 2010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.1
Duplicate	July 1, 2010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.1
	October 1, 2010	<0.005	<0.005	<0.005	<0.01	<0.005	<0.1
	April 7, 2011	<0.005	<0.005	<0.005	<0.01	<0.005	<0.1
	August 22, 2011	<0.005	<0.005	<0.005	<0.01	<0.005	NA
	March 14, 2012	NS	NS	NS	NS	NS	NS
	September 5, 2012	<0.005	<0.005	<0.005	<0.015	<0.005	NA
	May 14, 2013	<0.005	<0.005	<0.005	<0.015	<0.005	NA
	September 27, 2013	<0.005	<0.005	<0.005	<0.015	<0.005	NA
	April 23, 2014	<0.001	<0.001	<0.001	<0.003	<0.001	NA
	September 22, 2014	<0.001	<0.001	<0.001	<0.003	<0.001	NA
	March 5, 2015	<0.001	<0.001	<0.001	<0.003	<0.001	<0.1
	September 2, 2015	<0.005	<0.005	<0.005	<0.015	<0.005	<0.1
MW-2	August 7, 2006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.1
Duplicate	August 7, 2006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.1
	January 31, 2007	<0.001	<0.001	<0.001	<0.001	<0.008	<0.1
	August 23, 2007	0.074	0.22	0.022	0.091	0.014	NA
	February 20, 2008	0.01	0.0047	0.025	0.051	0.51	NA
	August 11, 2008	0.0087	<0.001	<0.001	<0.001	0.250	NA
	March 12, 2009	<0.001	<0.001	<0.001	<0.001	0.190	NA
	October 1, 2009	<0.005	<0.005	<0.005	<0.005	0.042	NA
	March 24, 2010	<0.005	<0.005	<0.005	<0.005	0.044	<0.1
	September 30, 2010	<0.005	<0.005	<0.005	<0.01	0.016	<0.1
	April 7, 2011	<0.005	<0.005	<0.005	<0.01	0.029	<0.1
	August 22, 2011	<0.005	<0.005	<0.005	<0.01	0.025	NA
	October 20, 2011	<0.005	<0.005	<0.005	<0.02	0.032	NA
	March 14, 2012	<0.005	<0.005	<0.005	<0.015	0.017	NA
	September 4, 2012	<0.005	<0.005	<0.005	<0.015	0.00944	NA
	May 13, 2013	<0.005	<0.005	<0.005	<0.015	0.011	NA
	September 26, 2013	<0.005	<0.005	<0.005	<0.015	0.011	NA
	April 22, 2014	<0.001	<0.001	<0.001	<0.003	0.00531	NA
	September 22, 2014	<0.001	<0.001	<0.001	<0.003	0.00639	NA
	March 5, 2015	<0.001	<0.001	<0.001	<0.003	0.003	<0.1
	September 2, 2015	<0.005	<0.005	<0.005	<0.015	0.0056	<0.1

TABLE 6

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS FOR TPH-GRO, BTEX AND MTBE PLANTATION PIPE LINE COMPANY PEAIRS ROAD SITE ZACHARY, LOUISIANA

Monitor Well Location	Sample Date	BTEX and MTBE by Method 8021B or Method 8260B (mg/l)					TPH-GRO by Method 8015B (mg/l)
		Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE	
MW-3	August 7, 2006	Samples were not collected due to LNAPL in the well.					
	January 31, 2007						
	August 23, 2007						
	February 21, 2008	**1.5**	7.5	1.2	8.5	45	NA
	August 11, 2008	**2.3**	3.4	0.71	4	43	NA
	March 12, 2009	0.270	2.6	0.740	4.9	5.7	NA
	October 1, 2009	**1.1**	3.2	1.0	5.5	13	NA
	March 24, 2010	<0.25	1.7	0.59	3.4	6.1	30
	October 1, 2010	0.518	5.19	1.07	5.44	8.55	48.4
	April 7, 2011	0.43	2.18	0.866	4.44	6.87	37.5
	June 29, 2011	0.416	1.75	0.543	2.84	8.63	NA
	August 23, 2011	<0.005	2.36	0.763	4.14	8.03	NA
Duplicate	August 23, 2011	<0.005	2.53	0.812	4.35	8.31	NA
	October 21, 2011	0.285	0.639	0.304	1.47	5.52	NA
	March 15, 2012	0.292	0.917	0.505	2.46	4.40	NA
	September 5, 2012	<0.250	0.720	0.411	1.96	3.97	NA
	May 14, 2013	0.134	0.562	0.377	1.79	2.53	NA
	September 27, 2013	0.188	0.568	0.484	2.62	2.34	NA
	April 23, 2014	0.100	0.302	0.379	1.88	1.13	NA
	September 24, 2014	0.0538	0.133	0.150	0.520	0.844	NA
	December 11, 2014	0.129	0.259	0.282	1.480	1.590	NA
	March 5, 2015	0.111	0.162	0.111	0.531	2.380	4.76
	September 3, 2015	0.0593	0.152	0.304	1.54	0.848	10.0
MW-4	August 7, 2006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.1
	January 31, 2007	<0.001	<0.001	<0.001	<0.001	<0.008	<0.1
	August 23, 2007	<0.001	<0.001	<0.001	<0.001	<0.008	NA
	February 20, 2008	<0.001	<0.001	<0.001	<0.001	<0.001	NA
	August 12, 2008	<0.001	<0.001	<0.001	<0.001	<0.008	NA
	March 12, 2009	<0.001	<0.001	<0.001	<0.001	<0.008	NA
	October 1, 2009	<0.005	<0.005	<0.005	<0.005	<0.005	NA
	March 24, 2010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.1
Duplicate	March 24, 2010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.1
	October 1, 2010	<0.005	<0.005	<0.005	<0.01	<0.005	<0.1
	April 7, 2011	<0.005	<0.005	<0.005	<0.01	<0.005	<0.1
	August 22, 2011	<0.005	<0.005	<0.005	<0.01	<0.005	NA
	October 20, 2011	<0.005	<0.005	<0.005	<0.02	<0.005	NA
	March 15, 2012	<0.005	<0.005	<0.005	<0.015	<0.005	NA
	September 5, 2012	<0.005	<0.005	<0.005	<0.015	<0.005	NA
	May 14, 2013	<0.005	<0.005	<0.005	<0.015	<0.005	NA
	September 27, 2013	<0.005	<0.005	<0.005	<0.015	<0.005	NA
	April 23, 2014	<0.001	<0.001	<0.001	<0.003	<0.001	NA
	September 22, 2014	NS	NS	NS	NS	NS	NS
	March 5, 2015	<0.001	<0.001	<0.001	<0.003	<0.001	<0.1
	September 2, 2015	<0.005	<0.005	<0.005	<0.015	<0.005	<0.1

TABLE 6

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS FOR
TPH-GRO, BTEX AND MTBE
PLANTATION PIPE LINE COMPANY
PEAIRS ROAD SITE
ZACHARY, LOUISIANA

Monitor Well Location	Sample Date	BTEX and MTBE by Method 8021B or Method 8260B (mg/l)					TPH-GRO by Method 8015B (mg/l)
		Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE	
MW-5	August 7, 2006	Sample was not collected due to LNAPL in the well.					
	January 31, 2007						
	August 23, 2007						
	February 21, 2008	**15**	48	23	81	170	NA
	August 12, 2008	**15**	40	3	14.4	110	NA
	March 12, 2009	**4.8**	21	4.1	21.9	34	NA
	October 1, 2009	**3.7**	18	2.5	13.8	26	NA
	March 24, 2010	**2.2**	17	9	20.7	4.1	260
	October 1, 2010	**2.55**	25.5	4.17	21.8	9.84	163
Duplicate	October 1, 2010	**2.4**	26.6	5.04	26.6	9.22	135
	April 7, 2011	**2.27**	19.9	4.01	21.4	13.2	155
Duplicate	April 7, 2011	**2.34**	20.2	3.7	20.1	13.3	133
	June 29, 2011	**1.6**	12.2	1.66	8.84	12.5	NA
	August 23, 2011	**1.35**	16.5	1.96	10.7	7.91	NA
	October 21, 2011	**1.32**	13.5	2.28	12.1	10.4	NA
	March 20, 2012	**2.59**	18.8	2.52	13.5	21.8	NA
	May 30, 2012	**1.58**	12.2	1.63	8.70	18.4	NA
	September 5, 2012	**2.24**	16.0	2.42	13.3	20.2	NA
	November 8, 2012	**1.76**	17.9	2.98	16.8	17.1	NA
Duplicate	November 8, 2012	**1.61**	17.4	2.73	15.6	17.8	NA
	March 27, 2013	**0.823**	8.76	1.56	8.30	6.54	NA
Duplicate	March 27, 2013	0.770	8.22	1.51	7.97	5.10	NA
	May 14, 2013	0.208	2.21	0.260	1.48	3.80	NA
Duplicate	May 14, 2013	0.531	4.91	0.647	3.76	7.69	NA
	June 6, 2013	0.628	7.98	1.46	8.12	5.23	NA
Duplicate	June 6, 2013	0.593	7.58	1.50	8.15	4.99	NA
	September 27, 2013	**1.16**	11.7	2.41	13.4	9.43	NA
Duplicate	September 27, 2013	**1.18**	12.6	2.16	12.4	9.96	NA
MW-5R1	November 12, 2013	0.124	0.226	0.028	0.134	2.79	NA
Duplicate	November 12, 2013	0.174	0.302	0.036	0.168	3.65	NA
	March 31, 2014	0.149	0.301	0.0358	0.158	4.14	NA
	April 23, 2014	0.280	0.670	0.132	0.848	5.60	NA
Duplicate	April 23, 2014	0.297	0.666	0.123	0.791	5.93	NA
	September 24, 2014	0.106	0.232	0.0238	0.108	2.82	NA
Duplicate	September 24, 2014	0.134	0.193	0.0304	0.154	3.31	NA
	December 11, 2014	0.504	0.888	0.119	0.541	10.6	NA
Duplicate	December 11, 2014	0.482	0.829	0.108	0.485	11.2	NA
	March 5, 2015	0.349	0.619	0.0794	0.362	9.96	8.40
Duplicate	March 5, 2015	0.344	0.598	0.0774	0.358	10.8	7.45
	September 3, 2015	0.0768	0.132	0.0181	0.0837	2.76	3.60

TABLE 6

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS FOR
TPH-GRO, BTEX AND MTBE
PLANTATION PIPE LINE COMPANY
PEAIRS ROAD SITE
ZACHARY, LOUISIANA

Monitor Well Location	Sample Date	BTEX and MTBE by Method 8021B or Method 8260B (mg/l)					TPH-GRO by Method 8015B (mg/l)
		Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE	
MW-6	August 7, 2006	Sample was not collected due to LNAPL in the well.					
	January 31, 2007						
	August 23, 2007	**3.4**	8.7	1.2	6.9	52	NA
	February 21, 2008	**3.3**	11	1.4	9.7	65	NA
Duplicate	February 21, 2008	**3**	9.7	1.3	8.8	64	NA
	August 12, 2008	**5.3**	16	1.4	9.6	52	NA
	March 12, 2009	**2.0**	11	1.8	13.6	25	NA
	October 1, 2009	**1.7**	9.9	1.3	10.6	26	NA
Duplicate	October 1, 2009	**1.8**	9.4	1.4	11.3	24	NA
	March 24, 2010	**0.91**	6.6	1.4	10.3	19	81
	October 1, 2010	**0.968**	6.03	2.12	14.7	15.7	84.8
	April 7, 2011	0.653	3.16	0.821	5.91	12.3	51.6
	June 29, 2011	<0.001	1.38	<0.001	<1.5	12	NA
	August 23, 2011	<0.001	1.61	<0.001	2.34	11.8	NA
	October 21, 2011	0.440	1.23	<0.3	1.47	9.72	NA
	March 15, 2012	0.386	0.714	<0.5	<1.5	10.0	NA
Duplicate	March 15, 2012	0.273	<0.5	<0.5	<1.5	6.62	NA
	May 30, 2012	<0.5	0.980	<0.5	<1.5	9.16	NA
	September 5, 2012	<0.5	0.769	<0.5	<1.5	9.30	NA
	May 14, 2013	0.273	0.717	0.127	0.766	7.37	NA
	September 27, 2013	0.331	0.802	0.138	1.02	6.43	NA
	April 23, 2014	0.202	0.343	0.0362	0.204	4.34	NA
	September 24, 2014	0.0473	0.112	0.0187	0.130	0.909	NA
	December 17, 2014	0.207	0.228	0.0261	0.226	5.20	NA
	March 5, 2015	0.227	0.599	0.0651	0.472	7.92	8.07
	September 3, 2015	0.109	0.317	0.0694	0.389	3.96	8.77
Duplicate	September 3, 2015	0.123	0.348	0.0646	0.408	4.07	8.62
MW-7	August 7, 2006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.1
	January 31, 2007	<0.001	<0.001	<0.001	<0.001	<0.008	<0.1
	August 23, 2007	<0.001	<0.001	<0.001	<0.001	<0.008	NA
	February 20, 2008	<0.001	<0.001	<0.001	<0.001	<0.001	NA
	August 11, 2008	<0.001	<0.001	<0.001	<0.001	<0.008	NA
	March 12, 2009	<0.001	<0.001	<0.001	<0.001	<0.008	NA
	October 1, 2009	<0.005	<0.005	<0.005	<0.005	<0.005	NA
	March 24, 2010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.1
	October 1, 2010	<0.005	<0.005	<0.005	<0.01	<0.005	<0.1
	April 7, 2011	<0.005	<0.005	<0.005	<0.01	<0.005	<0.1
	August 22, 2011	<0.005	<0.005	<0.005	<0.01	<0.005	NA
	March 15, 2012	<0.005	<0.005	<0.005	<0.015	<0.005	NA
	September 5, 2012	<0.005	<0.005	<0.005	<0.015	<0.005	NA
	May 14, 2013	<0.005	<0.005	<0.005	<0.015	<0.005	NA
	September 26, 2013	<0.005	<0.005	<0.005	<0.015	<0.005	NA
	April 22, 2014	<0.001	<0.001	<0.001	<0.003	<0.001	NA
	September 22, 2014	<0.001	<0.001	<0.001	<0.003	<0.001	NA
	March 5, 2015	<0.001	<0.001	<0.001	<0.003	<0.001	<0.1
	September 2, 2015	<0.005	<0.005	<0.005	<0.015	<0.005	<0.1

TABLE 6

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS FOR
TPH-GRO, BTEX AND MTBE
PLANTATION PIPE LINE COMPANY
PEAIRS ROAD SITE
ZACHARY, LOUISIANA

Monitor Well Location	Sample Date	BTEX and MTBE by Method 8021B or Method 8260B (mg/l)					TPH-GRO by Method 8015B (mg/l)
		Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE	
MW-8	August 7, 2006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.1
	January 31, 2007	<0.001	<0.001	<0.001	<0.001	<0.008	<0.1
	August 23, 2007	<0.001	<0.001	<0.001	<0.001	<0.008	NA
	February 20, 2008	<0.001	<0.001	<0.001	<0.001	<0.001	NA
	August 11, 2008	<0.001	<0.001	<0.001	<0.001	<0.008	NA
	March 12, 2009	<0.001	<0.001	<0.001	<0.001	<0.008	NA
	October 1, 2009	<0.005	<0.005	<0.005	<0.005	<0.005	NA
	March 24, 2010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.1
	September 30, 2010	<0.005	<0.005	<0.005	<0.01	0.028	<0.1
	April 7, 2011	<0.005	<0.005	<0.005	<0.01	<0.005	<0.1
	August 22, 2011	<0.005	<0.005	<0.005	<0.01	<0.005	NA
	October 20, 2011	<0.005	<0.005	<0.005	<0.02	<0.005	NA
	March 14, 2012	<0.005	<0.005	<0.005	<0.015	<0.005	NA
	September 4, 2012	<0.005	<0.005	<0.005	<0.015	<0.005	NA
	May 13, 2013	<0.005	<0.005	<0.005	<0.015	<0.005	NA
	September 26, 2013	<0.005	<0.005	<0.005	<0.015	<0.005	NA
	April 22, 2014	<0.001	<0.001	<0.001	<0.003	<0.001	NA
	September 22, 2014	<0.001	<0.001	<0.001	<0.003	<0.001	NA
	March 5, 2015	<0.001	<0.001	<0.001	<0.003	0.00137	<0.1
	September 2, 2015	<0.005	<0.005	<0.005	<0.015	<0.005	<0.1
MW-9	August 7, 2006	Sample was not collected due to LNAPL in the well.					
	January 31, 2007						
	August 23, 2007						
	February 21, 2008	0.074	0.76	0.350	2.14	5.3	NA
	August 12, 2008	0.016	0.03	0.016	0.105	0.7	NA
	March 12, 2009	0.0049	0.029	0.013	0.109	0.190	NA
	October 1, 2009	0.0063	0.0092	0.0058	0.051	0.25	NA
	March 24, 2010	0.0067	<0.005	<0.005	0.0215	0.39	0.82
	October 1, 2010	<0.005	<0.005	<0.005	0.019	0.155	0.521
	April 7, 2011	<0.01	<0.01	<0.01	<0.02	0.256	0.684
	August 23, 2011	<0.003	<0.003	<0.003	<0.005	0.578	NA
	March 15, 2012	<0.005	<0.025	<0.025	<0.075	0.306	NA
	September 5, 2012	<0.005	<0.005	<0.005	<0.015	0.041	NA
Duplicate	September 5, 2012	<0.005	<0.005	<0.005	<0.015	0.036	NA
	May 14, 2013	0.011	0.00507	<0.005	<0.015	0.446	NA
	September 27, 2013	0.00739	<0.005	<0.005	<0.015	0.236	NA
	April 23, 2014	0.00804	0.00411	0.00154	0.0122	0.357	NA
	September 24, 2014	0.00126	<0.001	<0.001	<0.003	0.0936	NA
	December 11, 2014	0.00311	0.00167	<0.001	0.541	0.215	NA
	March 5, 2015	0.00291	0.00174	<0.001	0.00323	0.283	0.489
	September 2, 2015	<0.050	<0.050	<0.050	<0.150	0.259	0.417

TABLE 6

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS FOR
TPH-GRO, BTEX AND MTBE
PLANTATION PIPE LINE COMPANY
PEAIRS ROAD SITE
ZACHARY, LOUISIANA

Monitor Well Location	Sample Date	BTEX and MTBE by Method 8021B or Method 8260B (mg/l)					TPH-GRO by Method 8015B (mg/l)
		Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE	
MW-10	August 7, 2006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.1
	January 31, 2007	<0.001	<0.001	<0.001	<0.001	<0.008	<0.1
	August 23, 2007	<0.001	<0.001	<0.001	<0.001	<0.008	NA
	February 20, 2008	<0.001	<0.001	<0.001	<0.001	<0.001	NA
	August 11, 2008	0.0026	<0.001	<0.001	<0.001	0.170	NA
	March 12, 2009	<0.001	<0.001	<0.001	<0.001	0.039	NA
	October 1, 2009	<0.005	<0.005	<0.005	<0.005	0.053	NA
	March 24, 2010	<0.005	<0.005	<0.005	<0.005	0.062	0.27
	September 30, 2010	<0.005	<0.005	<0.005	<0.01	0.086	0.118
	April 7, 2011	<0.005	<0.005	<0.005	<0.01	0.04	<0.1
	August 23, 2011	<0.005	<0.005	<0.005	<0.01	0.064	NA
	October 20, 2011	<0.005	<0.005	<0.005	<0.02	0.036	NA
	March 14, 2012	<0.005	<0.005	<0.005	<0.015	0.037	NA
	September 5, 2012	<0.005	<0.005	<0.005	<0.015	0.019	NA
	May 13, 2013	<0.005	<0.005	<0.005	<0.015	0.033	NA
	September 26, 2013	<0.005	<0.005	<0.005	<0.015	0.026	NA
	April 22, 2014	<0.001	<0.001	<0.001	<0.003	0.0229	NA
	September 22, 2014	<0.001	<0.001	<0.001	<0.003	0.014	NA
	March 5, 2015	<0.001	<0.001	<0.001	<0.003	0.0104	<0.1
	September 2, 2015	<0.005	<0.005	<0.005	<0.015	<0.005	<0.1
MW-11	August 7, 2006	<0.005	0.069	0.012	0.0384	0.052	0.38
	January 31, 2007	<0.001	<0.001	0.01	0.0022	<0.008	<0.1
Duplicate	January 31, 2007	<0.001	<0.001	0.01	0.0022	<0.008	<0.1
	August 23, 2007	<0.001	<0.001	<0.001	0.011	0.0066	NA
Duplicate	August 23, 2007	<0.001	<0.001	<0.001	0.011	0.0064	NA
	February 20, 2008	<0.001	<0.001	<0.001	0.0013	0.038	NA
	August 11, 2008	0.0014	<0.001	<0.001	<0.001	0.072	NA
Duplicate	August 11, 2008	0.0016	<0.001	<0.001	<0.001	0.066	NA
	March 12, 2009	<0.001	<0.001	<0.001	<0.001	<0.008	NA
	October 1, 2009	0.0078	<0.005	<0.005	<0.005	0.27	NA
	March 24, 2010	<0.005	<0.005	<0.005	<0.005	0.064	0.28
	September 30, 2010	<0.005	<0.005	<0.005	<0.01	0.073	<0.1
	April 7, 2011	<0.01	<0.01	<0.01	<0.02	0.212	0.465
	August 23, 2011	<0.005	<0.005	<0.005	<0.01	1.03	NA
	October 20, 2011	<0.03	<0.03	<0.03	<0.08	0.661	NA
	March 14, 2012	<0.005	<0.025	<0.025	<0.075	0.435	NA
	September 4, 2012	<0.005	<0.005	<0.005	<0.015	0.243	NA
	May 13, 2013	<0.005	<0.005	<0.005	<0.015	0.242	NA
	September 26, 2013	<0.005	<0.005	<0.005	<0.015	0.137	NA
	April 22, 2014	<0.001	<0.001	<0.001	<0.003	0.267	NA
	September 22, 2014	<0.001	<0.001	<0.001	<0.003	0.0843	NA
	December 11, 2014	<0.001	<0.001	<0.001	<0.003	0.164	NA
	March 5, 2015	<0.001	<0.001	<0.001	<0.003	0.0885	<0.1
	September 2, 2015	<0.005	<0.005	<0.005	<0.015	0.0798	<0.1

TABLE 6

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS FOR TPH-GRO, BTEX AND MTBE
PLANTATION PIPE LINE COMPANY
PEAIRS ROAD SITE
ZACHARY, LOUISIANA

Monitor Well Location	Sample Date	BTEX and MTBE by Method 8021B or Method 8260B (mg/l)					TPH-GRO by Method 8015B (mg/l)
		Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE	
PZ-1	August 7, 2006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.1
	August 23, 2007	<0.001	<0.001	<0.001	<0.001	<0.008	NA
	February 21, 2008	<0.001	<0.001	<0.001	<0.001	<0.001	NA
	August 12, 2008	<0.001	<0.001	<0.001	<0.001	<0.008	NA
	March 12, 2009	<0.001	<0.001	<0.001	<0.001	<0.008	NA
	October 1, 2009	<0.005	<0.005	<0.005	<0.005	<0.005	NA
	March 24, 2010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.1
	October 1, 2010	<0.005	<0.005	<0.005	<0.01	<0.005	<0.1
	April 7, 2011	<0.005	<0.005	<0.005	<0.01	<0.005	<0.1
	August 22, 2011	<0.005	<0.005	<0.005	<0.01	<0.005	NA
	October 20, 2011	<0.005	<0.005	<0.005	<0.02	<0.005	NA
	March 15, 2012	<0.005	<0.005	<0.005	<0.015	<0.005	NA
	September 5, 2012	<0.005	<0.005	<0.005	<0.015	<0.005	NA
	May 14, 2013	<0.005	<0.005	<0.005	<0.015	<0.005	NA
	September 26, 2013	<0.005	<0.005	<0.005	<0.015	<0.005	NA
	September 22, 2014	<0.001	<0.001	<0.001	<0.003	<0.001	NA
	March 5, 2015	<0.001	<0.001	<0.001	<0.003	<0.001	<0.1
	September 2, 2015	<0.005	<0.005	<0.005	<0.015	<0.005	<0.1
LDEQ Projected MO-1 RECAP Standard*		**0.82**	**530**	**170**	**160**	**34650**	**1953**

NOTES:

* Standard listed for groundwater is listed in milligram per liter.

Benzene, toluene, ethylbenzene, and xylenes (BTEX) and methyl tert-butyl ether (MTBE) by Method 8021B or Method 8260B. Reported in milligrams per liter.

Total Petroleum Hydrocarbons-Gasoline Range Organics (TPH-GRO) by Method 8015B. Reported in milligrams per liter.

LDEQ = Louisiana Department of Environmental Quality

MO-1 = Management Option 1

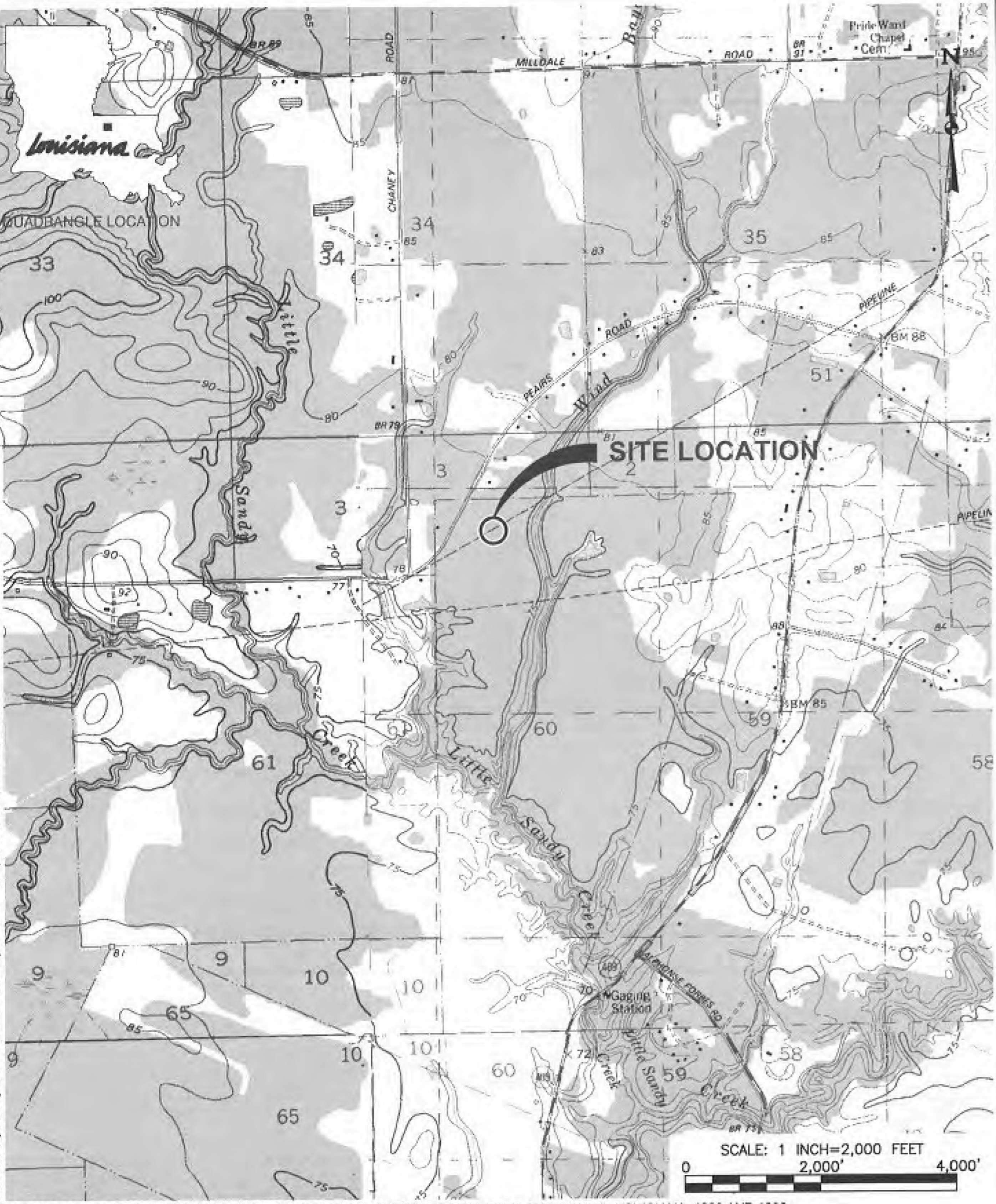
NA = Not Analyzed for this Constituent

NS = Not sampled, well was dry during sampling event

RECAP = Risk Evaluation / Corrective Action Program

BOLD print indicates sample analytical data exceeds the respective LDEQ MO-1 RECAP Standard.

FIGURES



REFERENCE: USGS 7.5 MINUTE SERIES QUADRANGLE. WATSON, PRIDE, FRED AND COMITE, LOUISIANA. 1980 AND 1996.

I:\PROJECTS\CADD\PLANTATION PIPELINE\PEAIRS ROAD\60483396\00001\60483396-00001-01.DWG – FIGURE_1

URS

7389 Florida Blvd., Suite 300
Baton Rouge, Louisiana 70806
225/922-5700

SCALE:	DRAWN BY: DB	DATE: 01/20/16
1"=2000'	CHKD. BY: PH	DATE: 01/20/16

PEAIRS ROAD SITE
ZACHARY, LOUISIANA

SITE LOCATION MAP

PROJ. NO. 60483396

FIG. NO. 1

REFERENCE: ATLAS: THE LOUISIANA STATE WIDE GIS SIDS. WWW.ATLAS.LSU.EDU

REV	DESCRIPTION OF REVISION	BY	DATE
△			
△			
△			
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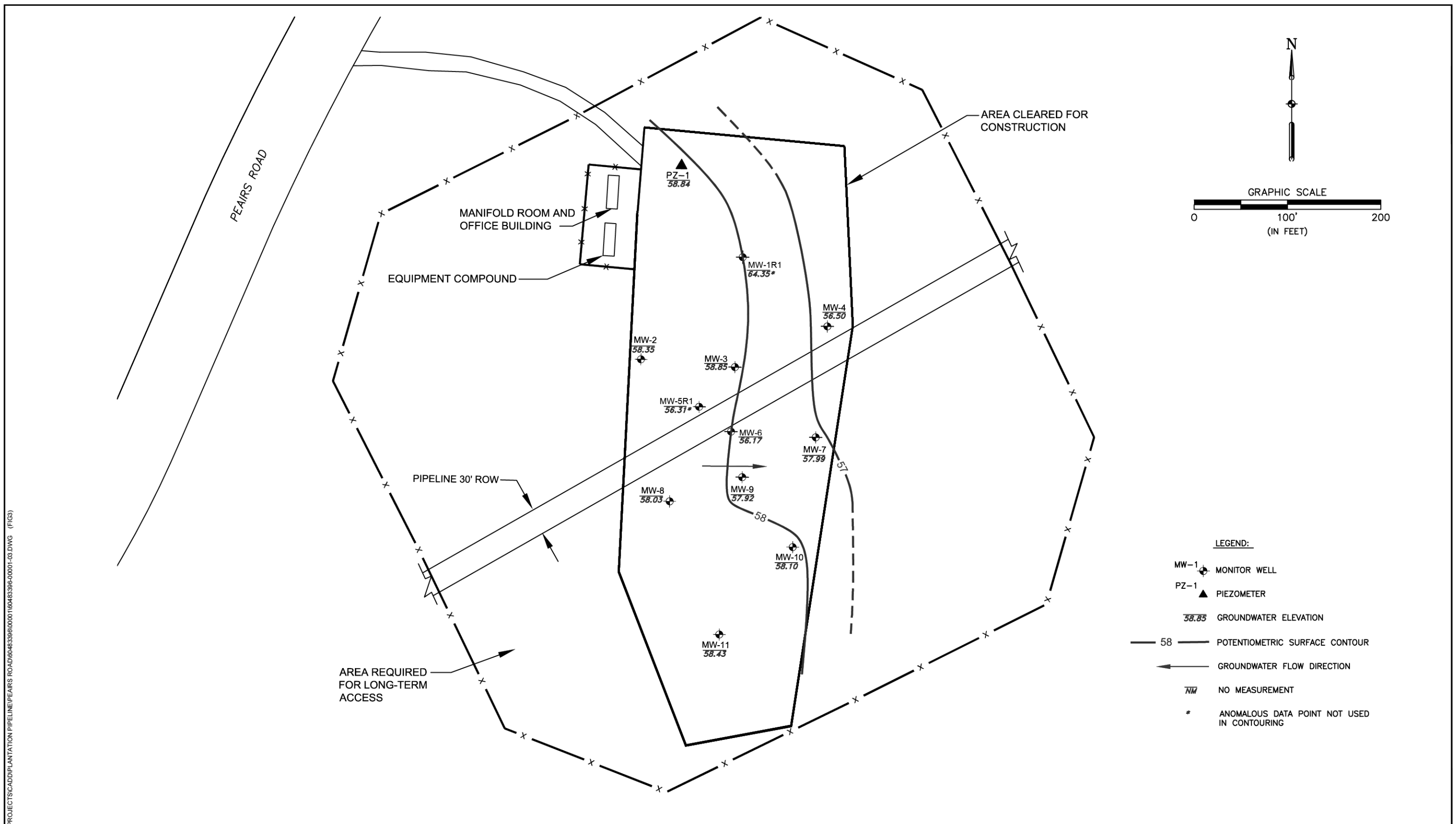
DATE	01/20/16

PEAIRS ROAD SITE
ZACHARY, LOUISIANA

MONITOR WELLS, HORIZONTAL AIR SPARGE WELLS, SOIL VAPOR EXTRACTION WELLS AND PIEZOMETER LOCATION MAP

REVISION △
PROJECT 60483396
FIGURE 2

I:\PROJECTS\CADD\PLANTATION PIPELINE\PEAIRS ROAD\60483396\0001\60483396-0001-02.DWG - FIGURE 2 - 1/20/2016 3:51 PM



REV	DESCRIPTION OF REVISION	BY	DATE
△			
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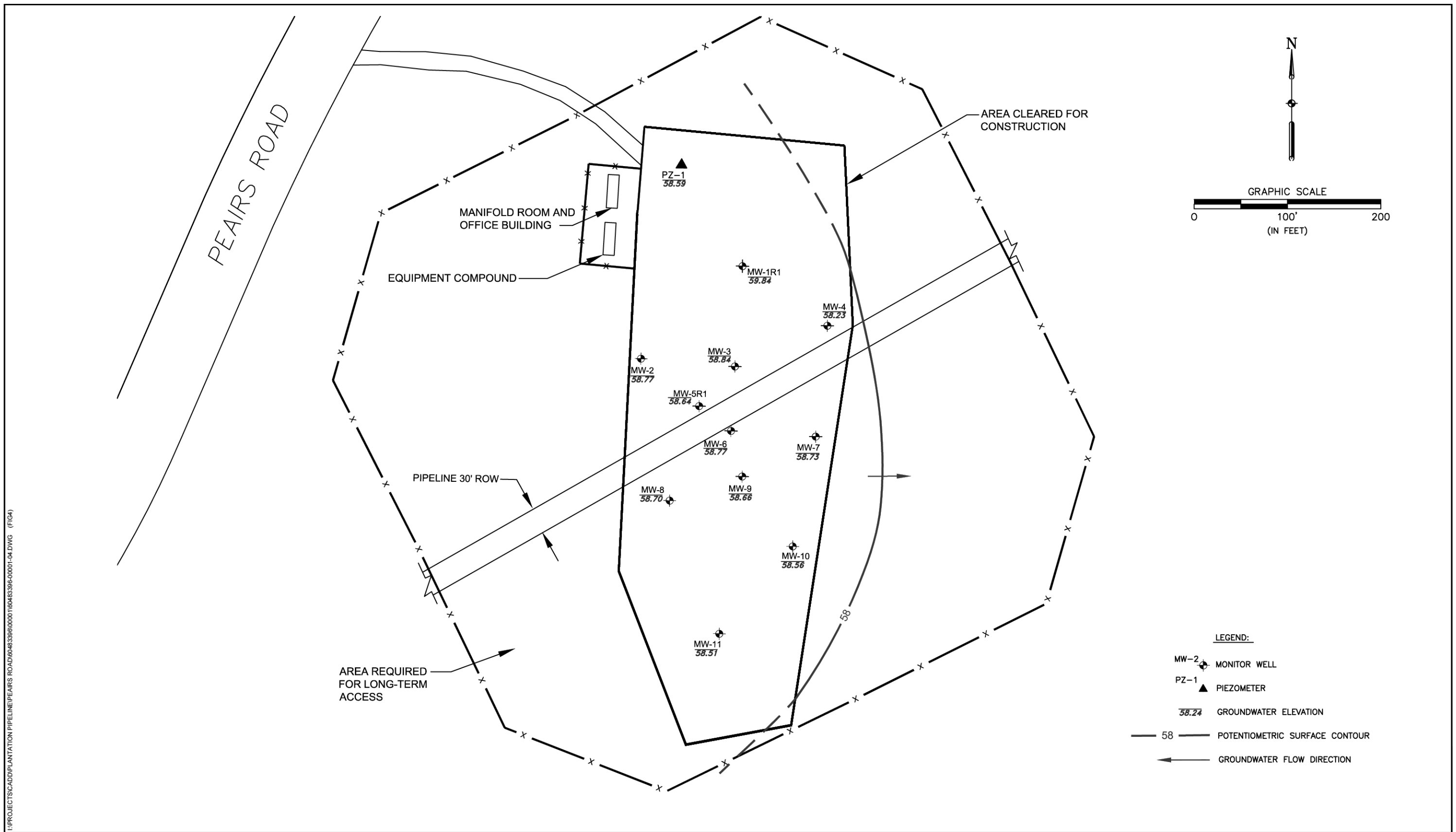
DRAWN	DB
CHECKED	PH
PEER REVIEWED	BH
DATE	01/20/16

PEAIRS ROAD SITE
ZACHARY, LOUISIANA

POTENTIOMETRIC MAP
MARCH 5, 2015

REVISION △
PROJECT 60483396
FIGURE 3



REV	DESCRIPTION OF REVISION	BY	DATE
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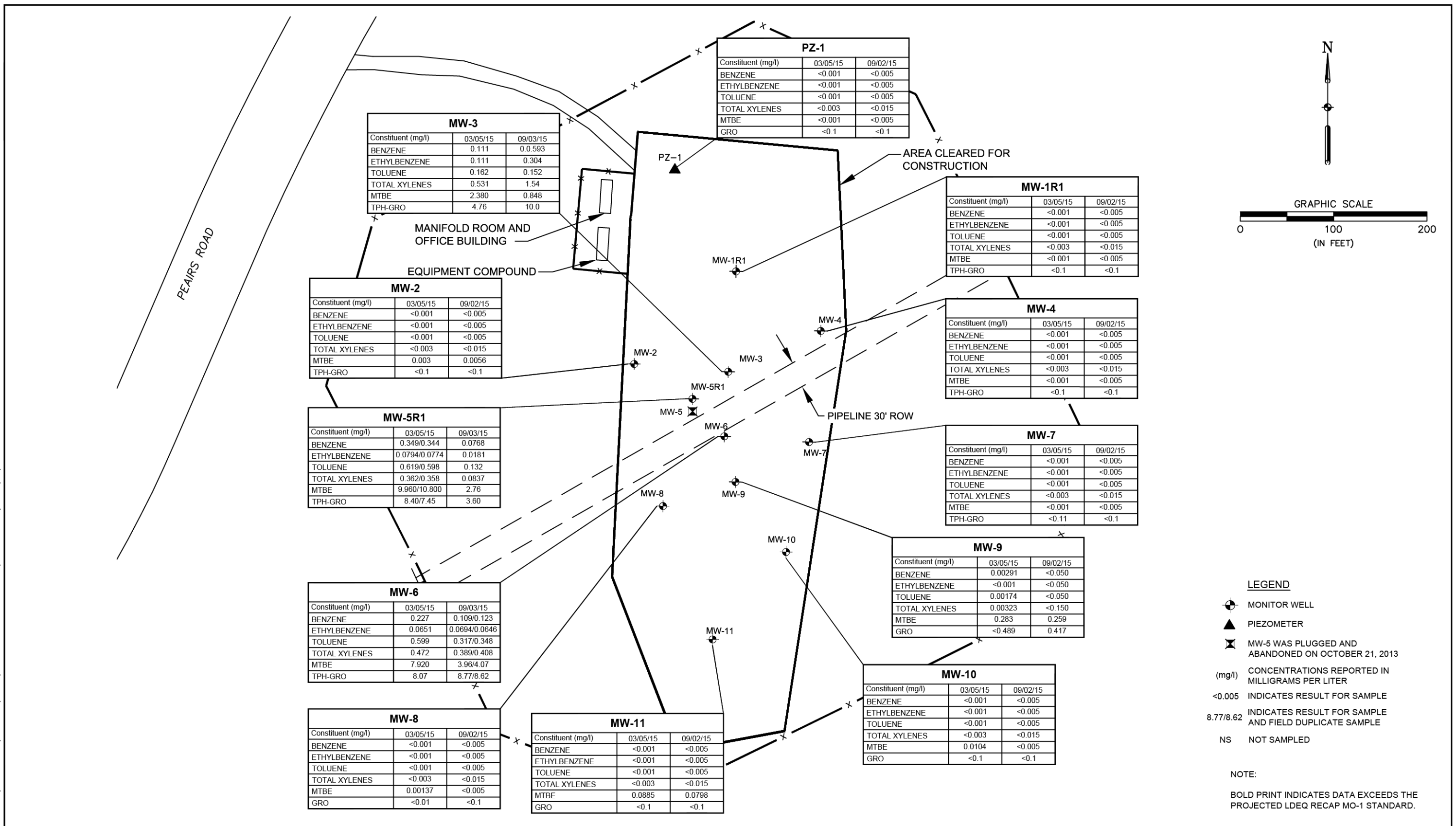
REFERENCE DRAWINGS

SCALE	AS SHOWN
DESIGNED	PH
DRAWN	DB
CHECKED	PH
PEER REVIEWED	BH
DATE	01/20/15

PEAIRS ROAD SITE
ZACHARY, LOUISIANA

POTENTIOMETRIC MAP
SEPTEMBER 2, 2015

REVISION △
PROJECT 60483396
FIGURE 4



PZ-1

Constituent (mg/l)	03/05/15	09/02/15
BENZENE	<0.001	<0.005
ETHYLBENZENE	<0.001	<0.005
TOLUENE	<0.001	<0.005
TOTAL XYLENES	<0.003	<0.015
MTBE	<0.001	<0.005
GRO	<0.1	<0.1

MW-3

Constituent (mg/l)	03/05/15	09/03/15
BENZENE	0.111	0.0.593
ETHYLBENZENE	0.111	0.304
TOLUENE	0.162	0.152
TOTAL XYLENES	0.531	1.54
MTBE	2.380	0.848
TPH-GRO	4.76	10.0

MW-1R1

Constituent (mg/l)	03/05/15	09/02/15
BENZENE	<0.001	<0.005
ETHYLBENZENE	<0.001	<0.005
TOLUENE	<0.001	<0.005
TOTAL XYLENES	<0.003	<0.015
MTBE	<0.001	<0.005
TPH-GRO	<0.1	<0.1

MW-2

Constituent (mg/l)	03/05/15	09/02/15
BENZENE	<0.001	<0.005
ETHYLBENZENE	<0.001	<0.005
TOLUENE	<0.001	<0.005
TOTAL XYLENES	<0.003	<0.015
MTBE	0.003	0.0056
TPH-GRO	<0.1	<0.1

MW-4

Constituent (mg/l)	03/05/15	09/02/15
BENZENE	<0.001	<0.005
ETHYLBENZENE	<0.001	<0.005
TOLUENE	<0.001	<0.005
TOTAL XYLENES	<0.003	<0.015
MTBE	<0.001	<0.005
TPH-GRO	<0.1	<0.1

MW-5R1

Constituent (mg/l)	03/05/15	09/03/15
BENZENE	0.349/0.344	0.0768
ETHYLBENZENE	0.0794/0.0774	0.0181
TOLUENE	0.619/0.598	0.132
TOTAL XYLENES	0.362/0.358	0.0837
MTBE	9.960/10.800	2.76
TPH-GRO	8.40/7.45	3.60

MW-7

Constituent (mg/l)	03/05/15	09/02/15
BENZENE	<0.001	<0.005
ETHYLBENZENE	<0.001	<0.005
TOLUENE	<0.001	<0.005
TOTAL XYLENES	<0.003	<0.015
MTBE	<0.001	<0.005
TPH-GRO	<0.11	<0.1

MW-9

Constituent (mg/l)	03/05/15	09/02/15
BENZENE	0.00291	<0.050
ETHYLBENZENE	<0.001	<0.050
TOLUENE	0.00174	<0.050
TOTAL XYLENES	0.00323	<0.150
MTBE	0.283	0.259
GRO	<0.489	0.417

MW-6

Constituent (mg/l)	03/05/15	09/03/15
BENZENE	0.227	0.109/0.123
ETHYLBENZENE	0.0651	0.0694/0.0646
TOLUENE	0.599	0.317/0.348
TOTAL XYLENES	0.472	0.389/0.408
MTBE	7.920	3.96/4.07
TPH-GRO	8.07	8.77/8.62

MW-10

Constituent (mg/l)	03/05/15	09/02/15
BENZENE	<0.001	<0.005
ETHYLBENZENE	<0.001	<0.005
TOLUENE	<0.001	<0.005
TOTAL XYLENES	<0.003	<0.015
MTBE	0.0104	<0.005
GRO	<0.1	<0.1

MW-8

Constituent (mg/l)	03/05/15	09/02/15
BENZENE	<0.001	<0.005
ETHYLBENZENE	<0.001	<0.005
TOLUENE	<0.001	<0.005
TOTAL XYLENES	<0.003	<0.015
MTBE	0.00137	<0.005
GRO	<0.01	<0.1

MW-11

Constituent (mg/l)	03/05/15	09/02/15
BENZENE	<0.001	<0.005
ETHYLBENZENE	<0.001	<0.005
TOLUENE	<0.001	<0.005
TOTAL XYLENES	<0.003	<0.015
MTBE	0.0885	0.0798
GRO	<0.1	<0.1

REV	DESCRIPTION OF REVISION	BY	DATE

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Baton Rouge, Louisiana 70806
225/922-5700

REFERENCE DRAWINGS

SCALE: AS SHOWN
DESIGNED: PH
DRAWN: DB
CHECKED: PH
PEER REVIEWED: BH
DATE: 01/20/16

PEAIRS ROAD SITE
ZACHARY, LOUISIANA

BTEX, MTBE AND TPH-GRO CONCENTRATIONS
IN SHALLOW GROUNDWATER
2015

REVISION
PROJECT: 60483396
FIGURE: 5

APPENDIX A

GROUNDWATER COLLECTION REPORT FORMS

URS

GROUNDWATER COLLECTION REPORT

PROJECT NUMBER AND NAME Pears Rd LOCATION Zachary, LA
COLLECTOR/OPERATOR Corey Burns / Kyle Templet WELL NO. 02-1
TYPE OF SAMPLE Water (X) GRAB ( ) COMPOSITE ( ) OTHER
METHOD OF SAMPLING IF OTHER THAN MONITOR WELL — SHUTTLE NO. —

MONITOR WELL INFORMATION

EVACUATION: DATE/TIME 3-5-15 11:00 METHOD OF EVACUATION Bailer
INITIAL DEPTH TO WATER LEVEL 20.30 TOP OF CASING TO BOTTOM 26.00
GALLONS PER WELL VOLUME 0.946 TOTAL GALLONS EVACUATED 3.00
FINAL DEPTH TO WATER — ELEVATION TOP OF CASING —

SAMPLING: DATE/TIME 3-5-15 11:15 METHOD OF SAMPLING Bailer
DEPTH TO WATER LEVEL —

SAMPLE DATA

FIELD REPLICATE #1	TEMP. 17.0 °C	pH 5.89	CONDUCTIVITY 0.95 mS
FIELD REPLICATE #2	TEMP. 17.8 °C	pH 5.64	CONDUCTIVITY 0.95 mS
FIELD REPLICATE #3	TEMP. 18.0 °C	pH 5.57	CONDUCTIVITY 0.92
FIELD REPLICATE #4	TEMP.	pH	CONDUCTIVITY

GENERAL INFORMATION

WEATHER CONDITIONS AT TIME OF SAMPLING Cloudy 48%
SAMPLING CHARACTERISTICS Stained
CONTAINERS AND PRESERVATIVES 5 VOAS (HCL) BTEX, MTBE TPH-GRO
RECOMMENDATION/OBSERVATIONS

SAMPLE ID NUMBERS 02-1

SAMPLING PERSONNEL TIME 1100 TO 1115

[signature] (SIGNED) DATE 3-5-15

LOCK OR SEAL NUMBER REPLACEMENT SEAL NUMBER

URS

GROUNDWATER COLLECTION REPORT

PROJECT NUMBER AND NAME Pears Rd 19289114 LOCATION Pears

COLLECTOR/OPERATOR Corey Burns/ Kyle Tempet WELL NO. 1-R1

TYPE OF SAMPLE Water (X) GRAB ( ) COMPOSITE ( ) OTHER

METHOD OF SAMPLING IF OTHER THAN MONITOR WELL — SHUTTLE NO. —

MONITOR WELL INFORMATION

EVACUATION: DATE/TIME 3-5-15 1140 METHOD OF EVACUATION Bailer

INITIAL DEPTH TO WATER LEVEL 14.70 TOP OF CASING TO BOTTOM 23.30

GALLONS PER WELL VOLUME C.B. TOTAL GALLONS EVACUATED C.B.

FINAL DEPTH TO WATER — ELEVATION TOP OF CASING —

SAMPLING: DATE/TIME 3-5-15 1200 METHOD OF SAMPLING Bailer

DEPTH TO WATER LEVEL —

SAMPLE DATA

FIELD REPLICATE #1	TEMP. 15.5 °C	pH 3.94	CONDUCTIVITY 0.35 mS
FIELD REPLICATE #2	TEMP. —	pH —	CONDUCTIVITY —
FIELD REPLICATE #3	TEMP. —	pH —	CONDUCTIVITY —
FIELD REPLICATE #4	TEMP.	pH	CONDUCTIVITY

GENERAL INFORMATION

WEATHER CONDITIONS AT TIME OF SAMPLING Cloudy 48° Flat

SAMPLING CHARACTERISTICS [illegible]

CONTAINERS AND PRESERVATIVES 5 VOAS (HCL) BTEX, MTBE TPH-GRO

RECOMMENDATION/OBSERVATIONS very cloudy to start, mud inside well. One well volume was all we could retrieve

SAMPLE ID NUMBERS MW-1R1

SAMPLING PERSONNEL

Corey Burns
(SIGNED)

TIME 1140 TO 1200

DATE 3-5-15

LOCK OR SEAL NUMBER

REPLACEMENT SEAL NUMBER

URS

GROUNDWATER COLLECTION REPORT

PROJECT NUMBER AND NAME Peairs Rd LOCATION Zachary, LA
COLLECTOR/OPERATOR Greg Burns / Kyle Templet WELL NO. MW-2
TYPE OF SAMPLE W (X) GRAB ( ) COMPOSITE ( ) OTHER
METHOD OF SAMPLING IF OTHER THAN MONITOR WELL — SHUTTLE NO. —

MONITOR WELL INFORMATION

EVACUATION: DATE/TIME 3-5-15 130 METHOD OF EVACUATION Bailer
INITIAL DEPTH TO WATER LEVEL 20.2 TOP OF CASING TO BOTTOM 24.29
GALLONS PER WELL VOLUME 0.68 TOTAL GALLONS EVACUATED 2.00
FINAL DEPTH TO WATER — ELEVATION TOP OF CASING —

SAMPLING: DATE/TIME 3-5-15 145 METHOD OF SAMPLING Bailer
DEPTH TO WATER LEVEL —

SAMPLE DATA

FIELD REPLICATE #1	TEMP. 15.5°C	pH 6.73	CONDUCTIVITY 416 mS
FIELD REPLICATE #2	TEMP. 16.5	pH 7.79	CONDUCTIVITY 409
FIELD REPLICATE #3	TEMP. 17.6	pH 7.82	CONDUCTIVITY 408
FIELD REPLICATE #4	TEMP.	pH	CONDUCTIVITY

GENERAL INFORMATION

WEATHER CONDITIONS AT TIME OF SAMPLING Cloudy 36° Flat
SAMPLING CHARACTERISTICS Clear
CONTAINERS AND PRESERVATIVES 5 VOAS (HCL) BTEX, MTBE
PTP-GRO
RECOMMENDATION/OBSERVATIONS

SAMPLE ID NUMBERS MW-2

SAMPLING PERSONNEL TIME 130 TO 145

Greg Burns (SIGNED) DATE 3-5-15

LOCK OR SEAL NUMBER REPLACEMENT SEAL NUMBER

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URS

GROUNDWATER COLLECTION REPORT

PROJECT NUMBER AND NAME Penics Rd LOCATION Zachary, LA
COLLECTOR/OPERATOR Greg Burns/Lyle Templet WELL NO. MW-3
TYPE OF SAMPLE W (X) GRAB ( ) COMPOSITE ( ) OTHER —
METHOD OF SAMPLING IF OTHER THAN MONITOR WELL — SHUTTLE NO. —

MONITOR WELL INFORMATION

EVACUATION: DATE/TIME 3-5-15 4:00 METHOD OF EVACUATION Bailer
INITIAL DEPTH TO WATER LEVEL 20.24 TOP OF CASING TO BOTTOM 25.56
GALLONS PER WELL VOLUME .88 TOTAL GALLONS EVACUATED 3
FINAL DEPTH TO WATER — ELEVATION TOP OF CASING —

SAMPLING: DATE/TIME 3-5-15 4:15 METHOD OF SAMPLING Bailer
DEPTH TO WATER LEVEL

SAMPLE DATA

	TEMP.	pH	CONDUCTIVITY
FIELD REPLICATE #1	14.9 °C	2.00	8.66 mS
FIELD REPLICATE #2	16.5	1.98	8.31 mS
FIELD REPLICATE #3	16.3	1.96	8.61
FIELD REPLICATE #4			

GENERAL INFORMATION

WEATHER CONDITIONS AT TIME OF SAMPLING Winter Cloudy 36°
SAMPLING CHARACTERISTICS Clear
CONTAINERS AND PRESERVATIVES 5 VOAs (HCL) BTEX, MTBE
TPH-GRO
RECOMMENDATION/OBSERVATIONS

SAMPLE ID NUMBERS MW-3

SAMPLING PERSONNEL TIME 4:00 TO 4:15

Greg Burns
(SIGNED) DATE 3-5-15

LOCK OR SEAL NUMBER REPLACEMENT SEAL NUMBER

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URS

GROUNDWATER COLLECTION REPORT

PROJECT NUMBER AND NAME Pearis Rd LOCATION Pearis / Zachary
COLLECTOR/OPERATOR Corey Burns / Kyle Templet WELL NO. MW-4
TYPE OF SAMPLE Water (X) GRAB ( ) COMPOSITE ( ) OTHER ______
METHOD OF SAMPLING IF OTHER THAN MONITOR WELL ______ SHUTTLE NO. ______

MONITOR WELL INFORMATION

EVACUATION: DATE/TIME 3-5-15 12:05 METHOD OF EVACUATION Bails
INITIAL DEPTH TO WATER LEVEL 22.45 TOP OF CASING TO BOTTOM 26.68
GALLONS PER WELL VOLUME 0.619 TOTAL GALLONS EVACUATED 2.00
FINAL DEPTH TO WATER — ELEVATION TOP OF CASING —

SAMPLING: DATE/TIME 3-5-15 12:15 METHOD OF SAMPLING Bails
DEPTH TO WATER LEVEL —

SAMPLE DATA

FIELD REPLICATE #1	TEMP. 15.5 °C	pH ~~4.09~~ 5.78	CONDUCTIVITY 0.05 mS
FIELD REPLICATE #2	TEMP. 17.0	pH 5.79	CONDUCTIVITY 0.07 mS
FIELD REPLICATE #3	TEMP. 17.0 C	pH 5.85	CONDUCTIVITY 0.02
FIELD REPLICATE #4	TEMP.	pH	CONDUCTIVITY

GENERAL INFORMATION

WEATHER CONDITIONS AT TIME OF SAMPLING Cloudy 48°
SAMPLING CHARACTERISTICS Mostly Clear
CONTAINERS AND PRESERVATIVES 5 VOAS (HCL) BTEX, MTBE TPH-GRO
RECOMMENDATION/OBSERVATIONS Starts Clear; Slightly cloudy on 3rd bailer

SAMPLE ID NUMBERS MW-4

SAMPLING PERSONNEL TIME 12:05 TO 12:15

Corey Burns (SIGNED) DATE 3-5-15

LOCK OR SEAL NUMBER ______ REPLACEMENT SEAL NUMBER ______

URS

GROUNDWATER COLLECTION REPORT

PROJECT NUMBER AND NAME Pearls, M [illegible] LOCATION Zachary, LA
COLLECTOR/OPERATOR Corey Burns / Kyle Templet WELL NO. MW-15
TYPE OF SAMPLE W (X) GRAB ( ) COMPOSITE ( ) OTHER —
METHOD OF SAMPLING IF OTHER THAN MONITOR WELL — SHUTTLE NO. —

MONITOR WELL INFORMATION

EVACUATION: DATE/TIME 3-5-15 4:45 METHOD OF EVACUATION Bailer
INITIAL DEPTH TO WATER LEVEL 22.07 TOP OF CASING TO BOTTOM 24.06
GALLONS PER WELL VOLUME 0.33 TOTAL GALLONS EVACUATED 3
FINAL DEPTH TO WATER — ELEVATION TOP OF CASING —

SAMPLING: DATE/TIME 3-5-15 500 METHOD OF SAMPLING Bailer
DEPTH TO WATER LEVEL

SAMPLE DATA

FIELD REPLICATE #1	TEMP. 15.4	pH 1.85	CONDUCTIVITY 8.25
FIELD REPLICATE #2	TEMP. 17.4	pH 1.87	CONDUCTIVITY 8.44
FIELD REPLICATE #3	TEMP. 17.4	pH 1.87	CONDUCTIVITY 8.39
FIELD REPLICATE #4	TEMP.	pH	CONDUCTIVITY

GENERAL INFORMATION

WEATHER CONDITIONS AT TIME OF SAMPLING Cloudy 36°
SAMPLING CHARACTERISTICS Clear
CONTAINERS AND PRESERVATIVES 10 VOAS (HCL) BTEX, MTBE TPH-DRO
RECOMMENDATION/OBSERVATIONS

SAMPLE ID NUMBERS Dup Taken
SAMPLING PERSONNEL TIME 4:45 TO 5:00

Corey Burns (SIGNED) DATE 3-5-15

LOCK OR SEAL NUMBER REPLACEMENT SEAL NUMBER

URS

GROUNDWATER COLLECTION REPORT

PROJECT NUMBER AND NAME Pearl's Pel LOCATION Zachary, LA
COLLECTOR/OPERATOR Corey Burns / Kyle Templet WELL NO. MW-6
TYPE OF SAMPLE W (X) GRAB ( ) COMPOSITE ( ) OTHER –
METHOD OF SAMPLING IF OTHER THAN MONITOR WELL – SHUTTLE NO. –

MONITOR WELL INFORMATION

EVACUATION: DATE/TIME 3-5-15 415 METHOD OF EVACUATION Bailer
INITIAL DEPTH TO WATER LEVEL 22.73 TOP OF CASING TO BOTTOM 24.9
GALLONS PER WELL VOLUME 0.37 TOTAL GALLONS EVACUATED 5
FINAL DEPTH TO WATER – ELEVATION TOP OF CASING –

SAMPLING: DATE/TIME 3-5-15 430 METHOD OF SAMPLING Bailer
DEPTH TO WATER LEVEL –

SAMPLE DATA

FIELD REPLICATE #1	TEMP. 15.5 °C	pH 2.91	CONDUCTIVITY 3.21 mS
FIELD REPLICATE #2	TEMP. 15.5	pH 2.93	CONDUCTIVITY 3.19
FIELD REPLICATE #3	TEMP. 17.6	pH 3.14	CONDUCTIVITY 3.15
FIELD REPLICATE #4	TEMP.	pH	CONDUCTIVITY

GENERAL INFORMATION

WEATHER CONDITIONS AT TIME OF SAMPLING Cloudy 36°
SAMPLING CHARACTERISTICS Clear
CONTAINERS AND PRESERVATIVES 5 VOAs (HCL) BTEX, MTBE
TPH-GRO
RECOMMENDATION/OBSERVATIONS

SAMPLE ID NUMBERS MW-6

SAMPLING PERSONNEL TIME 415 TO 430

[signature] (SIGNED) DATE 3-5-15

LOCK OR SEAL NUMBER REPLACEMENT SEAL NUMBER

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URS

GROUNDWATER COLLECTION REPORT

PROJECT NUMBER AND NAME Pecairs Rd LOCATION Zachory LA
COLLECTOR/OPERATOR Corey Burns/ Kyle Templet WELL NO. MW-7
TYPE OF SAMPLE W (X) GRAB ( ) COMPOSITE ( ) OTHER —
METHOD OF SAMPLING IF OTHER THAN MONITOR WELL — SHUTTLE NO. —

MONITOR WELL INFORMATION

EVACUATION: DATE/TIME 3-5-15 2:30 METHOD OF EVACUATION Bailer
INITIAL DEPTH TO WATER LEVEL 21.09 TOP OF CASING TO BOTTOM 25.45
GALLONS PER WELL VOLUME 0.78 TOTAL GALLONS EVACUATED 3.0
FINAL DEPTH TO WATER — ELEVATION TOP OF CASING —

SAMPLING: DATE/TIME 3-5-15 240 METHOD OF SAMPLING Bailer
DEPTH TO WATER LEVEL —

SAMPLE DATA

	TEMP.	pH	CONDUCTIVITY
FIELD REPLICATE #1	15.5 °C	4.94	0.33 mS
FIELD REPLICATE #2	17.1	5.19	0.32
FIELD REPLICATE #3	16.9	5.20	0.31
FIELD REPLICATE #4			

GENERAL INFORMATION

WEATHER CONDITIONS AT TIME OF SAMPLING Cloudy 36°
SAMPLING CHARACTERISTICS Clear
CONTAINERS AND PRESERVATIVES 5 VOAS (HCL) BTEX, MTBE
TPH-GRO
RECOMMENDATION/OBSERVATIONS

SAMPLE ID NUMBERS MW-7

SAMPLING PERSONNEL TIME 2:30 TO 2:40

Corey Burns
(SIGNED) DATE 3-5-15

LOCK OR SEAL NUMBER REPLACEMENT SEAL NUMBER

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GROUNDWATER COLLECTION REPORT

PROJECT NUMBER AND NAME Pearl Rd LOCATION Zachary, LA
COLLECTOR/OPERATOR Corey Burns/Kyle Templet WELL NO. MW-8
TYPE OF SAMPLE GW (X) GRAB ( ) COMPOSITE ( ) OTHER —
METHOD OF SAMPLING IF OTHER THAN MONITOR WELL — SHUTTLE NO. —

MONITOR WELL INFORMATION

EVACUATION: DATE/TIME 3-5-15 150 METHOD OF EVACUATION Baile
INITIAL DEPTH TO WATER LEVEL 20.50 TOP OF CASING TO BOTTOM 25.27
GALLONS PER WELL VOLUME 0.79 TOTAL GALLONS EVACUATED 2.5
FINAL DEPTH TO WATER — ELEVATION TOP OF CASING —

SAMPLING: DATE/TIME 3-5-15 200 METHOD OF SAMPLING Baile
DEPTH TO WATER LEVEL —

SAMPLE DATA

FIELD REPLICATE #1	TEMP.	15.6	pH	2.92	CONDUCTIVITY	110 mS
FIELD REPLICATE #2	TEMP.	14.1	pH	2.93	CONDUCTIVITY	0.98
FIELD REPLICATE #3	TEMP.	12.0	pH	2.97	CONDUCTIVITY	0.96
FIELD REPLICATE #4	TEMP.		pH		CONDUCTIVITY	

GENERAL INFORMATION

WEATHER CONDITIONS AT TIME OF SAMPLING Cloudy 36
SAMPLING CHARACTERISTICS Cloudy
CONTAINERS AND PRESERVATIVES 5 VOAs (HCL) BTEX, MTBE
TPH-GRO
RECOMMENDATION/OBSERVATIONS

SAMPLE ID NUMBERS MW-8

SAMPLING PERSONNEL TIME 150 TO 200

Corey Burns
(SIGNED) DATE 3-5-15

LOCK OR SEAL NUMBER REPLACEMENT SEAL NUMBER

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URS

GROUNDWATER COLLECTION REPORT

PROJECT NUMBER AND NAME Ponics Rd LOCATION Zachary, LA
COLLECTOR/OPERATOR Corey Thm / Kyle Templet WELL NO. MW-9
TYPE OF SAMPLE W (X) GRAB ( ) COMPOSITE ( ) OTHER —
METHOD OF SAMPLING IF OTHER THAN MONITOR WELL — SHUTTLE NO. —

MONITOR WELL INFORMATION

EVACUATION: DATE/TIME 3-5-15 1530 METHOD OF EVACUATION Bails
INITIAL DEPTH TO WATER LEVEL 20.5 TOP OF CASING TO BOTTOM 25.02
GALLONS PER WELL VOLUME [illegible] 0.75 TOTAL GALLONS EVACUATED 3
FINAL DEPTH TO WATER — ELEVATION TOP OF CASING —

SAMPLING: DATE/TIME 3-5-15 1540 METHOD OF SAMPLING Bails
DEPTH TO WATER LEVEL

SAMPLE DATA

FIELD REPLICATE #1	TEMP. ~~[illegible]~~ 9.8 °C	pH 2.07	CONDUCTIVITY ~~10~~ ~~0.01~~ mS 7.05
FIELD REPLICATE #2	TEMP. 9.8	pH 2.34	CONDUCTIVITY ~~0.01~~ 6.98
FIELD REPLICATE #3	TEMP. 10.8	pH 2.36	CONDUCTIVITY 6.91
FIELD REPLICATE #4	TEMP.	pH	CONDUCTIVITY

GENERAL INFORMATION

WEATHER CONDITIONS AT TIME OF SAMPLING Cloudy 36°
SAMPLING CHARACTERISTICS Clear
CONTAINERS AND PRESERVATIVES 5 VOAs (HCl) BTEX, MTBE

RECOMMENDATION/OBSERVATIONS
TPH-GRO

SAMPLE ID NUMBERS MW-9

SAMPLING PERSONNEL TIME 1530 TO 1540

[signature]
(SIGNED) DATE 3-5-15

LOCK OR SEAL NUMBER REPLACEMENT SEAL NUMBER

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GROUNDWATER COLLECTION REPORT

PROJECT NUMBER AND NAME Peairs Rd LOCATION Zachary, LA
COLLECTOR/OPERATOR Corey Burns/Kyle Templet WELL NO. MW-10
TYPE OF SAMPLE W (X) GRAB ( ) COMPOSITE ( ) OTHER —
METHOD OF SAMPLING IF OTHER THAN MONITOR WELL — SHUTTLE NO. —

MONITOR WELL INFORMATION

EVACUATION: DATE/TIME 3-5-15 15:00 METHOD OF EVACUATION Bailer
INITIAL DEPTH TO WATER LEVEL 20.22 TOP OF CASING TO BOTTOM 25.13
GALLONS PER WELL VOLUME 0.81 TOTAL GALLONS EVACUATED 3
FINAL DEPTH TO WATER — ELEVATION TOP OF CASING

SAMPLING: DATE/TIME 3-5-15 15:15 METHOD OF SAMPLING —
DEPTH TO WATER LEVEL —

SAMPLE DATA

FIELD REPLICATE #1	TEMP. 15.0 C	pH 1.74 (?)	CONDUCTIVITY 3.65 mS
FIELD REPLICATE #2	TEMP. 16.7	pH 1.75 (?)	CONDUCTIVITY 3.43
FIELD REPLICATE #3	TEMP. 16.5	pH 1.75 (?)	CONDUCTIVITY 3.42
FIELD REPLICATE #4	TEMP.	pH	CONDUCTIVITY

GENERAL INFORMATION

WEATHER CONDITIONS AT TIME OF SAMPLING Cloudy 36°
SAMPLING CHARACTERISTICS Clear
CONTAINERS AND PRESERVATIVES 5 VOAS (HCL) BTEX, MTBE
TPH-GRO
RECOMMENDATION/OBSERVATIONS

SAMPLE ID NUMBERS MW-10

SAMPLING PERSONNEL TIME 15:00 TO 15:15

Corey Burns (?)
(SIGNED) DATE 3-5-15

LOCK OR SEAL NUMBER REPLACEMENT SEAL NUMBER

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GROUNDWATER COLLECTION REPORT

PROJECT NUMBER AND NAME Pearis Rd LOCATION Zachary, LA
COLLECTOR/OPERATOR Corey Burns / Kelle Templet WELL NO. MW-11
TYPE OF SAMPLE W (X) GRAB ( ) COMPOSITE ( ) OTHER —
METHOD OF SAMPLING IF OTHER THAN MONITOR WELL — SHUTTLE NO. —

MONITOR WELL INFORMATION

EVACUATION: DATE/TIME 3-5-15 1515 METHOD OF EVACUATION Bailer
INITIAL DEPTH TO WATER LEVEL 19.56 TOP OF CASING TO BOTTOM 25.0'
GALLONS PER WELL VOLUME 0.92 TOTAL GALLONS EVACUATED 3
FINAL DEPTH TO WATER — ELEVATION TOP OF CASING —

SAMPLING: DATE/TIME 3-5-15 1530 METHOD OF SAMPLING Bailer
DEPTH TO WATER LEVEL —

SAMPLE DATA

FIELD REPLICATE #1	TEMP. 15.8	pH 3.18	CONDUCTIVITY 0.69 mS
FIELD REPLICATE #2	TEMP. 16.8	pH 3.19	CONDUCTIVITY 0.64
FIELD REPLICATE #3	TEMP. 16.8	pH 3.25	CONDUCTIVITY 0.64
FIELD REPLICATE #4	TEMP.	pH	CONDUCTIVITY

GENERAL INFORMATION

WEATHER CONDITIONS AT TIME OF SAMPLING Cloudy / 36°
SAMPLING CHARACTERISTICS Clear
CONTAINERS AND PRESERVATIVES 5 VOAs (HCL) BTEX, MTBE
TPH - GRO
RECOMMENDATION/OBSERVATIONS

SAMPLE ID NUMBERS MW-11
SAMPLING PERSONNEL TIME 1515 TO 1530
Corey Burns
(SIGNED) DATE 3-5-15

LOCK OR SEAL NUMBER REPLACEMENT SEAL NUMBER

URS

GROUNDWATER COLLECTION REPORT

PROJECT NUMBER AND NAME 60402697 LOCATION Zachary LA
COLLECTOR/OPERATOR Corey Burns / Kyle Templet WELL NO. PZ-01
TYPE OF SAMPLE Water ( ) GRAB ( ) COMPOSITE ( ) OTHER —
METHOD OF SAMPLING IF OTHER THAN MONITOR WELL NA SHUTTLE NO. NA

MONITOR WELL INFORMATION

EVACUATION: DATE/TIME 9-2-15 9:40 METHOD OF EVACUATION Bailer
INITIAL DEPTH TO WATER LEVEL 20.56 TOP OF CASING TO BOTTOM 26.00
GALLONS PER WELL VOLUME 0.88 TOTAL GALLONS EVACUATED 2.6
FINAL DEPTH TO WATER --------------- ELEVATION TOP OF CASING —

SAMPLING: DATE/TIME 9-2-15 10:00 METHOD OF SAMPLING Bailer
DEPTH TO WATER LEVEL --------------- 24.01

SAMPLE DATA

FIELD REPLICATE #1	TEMP.	23.3 C	pH	7.32	CONDUCTIVITY	0.87
FIELD REPLICATE #2	TEMP.	22.2	pH	7.11	CONDUCTIVITY	0.77
FIELD REPLICATE #3	TEMP.	21.9	pH	6.96	CONDUCTIVITY	0.76
FIELD REPLICATE #4	TEMP.	—	pH	—	CONDUCTIVITY	—

GENERAL INFORMATION

WEATHER CONDITIONS AT TIME OF SAMPLING Cloudy Warm
SAMPLING CHARACTERISTICS Clear
CONTAINERS AND PRESERVATIVES 2 VOAS - TPH GRO
3 VOAS - BTEX, MTBE

RECOMMENDATION/OBSERVATIONS —

SAMPLE ID NUMBERS PZ-1

SAMPLING PERSONNEL: TIME 9:40 TO 10:00

Corey Burns
(SIGNED)

DATE 9-2-15

Well casing was in locked position upon arrival. Yes ___ No ___ N/A	Well casing was in locked position upon completion of GW sampling. Yes ___ No ___ N/A

URS

GROUNDWATER COLLECTION REPORT

PROJECT NUMBER AND NAME 60402697 Pennzoil LOCATION Zachary, LA
COLLECTOR/OPERATOR Corey Burns / Kyle Templet WELL NO. 1-R1
TYPE OF SAMPLE Water ( ) GRAB ( ) COMPOSITE ( ) OTHER —
METHOD OF SAMPLING IF OTHER THAN MONITOR WELL NA SHUTTLE NO. NA

MONITOR WELL INFORMATION

EVACUATION: DATE/TIME 9-2-15 10:15 METHOD OF EVACUATION Bailer
INITIAL DEPTH TO WATER LEVEL 18.71 TOP OF CASING TO BOTTOM 23.30
GALLONS PER WELL VOLUME 0.74 TOTAL GALLONS EVACUATED ~~2.75~~ C.R.
FINAL DEPTH TO WATER ---------------- ELEVATION TOP OF CASING

SAMPLING: DATE/TIME 9-2-15 1030 METHOD OF SAMPLING Bailer
DEPTH TO WATER LEVEL -----------------

SAMPLE DATA

FIELD REPLICATE #1	TEMP. 23.5	pH 4.65	CONDUCTIVITY 0.46 ms
FIELD REPLICATE #2	TEMP. 22.4	pH 4.23	CONDUCTIVITY 0.47
FIELD REPLICATE #3	TEMP. —	pH —	CONDUCTIVITY —
FIELD REPLICATE #4	TEMP. —	pH —	CONDUCTIVITY —

GENERAL INFORMATION

WEATHER CONDITIONS AT TIME OF SAMPLING Cloudy Warm
SAMPLING CHARACTERISTICS Cloudy
CONTAINERS AND PRESERVATIVES 2 VOAs TPH-GRO
3 VOAs BTEX, MTBE
RECOMMENDATION/OBSERVATIONS Only 2 well volums removed.
Well dried up

SAMPLE ID NUMBERS

SAMPLING PERSONNEL: TIME 1015 TO 1030

Corey Burns (SIGNED) DATE 9-2-15

Well casing was in locked position upon arrival. Yes ____ No ____ N/A	Well casing was in locked position upon completion of GW sampling. Yes ____ No ____ N/A

URS

GROUNDWATER COLLECTION REPORT

PROJECT NUMBER AND NAME 60402697, Prairs Rd LOCATION Zachary, LA
COLLECTOR/OPERATOR Corey Burns/Kyle Templet WELL NO. MW-2
TYPE OF SAMPLE Water ( ) GRAB / ( ) COMPOSITE ( ) OTHER
METHOD OF SAMPLING IF OTHER THAN MONITOR WELL NA SHUTTLE NO. NA

MONITOR WELL INFORMATION

EVACUATION: DATE/TIME 9-2-15 11:15 METHOD OF EVACUATION Bailer
INITIAL DEPTH TO WATER LEVEL 19.78 TOP OF CASING TO BOTTOM 24.29
GALLONS PER WELL VOLUME 0.75 TOTAL GALLONS EVACUATED 2.25
FINAL DEPTH TO WATER ---------------- ELEVATION TOP OF CASING —

SAMPLING: DATE/TIME 9-2-15 11:45 METHOD OF SAMPLING Bailer
DEPTH TO WATER LEVEL ----------------

SAMPLE DATA

FIELD REPLICATE #1	TEMP. 24.0 °C	pH 4.19	CONDUCTIVITY	2.79 mS
FIELD REPLICATE #2	TEMP. 22.4	pH 4.12	CONDUCTIVITY	2.75
FIELD REPLICATE #3	TEMP. 22.5	pH 4.02	CONDUCTIVITY	2.78
FIELD REPLICATE #4	TEMP. —	pH —	CONDUCTIVITY	—

GENERAL INFORMATION

WEATHER CONDITIONS AT TIME OF SAMPLING Cloudy Warm
SAMPLING CHARACTERISTICS Sunny Warm
CONTAINERS AND PRESERVATIVES 2 VOAS TPH-GRO
3 VOAS BTEX, MTBE
RECOMMENDATION/OBSERVATIONS —

SAMPLE ID NUMBERS MW-2

SAMPLING PERSONNEL: TIME 11:15 TO 11:45

[signature] (SIGNED) DATE 9-2-15

Well casing was in locked position upon arrival. Yes ____ No ____ N/A	Well casing was in locked position upon completion of GW sampling. Yes ____ No ____ N/A

URS

GROUNDWATER COLLECTION REPORT

PROJECT NUMBER AND NAME 60402697 Pearis Rd LOCATION Zachary, VA
COLLECTOR/OPERATOR Cory Burns / Bill Hardie WELL NO. MW-3
TYPE OF SAMPLE Water (X) GRAB ( ) COMPOSITE ( ) OTHER —
~~METHOD OF SAMPLING IF OTHER THAN MONITOR WELL~~ NA ~~SHUTTLE NO.~~ NA

MONITOR WELL INFORMATION

EVACUATION: DATE/TIME 9-3-15 1420 METHOD OF EVACUATION Bailer
INITIAL DEPTH TO WATER LEVEL 20.25 TOP OF CASING TO BOTTOM 25.56
GALLONS PER WELL VOLUME 0.77 TOTAL GALLONS EVACUATED 2.5
FINAL DEPTH TO WATER ---------------- ELEVATION TOP OF CASING —

SAMPLING: DATE/TIME 9-3-15 1440 METHOD OF SAMPLING Bailer
DEPTH TO WATER LEVEL -----------------

SAMPLE DATA

FIELD REPLICATE #1	TEMP.	24.7	pH	2.87	CONDUCTIVITY	5.41 ms
FIELD REPLICATE #2	TEMP.	23.8	pH	2.89	CONDUCTIVITY	5.33
FIELD REPLICATE #3	TEMP.	23.2	pH	2.64	CONDUCTIVITY	5.23
FIELD REPLICATE #4	TEMP.	—	pH	—	CONDUCTIVITY	—

GENERAL INFORMATION

WEATHER CONDITIONS AT TIME OF SAMPLING Sunny Hot
SAMPLING CHARACTERISTICS Slightly Cloudy
CONTAINERS AND PRESERVATIVES 2 VOAS TPH-GRO
3 VOAS BTEX, MTBE

RECOMMENDATION/OBSERVATIONS —

SAMPLE ID NUMBERS MW-3

SAMPLING PERSONNEL: TIME 1420 TO 1440

Cory Burns
(SIGNED)

DATE 9-3-15

Well casing was in locked position upon arrival. Yes N/A No ___	Well casing was in locked position upon completion of GW sampling. Yes N/A No ___

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URS

GROUNDWATER COLLECTION REPORT

PROJECT NUMBER AND NAME 60402 697 Pea..., Rd LOCATION Zachary, LA
COLLECTOR/OPERATOR Corey Burns / Kyle Templet WELL NO. MW-4
TYPE OF SAMPLE Water (X) GRAB ( ) COMPOSITE ( ) OTHER —
METHOD OF SAMPLING IF OTHER THAN MONITOR WELL NA SHUTTLE NO. NA

MONITOR WELL INFORMATION

EVACUATION: DATE/TIME 9-2-15 1035 METHOD OF EVACUATION Bailer
INITIAL DEPTH TO WATER LEVEL 21.22 TOP OF CASING TO BOTTOM 26
GALLONS PER WELL VOLUME ~~0.88~~ 0.88 TOTAL GALLONS EVACUATED 2.66
FINAL DEPTH TO WATER 21.11 ELEVATION TOP OF CASING —

SAMPLING: DATE/TIME 9-2-15 1100 METHOD OF SAMPLING Bailer
DEPTH TO WATER LEVEL ----------------

SAMPLE DATA

FIELD REPLICATE #1	TEMP.	22.6	pH	5.88	CONDUCTIVITY	0.06
FIELD REPLICATE #2	TEMP.	22.1	pH	5.88	CONDUCTIVITY	0.06
FIELD REPLICATE #3	TEMP.	22.0	pH	5.89	CONDUCTIVITY	0.05
FIELD REPLICATE #4	TEMP.	—	pH	—	CONDUCTIVITY	—

GENERAL INFORMATION

WEATHER CONDITIONS AT TIME OF SAMPLING Cloudy Warm
SAMPLING CHARACTERISTICS Highly Cloudy
CONTAINERS AND PRESERVATIVES 2 VOAS TPH-GRO
3 VOAS BTEX, MTBE

RECOMMENDATION/OBSERVATIONS —

SAMPLE ID NUMBERS MW-4

SAMPLING PERSONNEL: TIME 1035 TO 11:00

Corey Burns
(SIGNED)

DATE 9-2-15

Well casing was in locked position upon arrival. Yes ____ No ____ N/A	Well casing was in locked position upon completion of GW sampling. Yes ____ No ____ N/A

URS

GROUNDWATER COLLECTION REPORT

PROJECT NUMBER AND NAME 60402697 Pearcs Rd LOCATION Zachary, LA

COLLECTOR/OPERATOR Corey Burns / Bill Hardle WELL NO. OMW-5

TYPE OF SAMPLE Water (X) GRAB ( ) COMPOSITE ( ) OTHER —

METHOD OF SAMPLING IF OTHER THAN MONITOR WELL NA SHUTTLE NO. NA

MONITOR WELL INFORMATION

EVACUATION: DATE/TIME 9-3-15 1530 METHOD OF EVACUATION Bailer

INITIAL DEPTH TO WATER LEVEL 19.80 TOP OF CASING TO BOTTOM 24.06

GALLONS PER WELL VOLUME 0.70 TOTAL GALLONS EVACUATED 2

FINAL DEPTH TO WATER ---------------- ELEVATION TOP OF CASING —

SAMPLING: DATE/TIME 9-3-15 1630 METHOD OF SAMPLING Bailer

DEPTH TO WATER LEVEL ---------------- 20.03

SAMPLE DATA

FIELD REPLICATE #1	TEMP.	23.6 C	pH	2.92	CONDUCTIVITY	6.96 ms
FIELD REPLICATE #2	TEMP.	23.0	pH	2.92	CONDUCTIVITY	7.01
FIELD REPLICATE #3	TEMP.	22.7	pH	2.90	CONDUCTIVITY	7.07
FIELD REPLICATE #4	TEMP.		pH		CONDUCTIVITY	

GENERAL INFORMATION

WEATHER CONDITIONS AT TIME OF SAMPLING Cloudy Hot

SAMPLING CHARACTERISTICS Slightly Cloudy

CONTAINERS AND PRESERVATIVES 2 VOAs TPH-GRO

3 VOAs BTEX, MTBE

RECOMMENDATION/OBSERVATIONS —

SAMPLE ID NUMBERS OMW-5

SAMPLING PERSONNEL: Corey Burns (SIGNED)

TIME 1530 TO 1630

DATE 9-3-15

Well casing was in locked position upon arrival. Yes ___ No ___ N/A	Well casing was in locked position upon completion of GW sampling. Yes ___ No ___ N/A

URS

GROUNDWATER COLLECTION REPORT

PROJECT NUMBER AND NAME 604 07 697 Pearis Rd LOCATION Zachary, LA
COLLECTOR/OPERATOR Corey Burns / Kyle Templet WELL NO. MW-6
TYPE OF SAMPLE Water (X) GRAB ( ) COMPOSITE ( ) OTHER
METHOD OF SAMPLING IF OTHER THAN MONITOR WELL NA SHUTTLE NO. NA

MONITOR WELL INFORMATION

EVACUATION: DATE/TIME 9-3-15 1500 METHOD OF EVACUATION Bailer
INITIAL DEPTH TO WATER LEVEL 20.13 TOP OF CASING TO BOTTOM 24.90
GALLONS PER WELL VOLUME 0.77 TOTAL GALLONS EVACUATED ≈2
FINAL DEPTH TO WATER ---------------- ELEVATION TOP OF CASING —

SAMPLING: DATE/TIME 9-3-15 1520 METHOD OF SAMPLING Bailer
DEPTH TO WATER LEVEL ---------------- dry

SAMPLE DATA

FIELD REPLICATE #1	TEMP.	24.9 °C	pH	3.67	CONDUCTIVITY	2.68
FIELD REPLICATE #2	TEMP.	24.0	pH	3.88	CONDUCTIVITY	2.57
FIELD REPLICATE #3	TEMP.	24.1	pH	3.26	CONDUCTIVITY	2.72
FIELD REPLICATE #4	TEMP.		pH		CONDUCTIVITY	

GENERAL INFORMATION

WEATHER CONDITIONS AT TIME OF SAMPLING Sunny Hot
SAMPLING CHARACTERISTICS Cloudy Slightly
CONTAINERS AND PRESERVATIVES 2 VOAs TPH-GRO
3 VOAs MTBE, BTEX
RECOMMENDATION/OBSERVATIONS Duplicate taken at MW-6
Temp Blank, Trip Blank put in ice chest at 1700. Only two volumes removed from MW-6. Let recharge, got 3rd reading & began sampling
SAMPLE ID NUMBERS MW-6 MW-6 FD

SAMPLING PERSONNEL: TIME 1500 TO 1520

Corey Burns (SIGNED) DATE 9-3-15

Well casing was in locked position upon arrival. Yes ____ No ____ N/A	Well casing was in locked position upon completion of GW sampling. Yes ____ No ____ N/A

URS

GROUNDWATER COLLECTION REPORT

PROJECT NUMBER AND NAME 60402697 Peairs, Rd LOCATION Zachary, LA
COLLECTOR/OPERATOR Corey Burns / Kyle Templet WELL NO. MW-7
TYPE OF SAMPLE Water (X) GRAB ( ) COMPOSITE ( ) OTHER —
METHOD OF SAMPLING IF OTHER THAN MONITOR WELL NA SHUTTLE NO. NA

MONITOR WELL INFORMATION

EVACUATION: DATE/TIME 9-2-15 1320 METHOD OF EVACUATION Bailer
INITIAL DEPTH TO WATER LEVEL 20.35 TOP OF CASING TO BOTTOM 25.45
GALLONS PER WELL VOLUME .83 TOTAL GALLONS EVACUATED 2.49
FINAL DEPTH TO WATER ---------------- ELEVATION TOP OF CASING —

SAMPLING: DATE/TIME 9-2-15 1340 METHOD OF SAMPLING Bailer
DEPTH TO WATER LEVEL ---------------- 20.39

SAMPLE DATA

FIELD REPLICATE #1	TEMP. 22.9	pH 5.15	CONDUCTIVITY 0.25 ms
FIELD REPLICATE #2	TEMP. 21.9	pH 5.24	CONDUCTIVITY 0.22
FIELD REPLICATE #3	TEMP. 22.0	pH 5.76	CONDUCTIVITY 0.22
FIELD REPLICATE #4	TEMP. —	pH —	CONDUCTIVITY —

GENERAL INFORMATION

WEATHER CONDITIONS AT TIME OF SAMPLING Cloudy Warm
SAMPLING CHARACTERISTICS
CONTAINERS AND PRESERVATIVES 2 VOAs TPH-GRO
3 VOAs BTEX, MTBE
RECOMMENDATION/OBSERVATIONS —

SAMPLE ID NUMBERS MW-7

SAMPLING PERSONNEL: TIME 1320 TO 1340

Corey Burns
(SIGNED)

DATE 9-2-15

Well casing was in locked position upon arrival. Yes ___ No ___ N/A	Well casing was in locked position upon completion of GW sampling. Yes ___ No ___ N/A

URS

GROUNDWATER COLLECTION REPORT

PROJECT NUMBER AND NAME 600402 697 Peairs Rd LOCATION Zachary, LA
COLLECTOR/OPERATOR Corey Burns Kyle Templet WELL NO. SMW-8
TYPE OF SAMPLE Water (X) GRAB ( ) COMPOSITE ( ) OTHER —
METHOD OF SAMPLING IF OTHER THAN MONITOR WELL NA SHUTTLE NO. NA

MONITOR WELL INFORMATION

EVACUATION: DATE/TIME 9-2-15 1245 METHOD OF EVACUATION Bailer
INITIAL DEPTH TO WATER LEVEL 19.83 TOP OF CASING TO BOTTOM 25.27
GALLONS PER WELL VOLUME .88 TOTAL GALLONS EVACUATED 3
FINAL DEPTH TO WATER ---------------- 19.83 ELEVATION TOP OF CASING —

SAMPLING: DATE/TIME 9-2-15 METHOD OF SAMPLING Bailer
DEPTH TO WATER LEVEL -----------------

SAMPLE DATA

FIELD REPLICATE #1	TEMP. 22.3 C	pH 3.77	CONDUCTIVITY 1.09 mS
FIELD REPLICATE #2	TEMP. 22.5	pH 3.74	CONDUCTIVITY 1.12
FIELD REPLICATE #3	TEMP. 22.7	pH 3.74	CONDUCTIVITY 0.97
FIELD REPLICATE #4	TEMP. —	pH —	CONDUCTIVITY —

GENERAL INFORMATION

WEATHER CONDITIONS AT TIME OF SAMPLING Cloudy Warm
SAMPLING CHARACTERISTICS Mostly clear
CONTAINERS AND PRESERVATIVES 2 VOAs TPH-GRO
3 VOAs BTEX, MTBE

RECOMMENDATION/OBSERVATIONS —

SAMPLE ID NUMBERS MW-8

SAMPLING PERSONNEL: TIME 1245 TO 1315

Corey Burns
(SIGNED)

DATE 9-2-15

Well casing was in locked position upon arrival. Yes ___ No ___ N/A	Well casing was in locked position upon completion of GW sampling. Yes ___ No ___ N/A

URS

GROUNDWATER COLLECTION REPORT

PROJECT NUMBER AND NAME 604 07 697 Pearis Rd LOCATION Zachary LA
COLLECTOR/OPERATOR Corey Burns / Kyle Templet WELL NO. MW-9
TYPE OF SAMPLE Water (X) GRAB ( ) COMPOSITE ( ) OTHER
METHOD OF SAMPLING IF OTHER THAN MONITOR WELL NA SHUTTLE NO. NA

MONITOR WELL INFORMATION

EVACUATION: DATE/TIME 9-2-15 1450 METHOD OF EVACUATION Bailer
INITIAL DEPTH TO WATER LEVEL 19.76 TOP OF CASING TO BOTTOM 25.02
GALLONS PER WELL VOLUME 0.85 TOTAL GALLONS EVACUATED 3
FINAL DEPTH TO WATER 19.82 ELEVATION TOP OF CASING —

SAMPLING: DATE/TIME 9-2-15 1520 METHOD OF SAMPLING Bailer
DEPTH TO WATER LEVEL ------------------

SAMPLE DATA

FIELD REPLICATE #1	TEMP. 23.5	pH 7.93	CONDUCTIVITY	4.67
FIELD REPLICATE #2	TEMP. 22.3	pH 7.91	CONDUCTIVITY	4.79
FIELD REPLICATE #3	TEMP. 22.1	pH 7.97	CONDUCTIVITY	4.85
FIELD REPLICATE #4	TEMP. —	pH —	CONDUCTIVITY	—

GENERAL INFORMATION

WEATHER CONDITIONS AT TIME OF SAMPLING Cloudy Warm
SAMPLING CHARACTERISTICS mostly clear
CONTAINERS AND PRESERVATIVES 2 VOAs TPH-GRO
3 VOAs MTBE, BTEX

RECOMMENDATION/OBSERVATIONS —

SAMPLE ID NUMBERS MW-9

SAMPLING PERSONNEL: TIME 1450 TO 1520

Corey Burns (SIGNED) DATE 9-2-15

Well casing was in locked position upon arrival. Yes ____ No ____ N/A	Well casing was in locked position upon completion of GW sampling. Yes ____ No ____ N/A

URS

GROUNDWATER COLLECTION REPORT

PROJECT NUMBER AND NAME 60402697 Peairs, Rd LOCATION Zachary, LA
COLLECTOR/OPERATOR Greg Burns / Kyle Templet WELL NO. MW-10
TYPE OF SAMPLE W ( ) GRAB ( ) COMPOSITE ( ) OTHER —
METHOD OF SAMPLING IF OTHER THAN MONITOR WELL NA SHUTTLE NO. NA

MONITOR WELL INFORMATION

EVACUATION: DATE/TIME 9-2-15 1345 METHOD OF EVACUATION Bailer
INITIAL DEPTH TO WATER LEVEL 19.81 TOP OF CASING TO BOTTOM 25.13
GALLONS PER WELL VOLUME 0.86 TOTAL GALLONS EVACUATED 2.5
FINAL DEPTH TO WATER ---------------- ELEVATION TOP OF CASING —

SAMPLING: DATE/TIME 9-2-15 1400 METHOD OF SAMPLING Bailer
DEPTH TO WATER LEVEL ----------------

SAMPLE DATA

FIELD REPLICATE #1	TEMP. 23.2	pH 3.08	CONDUCTIVITY 2.12
FIELD REPLICATE #2	TEMP. 22.3	pH 3.04	CONDUCTIVITY 2.18
FIELD REPLICATE #3	TEMP. 21.8	pH 3.07	CONDUCTIVITY 2.14
FIELD REPLICATE #4	TEMP. —	pH —	CONDUCTIVITY —

GENERAL INFORMATION

WEATHER CONDITIONS AT TIME OF SAMPLING Cloudy Warm
SAMPLING CHARACTERISTICS clear
CONTAINERS AND PRESERVATIVES 2 VOAS - TPH GRO
3 VOAS - BTEX, MTBE
RECOMMENDATION/OBSERVATIONS —

SAMPLE ID NUMBERS MW-10

SAMPLING PERSONNEL: TIME 1345 TO 1400

Greg Burns
(SIGNED) DATE 9-2-15

Well casing was in locked position upon arrival. Yes ___ No ___ N/A	Well casing was in locked position upon completion of GW sampling. Yes ___ No ___ N/A

URS

GROUNDWATER COLLECTION REPORT

PROJECT NUMBER AND NAME 60402697 Pearrs Rd LOCATION Zachary, LA
COLLECTOR/OPERATOR Greg Burns / Kyle Templet WELL NO. MW-11
TYPE OF SAMPLE Water (X) GRAB ( ) COMPOSITE ( ) OTHER
METHOD OF SAMPLING IF OTHER THAN MONITOR WELL NA SHUTTLE NO. NA

MONITOR WELL INFORMATION

EVACUATION: DATE/TIME 9-2-15 1420 METHOD OF EVACUATION Bailer
INITIAL DEPTH TO WATER LEVEL 19.48 TOP OF CASING TO BOTTOM 25.00
GALLONS PER WELL VOLUME .90 TOTAL GALLONS EVACUATED 3
FINAL DEPTH TO WATER ---- ELEVATION TOP OF CASING —

SAMPLING: DATE/TIME 9-2-15 1440 METHOD OF SAMPLING Bailer
DEPTH TO WATER LEVEL ----

SAMPLE DATA

FIELD REPLICATE #1	TEMP. 24.2	pH 4.36	CONDUCTIVITY 0.74
FIELD REPLICATE #2	TEMP. 22.3	pH 4.23	CONDUCTIVITY 0.74
FIELD REPLICATE #3	TEMP. 22.1	pH 4.22	CONDUCTIVITY 0.73
FIELD REPLICATE #4	TEMP. —	pH —	CONDUCTIVITY —

GENERAL INFORMATION

WEATHER CONDITIONS AT TIME OF SAMPLING Cloudy Warm
SAMPLING CHARACTERISTICS
CONTAINERS AND PRESERVATIVES 2 VOAS TPH GRO
3 VOAS BTEX, MTBE
RECOMMENDATION/OBSERVATIONS —

SAMPLE ID NUMBERS

SAMPLING PERSONNEL: TIME 1420 TO 1440

Greg Burns
(SIGNED)

DATE 9-2-15

Well casing was in locked position upon arrival. Yes ____ No ____ N/A	Well casing was in locked position upon completion of GW sampling. Yes ____ No ____ N/A

APPENDIX B

GROUNDWATER ANALYTICAL LABORATORY REPORTS

GCAL ANALYTICAL LABORATORIES, LLC

NELAP CERTIFICATE NUMBER: 01955
DOD ELAP CERTIFICATE NUMBER: L14-243

ANALYTICAL RESULTS

PERFORMED BY

GCAL, LLC
7979 Innovation Park Dr.
Baton Rouge, LA 70820

Report Date 03/16/2015

GCAL Report 215030626

Deliver To	URS/WCC 7389 Florida Blvd, Suite 300 Paul_Harper@URSCorp.com Baton Rouge, LA 70806 225-252-5413
Attn	Paul Harper
Project	Peirs Rd 19230915.00001

PJLA Testing DoD ELAP

ISO 17025

NELAP ACCREDITED TNI LABORATORY

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with GCAL's Standard Operating Procedures.

Common Abbreviations that may be Utilized in this Report

ND	Indicates the result was Not Detected at the specified reporting limit
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
MDL	Method Detection Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
RE	Re-analysis
DL	Dilution
N	Metals Matrix Spike or Matrix Spike Duplicate Recovery is outside control limits
00:00	Reported as a time equivalent to 12:00 AM

Reporting Flags that may be Utilized in this Report

J or I	Indicates the result is between the MDL and LOQ
U	Indicates the compound was analyzed for but not detected
B	Indicates the analyte was detected in the associated Method Blank
Q	Indicates a non-compliant QC Result (See Q Flag Application Report)
*****	Indicates a non-compliant or not applicable QC recovery or RPD

Sample receipt at GCAL is documented through the attached chain of custody. In accordance with NELAC, this report shall be reproduced only in full and with the written permission of GCAL. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with the NELAC standard and terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.

Estimated uncertainty of measurement is available upon request. This report is in compliance with the DOD QSM as specified in the contract if applicable.

Karen Melerine/Mng Data Del

Authorized Signature
GCAL Report 215030626

Case Narrative

Client: Kinder Morgan Energy Partners **Report:** 215030626

Gulf Coast Analytical Laboratories received and analyzed the sample(s) listed on the Report Sample Summary page of this report. Receipt of the sample(s) is documented by the attached chain of custody. This applies only to the sample(s) listed in this report. No sample integrity or quality control exceptions were identified unless noted below.

VOLATILES MASS SPECTROMETRY

In the EPA 8260B analysis, samples 21503062610 (MW-3), 21503062611 (MW-6), 21503062609 (MW-9), 21503062613 (MW-5) and 21503062614 (MW-5 DUP) had to be diluted to bracket the concentration of target compounds within the calibration range of the instrument. The dilution is reflected in elevated detection limits.

VOLATILES GAS CHROMATOGRAPHY

In the EPA 8015C GRO analysis, samples 21503062610 (MW-3), 21503062611 (MW-6), 21503062613 (MW-5) and 21503062614 (MW-5 DUP) had to be diluted to bracket the concentration of target analyte(s) within the calibration range of the instrument.

In the EPA 8015C GRO analysis, the recovery for the surrogate was outside control limits for sample 21503062611 (MW-6). The sample was re-analyzed yielding a similar recovery. This is attributed to matrix interference.

Report Sample Summary

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21503062601	PZ-1	Water	03/05/2015 11:15	03/06/2015 14:50
21503062602	MW-1R1	Water	03/05/2015 12:00	03/06/2015 14:50
21503062603	MW-4	Water	03/05/2015 12:15	03/06/2015 14:50
21503062604	MW-2	Water	03/05/2015 13:45	03/06/2015 14:50
21503062605	MW-8	Water	03/05/2015 14:00	03/06/2015 14:50
21503062606	MW-7	Water	03/05/2015 14:40	03/06/2015 14:50
21503062607	MW-10	Water	03/05/2015 15:15	03/06/2015 14:50
21503062608	MW-11	Water	03/05/2015 15:30	03/06/2015 14:50
21503062609	MW-9	Water	03/05/2015 15:40	03/06/2015 14:50
21503062610	MW-3	Water	03/05/2015 16:15	03/06/2015 14:50
21503062611	MW-6	Water	03/05/2015 16:30	03/06/2015 14:50
21503062612	TRIP BLANK	Water	03/05/2015 16:35	03/06/2015 14:50
21503062613	MW-5	Water	03/05/2015 17:00	03/06/2015 14:50
21503062614	MW-5 DUP	Water	03/05/2015 17:00	03/06/2015 14:50

Summary of Compounds Detected

MW-2	**Collect Date**	03/05/2015 13:45	**GCAL ID**	21503062604
	Receive Date	03/06/2015 14:50	**Matrix**	Water

EPA 8260B

CAS#	Parameter	Result	LOQ	Units
1634-04-4	tert-Butyl methyl ether (MTBE)	3.00	1.00	ug/L

MW-8	**Collect Date**	03/05/2015 14:00	**GCAL ID**	21503062605
	Receive Date	03/06/2015 14:50	**Matrix**	Water

EPA 8260B

CAS#	Parameter	Result	LOQ	Units
1634-04-4	tert-Butyl methyl ether (MTBE)	1.37	1.00	ug/L

MW-10	**Collect Date**	03/05/2015 15:15	**GCAL ID**	21503062607
	Receive Date	03/06/2015 14:50	**Matrix**	Water

EPA 8260B

CAS#	Parameter	Result	LOQ	Units
1634-04-4	tert-Butyl methyl ether (MTBE)	10.4	1.00	ug/L

MW-11	**Collect Date**	03/05/2015 15:30	**GCAL ID**	21503062608
	Receive Date	03/06/2015 14:50	**Matrix**	Water

EPA 8260B

CAS#	Parameter	Result	LOQ	Units
1634-04-4	tert-Butyl methyl ether (MTBE)	88.5	1.00	ug/L

MW-9	**Collect Date**	03/05/2015 15:40	**GCAL ID**	21503062609
	Receive Date	03/06/2015 14:50	**Matrix**	Water

EPA 8260B

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	2.91	1.00	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	283	5.00	ug/L
108-88-3	Toluene	1.74	1.00	ug/L
1330-20-7	Xylene (total)	3.23	3.00	ug/L

Summary of Compounds Detected

MW-9	**Collect Date**	03/05/2015 15:40	**GCAL ID**	21503062609
	Receive Date	03/06/2015 14:50	**Matrix**	Water

EPA 8015C GRO

CAS#	Parameter	Result	LOQ	Units
8006-61-9	Gasoline Range Organics	489	100	ug/L

MW-3	**Collect Date**	03/05/2015 16:15	**GCAL ID**	21503062610
	Receive Date	03/06/2015 14:50	**Matrix**	Water

EPA 8260B

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	111	20.0	ug/L
100-41-4	Ethylbenzene	111	20.0	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	2380	20.0	ug/L
108-88-3	Toluene	162	20.0	ug/L
1330-20-7	Xylene (total)	531	60.0	ug/L

EPA 8015C GRO

CAS#	Parameter	Result	LOQ	Units
8006-61-9	Gasoline Range Organics	4760	1000	ug/L

MW-6	**Collect Date**	03/05/2015 16:30	**GCAL ID**	21503062611
	Receive Date	03/06/2015 14:50	**Matrix**	Water

EPA 8260B

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	227	50.0	ug/L
100-41-4	Ethylbenzene	65.1	50.0	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	7920	50.0	ug/L
108-88-3	Toluene	599	50.0	ug/L
1330-20-7	Xylene (total)	472	150	ug/L

EPA 8015C GRO

CAS#	Parameter	Result	LOQ	Units
8006-61-9	Gasoline Range Organics	8070	1000	ug/L

Summary of Compounds Detected

MW-5	**Collect Date**	03/05/2015 17:00	**GCAL ID**	21503062613
	Receive Date	03/06/2015 14:50	**Matrix**	Water

EPA 8260B

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	349	10.0	ug/L
100-41-4	Ethylbenzene	79.4	10.0	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	9960	100	ug/L
108-88-3	Toluene	619	10.0	ug/L
1330-20-7	Xylene (total)	362	30.0	ug/L

EPA 8015C GRO

CAS#	Parameter	Result	LOQ	Units
8006-61-9	Gasoline Range Organics	8400	1000	ug/L

MW-5 DUP	**Collect Date**	03/05/2015 17:00	**GCAL ID**	21503062614
	Receive Date	03/06/2015 14:50	**Matrix**	Water

EPA 8260B

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	344	10.0	ug/L
100-41-4	Ethylbenzene	77.4	10.0	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	10800	100	ug/L
108-88-3	Toluene	598	10.0	ug/L
1330-20-7	Xylene (total)	358	30.0	ug/L

EPA 8015C GRO

CAS#	Parameter	Result	LOQ	Units
8006-61-9	Gasoline Range Organics	7450	1000	ug/L

Sample Results

PZ-1	**Collect Date**	03/05/2015 11:15	**GCAL ID**	21503062601
	Receive Date	03/06/2015 14:50	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/13/2015 02:03	JCK	554041

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	ND	1.00	ug/L
100-41-4	Ethylbenzene	ND	1.00	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	ND	1.00	ug/L
108-88-3	Toluene	ND	1.00	ug/L
1330-20-7	Xylene (total)	ND	3.00	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	50.7	ug/L	101	78 - 130
1868-53-7	Dibromofluoromethane	50	51.7	ug/L	103	77 - 127
2037-26-5	Toluene d8	50	56	ug/L	112	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	50	ug/L	100	71 - 127

EPA 8015C GRO

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/12/2015 12:59	JAR	553972

CAS#	Parameter	Result	LOQ	Units
8006-61-9	Gasoline Range Organics	ND	100	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
106-39-8	Bromochlorobenzene	30	19.6	ug/L	65	49 - 136

MW-1R1	**Collect Date**	03/05/2015 12:00	**GCAL ID**	21503062602
	Receive Date	03/06/2015 14:50	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/13/2015 02:24	JCK	554041

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	ND	1.00	ug/L
100-41-4	Ethylbenzene	ND	1.00	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	ND	1.00	ug/L
108-88-3	Toluene	ND	1.00	ug/L

Sample Results

MW-1R1	**Collect Date**	03/05/2015 12:00	**GCAL ID**	21503062602
	Receive Date	03/06/2015 14:50	**Matrix**	Water

EPA 8260B (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/13/2015 02:24	JCK	554041

CAS#	Parameter	Result	LOQ	Units
1330-20-7	Xylene (total)	ND	3.00	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	50.1	ug/L	100	78 - 130
1868-53-7	Dibromofluoromethane	50	51.9	ug/L	104	77 - 127
2037-26-5	Toluene d8	50	55.2	ug/L	110	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	49.3	ug/L	99	71 - 127

EPA 8015C GRO

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/12/2015 13:16	JAR	553972

CAS#	Parameter	Result	LOQ	Units
8006-61-9	Gasoline Range Organics	ND	100	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
106-39-8	Bromochlorobenzene	30	21	ug/L	70	49 - 136

MW-4	**Collect Date**	03/05/2015 12:15	**GCAL ID**	21503062603
	Receive Date	03/06/2015 14:50	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/13/2015 02:45	JCK	554041

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	ND	1.00	ug/L
100-41-4	Ethylbenzene	ND	1.00	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	ND	1.00	ug/L
108-88-3	Toluene	ND	1.00	ug/L
1330-20-7	Xylene (total)	ND	3.00	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	50.6	ug/L	101	78 - 130
1868-53-7	Dibromofluoromethane	50	53	ug/L	106	77 - 127
2037-26-5	Toluene d8	50	56.4	ug/L	113	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	49.9	ug/L	100	71 - 127

Sample Results

MW-4	**Collect Date**	03/05/2015 12:15	**GCAL ID**	21503062603
	Receive Date	03/06/2015 14:50	**Matrix**	Water

EPA 8015C GRO

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/12/2015 13:30	JAR	553972

CAS#	Parameter	Result	LOQ	Units
8006-61-9	Gasoline Range Organics	ND	100	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
106-39-8	Bromochlorobenzene	30	20.4	ug/L	68	49 - 136

MW-2	**Collect Date**	03/05/2015 13:45	**GCAL ID**	21503062604
	Receive Date	03/06/2015 14:50	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/13/2015 03:06	JCK	554041

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	ND	1.00	ug/L
100-41-4	Ethylbenzene	ND	1.00	ug/L
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**3.00**	**1.00**	**ug/L**
108-88-3	Toluene	ND	1.00	ug/L
1330-20-7	Xylene (total)	ND	3.00	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	49.5	ug/L	99	78 - 130
1868-53-7	Dibromofluoromethane	50	52.2	ug/L	104	77 - 127
2037-26-5	Toluene d8	50	56.4	ug/L	113	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	49.4	ug/L	99	71 - 127

EPA 8015C GRO

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/12/2015 13:43	JAR	553972

CAS#	Parameter	Result	LOQ	Units
8006-61-9	Gasoline Range Organics	ND	100	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
106-39-8	Bromochlorobenzene	30	20.3	ug/L	68	49 - 136

Sample Results

MW-8

Collect Date	03/05/2015 14:00	GCAL ID	21503062605
Receive Date	03/06/2015 14:50	Matrix	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/13/2015 03:28	JCK	554041

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	ND	1.00	ug/L
100-41-4	Ethylbenzene	ND	1.00	ug/L
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**1.37**	**1.00**	**ug/L**
108-88-3	Toluene	ND	1.00	ug/L
1330-20-7	Xylene (total)	ND	3.00	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	50	ug/L	100	78 - 130
1868-53-7	Dibromofluoromethane	50	52.6	ug/L	105	77 - 127
2037-26-5	Toluene d8	50	55.2	ug/L	110	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	49.6	ug/L	99	71 - 127

EPA 8015C GRO

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/12/2015 13:55	JAR	553972

CAS#	Parameter	Result	LOQ	Units
8006-61-9	Gasoline Range Organics	ND	100	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
106-39-8	Bromochlorobenzene	30	20.3	ug/L	68	49 - 136

MW-7

Collect Date	03/05/2015 14:40	GCAL ID	21503062606
Receive Date	03/06/2015 14:50	Matrix	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/13/2015 03:49	JCK	554041

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	ND	1.00	ug/L
100-41-4	Ethylbenzene	ND	1.00	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	ND	1.00	ug/L
108-88-3	Toluene	ND	1.00	ug/L

Sample Results

MW-7	**Collect Date**	03/05/2015 14:40	**GCAL ID**	21503062606
	Receive Date	03/06/2015 14:50	**Matrix**	Water

EPA 8260B (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/13/2015 03:49	JCK	554041

CAS#	Parameter	Result	LOQ	Units
1330-20-7	Xylene (total)	ND	3.00	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	52	ug/L	104	78 - 130
1868-53-7	Dibromofluoromethane	50	52.5	ug/L	105	77 - 127
2037-26-5	Toluene d8	50	56.8	ug/L	114	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	50	ug/L	100	71 - 127

EPA 8015C GRO

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/12/2015 14:09	JAR	553972

CAS#	Parameter	Result	LOQ	Units
8006-61-9	Gasoline Range Organics	ND	100	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
106-39-8	Bromochlorobenzene	30	20.4	ug/L	68	49 - 136

MW-10	**Collect Date**	03/05/2015 15:15	**GCAL ID**	21503062607
	Receive Date	03/06/2015 14:50	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/13/2015 04:10	JCK	554041

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	ND	1.00	ug/L
100-41-4	Ethylbenzene	ND	1.00	ug/L
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**10.4**	**1.00**	**ug/L**
108-88-3	Toluene	ND	1.00	ug/L
1330-20-7	Xylene (total)	ND	3.00	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.2	ug/L	102	78 - 130
1868-53-7	Dibromofluoromethane	50	52.2	ug/L	104	77 - 127
2037-26-5	Toluene d8	50	55.6	ug/L	111	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	49.1	ug/L	98	71 - 127

Sample Results

MW-10

Collect Date	03/05/2015 15:15	**GCAL ID**	21503062607
Receive Date	03/06/2015 14:50	**Matrix**	Water

EPA 8015C GRO

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/12/2015 14:22	JAR	553972

CAS#	Parameter	Result	LOQ	Units
8006-61-9	Gasoline Range Organics	ND	100	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
106-39-8	Bromochlorobenzene	30	20.6	ug/L	69	49 - 136

MW-11

Collect Date	03/05/2015 15:30	**GCAL ID**	21503062608
Receive Date	03/06/2015 14:50	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/13/2015 04:31	JCK	554041

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	ND	1.00	ug/L
100-41-4	Ethylbenzene	ND	1.00	ug/L
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**88.5**	**1.00**	**ug/L**
108-88-3	Toluene	ND	1.00	ug/L
1330-20-7	Xylene (total)	ND	3.00	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	50.6	ug/L	101	78 - 130
1868-53-7	Dibromofluoromethane	50	52.3	ug/L	105	77 - 127
2037-26-5	Toluene d8	50	54.5	ug/L	109	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	49.9	ug/L	100	71 - 127

EPA 8015C GRO

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/12/2015 14:35	JAR	553972

CAS#	Parameter	Result	LOQ	Units
8006-61-9	Gasoline Range Organics	ND	100	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
106-39-8	Bromochlorobenzene	30	20.4	ug/L	68	49 - 136

Sample Results

MW-9	**Collect Date**	03/05/2015 15:40	**GCAL ID**	21503062609
	Receive Date	03/06/2015 14:50	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/13/2015 05:16	JCK	554041

CAS#	Parameter	Result	LOQ	Units
71-43-2	**Benzene**	**2.91**	**1.00**	**ug/L**
100-41-4	Ethylbenzene	ND	1.00	ug/L
108-88-3	**Toluene**	**1.74**	**1.00**	**ug/L**
1330-20-7	**Xylene (total)**	**3.23**	**3.00**	**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	50.9	ug/L	102	78 - 130
1868-53-7	Dibromofluoromethane	50	48	ug/L	96	77 - 127
2037-26-5	Toluene d8	50	56.5	ug/L	113	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	46.4	ug/L	93	71 - 127

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	5	03/13/2015 04:55	JCK	554041

CAS#	Parameter	Result	LOQ	Units
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**283**	**5.00**	**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	250	255	ug/L	102	78 - 130
1868-53-7	Dibromofluoromethane	250	251	ug/L	100	77 - 127
2037-26-5	Toluene d8	250	280	ug/L	112	76 - 134
17060-07-0	1,2-Dichloroethane-d4	250	243	ug/L	97	71 - 127

EPA 8015C GRO

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/12/2015 14:48	JAR	553972

CAS#	Parameter	Result	LOQ	Units
8006-61-9	**Gasoline Range Organics**	**489**	**100**	**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
106-39-8	Bromochlorobenzene	30	26.8	ug/L	89	49 - 136

Sample Results

MW-3	**Collect Date**	03/05/2015 16:15	**GCAL ID**	21503062610
	Receive Date	03/06/2015 14:50	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	20	03/13/2015 05:58	JCK	554041

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	111	20.0	ug/L
100-41-4	Ethylbenzene	111	20.0	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	2380	20.0	ug/L
108-88-3	Toluene	162	20.0	ug/L
1330-20-7	Xylene (total)	531	60.0	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	1000	1070	ug/L	107	78 - 130
1868-53-7	Dibromofluoromethane	1000	1040	ug/L	104	77 - 127
2037-26-5	Toluene d8	1000	1130	ug/L	113	76 - 134
17060-07-0	1,2-Dichloroethane-d4	1000	1000	ug/L	100	71 - 127

EPA 8015C GRO

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	10	03/12/2015 17:12	JAR	553972

CAS#	Parameter	Result	LOQ	Units
8006-61-9	Gasoline Range Organics	4760	1000	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
106-39-8	Bromochlorobenzene	300	378	ug/L	126	49 - 136

MW-6	**Collect Date**	03/05/2015 16:30	**GCAL ID**	21503062611
	Receive Date	03/06/2015 14:50	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	50	03/13/2015 06:19	JCK	554041

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	227	50.0	ug/L
100-41-4	Ethylbenzene	65.1	50.0	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	7920	50.0	ug/L
108-88-3	Toluene	599	50.0	ug/L

Sample Results

MW-6	Collect Date	03/05/2015 16:30	GCAL ID	21503062611
	Receive Date	03/06/2015 14:50	Matrix	Water

EPA 8260B (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	50	03/13/2015 06:19	JCK	554041

CAS#	Parameter	Result	LOQ	Units
1330-20-7	**Xylene (total)**	**472**	**150**	**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	2500	2590	ug/L	104	78 - 130
1868-53-7	Dibromofluoromethane	2500	2550	ug/L	102	77 - 127
2037-26-5	Toluene d8	2500	2790	ug/L	112	76 - 134
17060-07-0	1,2-Dichloroethane-d4	2500	2490	ug/L	100	71 - 127

EPA 8015C GRO

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	10	03/12/2015 17:25	JAR	553972

CAS#	Parameter	Result	LOQ	Units
8006-61-9	**Gasoline Range Organics**	**8070**	**1000**	**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
106-39-8	Bromochlorobenzene	300	445	ug/L	**148***	49 - 136

TRIP BLANK	Collect Date	03/05/2015 16:35	GCAL ID	21503062612
	Receive Date	03/06/2015 14:50	Matrix	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/13/2015 01:42	JCK	554041

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	ND	1.00	ug/L
100-41-4	Ethylbenzene	ND	1.00	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	ND	1.00	ug/L
108-88-3	Toluene	ND	1.00	ug/L
1330-20-7	Xylene (total)	ND	3.00	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.3	ug/L	103	78 - 130
1868-53-7	Dibromofluoromethane	50	52.6	ug/L	105	77 - 127
2037-26-5	Toluene d8	50	56.5	ug/L	113	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	50	ug/L	100	71 - 127

Sample Results

TRIP BLANK	**Collect Date**	03/05/2015 16:35	**GCAL ID**	21503062612
	Receive Date	03/06/2015 14:50	**Matrix**	Water

EPA 8015C GRO

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/12/2015 16:57	JAR	553972

CAS#	Parameter	Result	LOQ	Units
8006-61-9	Gasoline Range Organics	ND	100	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
106-39-8	Bromochlorobenzene	30	22.3	ug/L	74	49 - 136

MW-5	**Collect Date**	03/05/2015 17:00	**GCAL ID**	21503062613
	Receive Date	03/06/2015 14:50	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	10	03/13/2015 13:21	CLH	554083

CAS#	Parameter	Result	LOQ	Units
71-43-2	**Benzene**	**349**	**10.0**	**ug/L**
100-41-4	**Ethylbenzene**	**79.4**	**10.0**	**ug/L**
108-88-3	**Toluene**	**619**	**10.0**	**ug/L**
1330-20-7	**Xylene (total)**	**362**	**30.0**	**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	500	533	ug/L	107	78 - 130
1868-53-7	Dibromofluoromethane	500	489	ug/L	98	77 - 127
2037-26-5	Toluene d8	500	558	ug/L	112	76 - 134
17060-07-0	1,2-Dichloroethane-d4	500	506	ug/L	101	71 - 127

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	100	03/13/2015 06:40	JCK	554041

CAS#	Parameter	Result	LOQ	Units
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**9960**	**100**	**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	5000	5080	ug/L	102	78 - 130
1868-53-7	Dibromofluoromethane	5000	5210	ug/L	104	77 - 127
2037-26-5	Toluene d8	5000	5690	ug/L	114	76 - 134
17060-07-0	1,2-Dichloroethane-d4	5000	5070	ug/L	101	71 - 127

Sample Results

MW-5

Collect Date	03/05/2015 17:00	**GCAL ID**	21503062613
Receive Date	03/06/2015 14:50	**Matrix**	Water

EPA 8015C GRO

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	10	03/12/2015 17:36	JAR	553972

CAS#	Parameter	Result	LOQ	Units
8006-61-9	Gasoline Range Organics	8400	1000	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
106-39-8	Bromochlorobenzene	300	250	ug/L	83	49 - 136

MW-5 DUP

Collect Date	03/05/2015 17:00	**GCAL ID**	21503062614
Receive Date	03/06/2015 14:50	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	10	03/13/2015 13:42	CLH	554083

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	344	10.0	ug/L
100-41-4	Ethylbenzene	77.4	10.0	ug/L
108-88-3	Toluene	598	10.0	ug/L
1330-20-7	Xylene (total)	358	30.0	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	500	524	ug/L	105	78 - 130
1868-53-7	Dibromofluoromethane	500	491	ug/L	98	77 - 127
2037-26-5	Toluene d8	500	552	ug/L	110	76 - 134
17060-07-0	1,2-Dichloroethane-d4	500	500	ug/L	100	71 - 127

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	100	03/13/2015 07:01	JCK	554041

CAS#	Parameter	Result	LOQ	Units
1634-04-4	tert-Butyl methyl ether (MTBE)	10800	100	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	5000	5110	ug/L	102	78 - 130
1868-53-7	Dibromofluoromethane	5000	5180	ug/L	104	77 - 127
2037-26-5	Toluene d8	5000	5550	ug/L	111	76 - 134
17060-07-0	1,2-Dichloroethane-d4	5000	5020	ug/L	100	71 - 127

Sample Results

MW-5 DUP	**Collect Date**	03/05/2015 17:00	**GCAL ID**	21503062614
	Receive Date	03/06/2015 14:50	**Matrix**	Water

EPA 8015C GRO

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	10	03/12/2015 17:51	JAR	553972

CAS#	Parameter	Result	LOQ	Units
8006-61-9	Gasoline Range Organics	7450	1000	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
106-39-8	Bromochlorobenzene	300	237	ug/L	79	49 - 136

GC/MS Volatiles Quality Control Summary

Analytical Batch 554041	Client ID	MB554041		LCS554041				LCSD554041				
	GCAL ID	1424173		1424174				1424175				
	Sample Type	MB		LCS				LCSD				
	Prep Date	NA		NA				NA				
	Analysis Date	03/13/2015 00:18		03/12/2015 22:53				03/13/2015 01:00				
	Matrix	Water		Water				Water				
EPA 8260B		Units Result	ug/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Benzene	71-43-2	ND	1.00	50.0	49.0	98	70 - 129	50.0	49.7	99	1	20
Ethylbenzene	100-41-4	ND	1.00	50.0	51.3	103	74 - 126	50.0	52.2	104	2	30
tert-Butyl methyl ether (MTBE)	1634-04-4	ND	1.00	50.0	58.7	117	71 - 125	50.0	52.4	105	11	30
Toluene	108-88-3	ND	1.00	50.0	47.8	96	72 - 120	50.0	48.5	97	1	20
Xylene (total)	1330-20-7	ND	3.00	150	161	107	74 - 127	150	163	109	1	30
Surrogate												
1,2-Dichloroethane-d4	17060-07-0	49.6	99	50	50	100	71 - 127	50	49.6	99	1	NA
4-Bromofluorobenzene	460-00-4	50.5	101	50	55	110	78 - 130	50	55.4	111	1	NA
Dibromofluoromethane	1868-53-7	52.4	105	50	52.8	106	77 - 127	50	52.1	104	1	NA
Toluene d8	2037-26-5	55.4	111	50	48.8	98	76 - 134	50	49.1	98	1	NA

Analytical Batch 554083	Client ID	MB554083		LCS554083				LCSD554083				
	GCAL ID	1424290		1424291				1424292				
	Sample Type	MB		LCS				LCSD				
	Prep Date	NA		NA				NA				
	Analysis Date	03/13/2015 12:38		03/13/2015 10:54				03/13/2015 11:18				
	Matrix	Water		Water				Water				
EPA 8260B		Units Result	ug/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Benzene	71-43-2	ND	1.00	50.0	50.2	100	70 - 129	50.0	54.1	108	7	20
Ethylbenzene	100-41-4	ND	1.00	50.0	51.8	104	74 - 126	50.0	55.4	111	7	30
tert-Butyl methyl ether (MTBE)	1634-04-4	ND	1.00	50.0	54.7	109	71 - 125	50.0	61.8	124	12	30
Toluene	108-88-3	ND	1.00	50.0	48.8	98	72 - 120	50.0	52.0	104	6	20
Xylene (total)	1330-20-7	ND	3.00	150	164	109	74 - 127	150	174	116	6	30
Surrogate												
1,2-Dichloroethane-d4	17060-07-0	50.8	102	50	50.3	101	71 - 127	50	51.1	102	2	NA
4-Bromofluorobenzene	460-00-4	50.1	100	50	53	106	78 - 130	50	54.2	108	2	NA
Dibromofluoromethane	1868-53-7	53.1	106	50	53.2	106	77 - 127	50	54.4	109	2	NA
Toluene d8	2037-26-5	56.3	113	50	47.9	96	76 - 134	50	48.3	97	1	NA

GC Volatiles Quality Control Summary

Analytical Batch	Client ID	MB553972	LCS553972	LCSD553972
553972	GCAL ID	1423844	1423845	1423846
	Sample Type	MB	LCS	LCSD
	Prep Date	NA	NA	NA
	Analysis Date	03/12/2015 12:38	03/12/2015 12:15	03/12/2015 12:28
	Matrix	Water	Water	Water

EPA 8015C GRO		Units Result	ug/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Gasoline Range Organics	8006-61-9	ND	100	500	451	90	70 - 128	500	444	89	2	25
Surrogate												
Bromochlorobenzene	106-39-8	21.2	71	30	25.2	84	49 - 136	30	24.8	83	2	NA

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CHAIN OF CUSTODY RECORD

Client ID: 4757 - Kinder Morgan Energy Partners
SDG: 215030626
Due Date: 03/12/15

Report to:
Client: AE Com
Address: 7389 Florida Blvd Baton Rouge
Contact: Paul Harper
Phone: 225-922-5700
E-mail:

Bill to:
Client: Plantation Pipeline
Address:
Contact: Greg Dempsey
Phone:
E-mail:

P.O. Number: 19730915
Project Name/Number: Peairs Rd 19730915.00001
Sampled By: Corey Burrus/ Kyle Templet

GCAL use only:
Custody Seal used ☐ yes ☑ no
intact ☐ yes ☐ no
Temperature °C 3.2 E26

☐ Dissolved Analysis Requested
☐ Field filtered
☐ Lab filtered

Analytical Requests & Method: BTEX/MTBE; TPH-GRO

Matrix[1]	Date	Time (2400)	Comp	Grab	Sample Description	No Containers	BTEX/MTBE	TPH-GRO	Preservative
W	3-5-15	1115		X	PZ-1	5	X	X	1
W	3-5-15	1200		X	MW-1R1	5	X	X	2
W	3-5-15	1215		X	MW-4	5	X	X	3
W	3-5-15	145		X	MW-2	5	X	X	4
W	3-5-15	200		X	MW-8	5	X	X	5
W	3-5-15	240		X	MW-7	5	X	X	6
W	3-5-15	315		X	MW-10	5	X	X	7
W	3-5-15	330		X	MW-11	5	X	X	8
W	3-5-15	340		X	MW-9	5	X	X	9
W	3-5-15	415		X	MW-3	5	X	X	10
W	3-5-15	430		X	MW-6	5	X	X	11
W	3-5-15	435		X	Trip Blank	3	X	X	12
W	3-5-15	500		X	MW-5 / MW-5 Dup	10	X	X	13, 14

Air Bill No:

Turn Around Time (Business Days): ☐ 24h* ☐ 48h* ☐ 3 days* ☐ 1 week* ☑ Standard (Per Contract/Quote)

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
[signature]	3-6-15	14:00	John Bailey	3-6-15	14:00
John Bailey	3-6-15	14:50	[signature]	3/6/15	1450

Note:

By submitting these samples, you agree to GCAL's terms and conditions contained in our most recent schedule of services.

Matrix[1]: W = water, S = solid, L = liquid, T = tissue

*Requires prior approval, rush charges may apply.

We cannot accept verbal changes. Please email written changes to your PM.

WHITE: CLIENT FINAL REPORT - CANARY: CLIENT

GCAL ANALYTICAL LABORATORIES, LLC

SAMPLE RECEIVING CHECKLIST

215030626

SAMPLE DELIVERY GROUP 215030626

Client	4757 - Kinder Morgan Energy Partners	Transport Method	COURIER
Profile Number	226219	Received By	Saucier, Charlotte M.
Line Item(s)	1 - BTEX/MTBE	Receive Date(s)	03/06/15

CHECKLIST

CHECKLIST	YES	NO	NA
Were all samples received using proper thermal preservation?	☑	☐	☐
When used, were all custody seals intact?	☐	☐	☑
Were all samples received in proper containers?	☑	☐	☐
Were all samples received using proper chemical preservation?	☑	☐	☐
Was preservative added to any container at the lab?	☐	☑	☐
Were all containers received in good condition?	☑	☐	☐
Were all VOA vials received with no head space?	☑	☐	☐
Do all sample labels match the Chain of Custody?	☑	☐	☐
Did the Chain of Custody list the sampling technician?	☑	☐	☐
Was the COC maintained i.e. all signatures, dates and time of receipt included?	☑	☐	☐

COOLERS

Airbill	Thermometer ID: E26	Temp(°C)
		3.2

DISCREPANCIES

None

LAB PRESERVATIONS

None

NOTES

Revision 1.4

Page 1 of 1

ANALYTICAL RESULTS

PERFORMED BY

GCAL, LLC
7979 Innovation Park Dr.
Baton Rouge, LA 70820

Report Date 09/17/2015

GCAL Report 215090441

Project 60402697-PPL Peairs Road

Deliver To
William Hurdle
AECOM
7389 Florida Blvd.
Suite 300
Baton Rouge, LA 70806
225-922-5841

PJLA Testing DoD ELAP

ISO 17025

NELAP ACCREDITED TNI LABORATORY

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with GCAL's Standard Operating Procedures.

Common Abbreviations that may be Utilized in this Report

ND	Indicates the result was Not Detected at the specified reporting limit
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
DL	Detection Limit
DL	Diluted analysis – when appended to Client Sample ID
LOD	Limit of Detection
LOQ	Limit of Quantitation
RE	Re-analysis
N	Metals Matrix Spike or Matrix Spike Duplicate Recovery is outside control limits
00:00	Reported as a time equivalent to 12:00 AM

Reporting Flags that may be Utilized in this Report

J or I	Indicates the result is between the MDL and LOQ
U	Indicates the compound was analyzed for but not detected
B	Indicates the analyte was detected in the associated Method Blank
Q	Indicates a non-compliant QC Result (See Q Flag Application Report)
*	Indicates a non-compliant or not applicable QC recovery or RPD

Sample receipt at GCAL is documented through the attached chain of custody. In accordance with NELAC, this report shall be reproduced only in full and with the written permission of GCAL. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with the NELAC standard and terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.

Estimated uncertainty of measurement is available upon request. This report is in compliance with the DOD QSM as specified in the contract if applicable.

Robyn Migues/Director Data Del

Authorized Signature
GCAL Report 215090441

Case Narrative

Client: AECOM - BTR **Report:** 215090441

Gulf Coast Analytical Laboratories received and analyzed the sample(s) listed on the Report Sample Summary page of this report. Receipt of the sample(s) is documented by the attached chain of custody. This applies only to the sample(s) listed in this report. No sample integrity or quality control exceptions were identified unless noted below.

VOLATILES MASS SPECTROMETRY

In the EPA 8260B analysis, samples 21509044109 (MW-9), 21509044110 (MW-3), 21509044111 (MW-6), 21509044112 (MW-6 FD) and 21509044114 (MW-5) had to be diluted to bracket the concentration of target compounds within the calibration range of the instrument. The dilution is reflected in elevated detection limits.

VOLATILES GAS CHROMATOGRAPHY

In the EPA 8015C GRO analysis, samples 21509044110 (MW-3), 21509044111 (MW-6), 21509044112 (MW-6 FD) and 21509044114 (MW-5) had to be diluted to bracket the concentration within the calibration range of the instrument. The recovery for the surrogate is outside control limits for these samples. This is attributed to matrix interference.

Sample Summary

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21509044101	PZ-1	Water	09/02/2015 10:00	09/04/2015 14:30
21509044102	MW-1-R1	Water	09/02/2015 10:30	09/04/2015 14:30
21509044103	MW-4	Water	09/02/2015 11:00	09/04/2015 14:30
21509044104	MW-2	Water	09/02/2015 11:45	09/04/2015 14:30
21509044105	MW-8	Water	09/02/2015 13:15	09/04/2015 14:30
21509044106	MW-7	Water	09/02/2015 13:40	09/04/2015 14:30
21509044107	MW-10	Water	09/02/2015 14:00	09/04/2015 14:30
21509044108	MW-11	Water	09/02/2015 14:40	09/04/2015 14:30
21509044109	MW-9	Water	09/02/2015 15:20	09/04/2015 14:30
21509044110	MW-3	Water	09/03/2015 14:40	09/04/2015 14:30
21509044111	MW-6	Water	09/03/2015 15:20	09/04/2015 14:30
21509044112	MW-6 FD	Water	09/03/2015 15:20	09/04/2015 14:30
21509044113	TRIP BLANK	Water	09/03/2015 17:00	09/04/2015 14:30
21509044114	MW-5	Water	09/03/2015 16:30	09/04/2015 14:30

Sample Results

PZ-1	**Collect Date**	09/02/2015 10:00	**GCAL ID**	21509044101
	Receive Date	09/04/2015 14:30	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	09/06/2015 15:22	CJR	567140

CAS#	Parameter	Result	LOQ	Reg Limit	Units
71-43-2	Benzene	ND	5.00	5	ug/L
100-41-4	Ethylbenzene	ND	5.00	700	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	ND	5.00	20	ug/L
108-88-3	Toluene	ND	5.00	1000	ug/L
1330-20-7	Xylene (total)	ND	15.0	10000	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	47.9	ug/L	96	78 - 130
1868-53-7	Dibromofluoromethane	50	47.8	ug/L	96	77 - 127
2037-26-5	Toluene d8	50	52.5	ug/L	105	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	48.3	ug/L	97	71 - 127

EPA 8015C GRO

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	09/16/2015 10:00	BMR	567688

CAS#	Parameter	Result	LOQ	Reg Limit	Units
8006-61-9	Gasoline Range Organics	ND	100	150	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
106-39-8	Bromochlorobenzene	30	20	ug/L	67	49 - 136

MW-1-R1	**Collect Date**	09/02/2015 10:30	**GCAL ID**	21509044102
	Receive Date	09/04/2015 14:30	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	09/06/2015 15:42	CJR	567140

CAS#	Parameter	Result	LOQ	Reg Limit	Units
71-43-2	Benzene	ND	5.00	5	ug/L
100-41-4	Ethylbenzene	ND	5.00	700	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	ND	5.00	20	ug/L
108-88-3	Toluene	ND	5.00	1000	ug/L

Sample Results

MW-1-R1	**Collect Date**	09/02/2015 10:30	**GCAL ID**	21509044102
	Receive Date	09/04/2015 14:30	**Matrix**	Water

EPA 8260B (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	09/06/2015 15:42	CJR	567140

CAS#	Parameter	Result	LOQ	Reg Limit	Units
1330-20-7	Xylene (total)	ND	15.0	10000	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	47.4	ug/L	95	78 - 130
1868-53-7	Dibromofluoromethane	50	47.5	ug/L	95	77 - 127
2037-26-5	Toluene d8	50	52.1	ug/L	104	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	47.8	ug/L	96	71 - 127

EPA 8015C GRO

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	09/16/2015 10:18	BMR	567688

CAS#	Parameter	Result	LOQ	Reg Limit	Units
8006-61-9	Gasoline Range Organics	ND	100	150	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
106-39-8	Bromochlorobenzene	30	19.5	ug/L	65	49 - 136

MW-4	**Collect Date**	09/02/2015 11:00	**GCAL ID**	21509044103
	Receive Date	09/04/2015 14:30	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	09/06/2015 16:03	CJR	567140

CAS#	Parameter	Result	LOQ	Reg Limit	Units
71-43-2	Benzene	ND	5.00	5	ug/L
100-41-4	Ethylbenzene	ND	5.00	700	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	ND	5.00	20	ug/L
108-88-3	Toluene	ND	5.00	1000	ug/L

Sample Results

MW-4

Collect Date	09/02/2015 11:00	**GCAL ID**	21509044103
Receive Date	09/04/2015 14:30	**Matrix**	Water

EPA 8260B (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	09/06/2015 16:03	CJR	567140

CAS#	Parameter	Result	LOQ	Reg Limit	Units
1330-20-7	Xylene (total)	ND	15.0	10000	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	48	ug/L	96	78 - 130
1868-53-7	Dibromofluoromethane	50	48.3	ug/L	97	77 - 127
2037-26-5	Toluene d8	50	51.7	ug/L	103	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	48.8	ug/L	98	71 - 127

EPA 8015C GRO

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	09/16/2015 10:31	BMR	567688

CAS#	Parameter	Result	LOQ	Reg Limit	Units
8006-61-9	Gasoline Range Organics	ND	100	150	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
106-39-8	Bromochlorobenzene	30	19.1	ug/L	64	49 - 136

MW-2

Collect Date	09/02/2015 11:45	**GCAL ID**	21509044104
Receive Date	09/04/2015 14:30	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	09/06/2015 16:23	CJR	567140

CAS#	Parameter	Result	LOQ	Reg Limit	Units
71-43-2	Benzene	ND	5.00	5	ug/L
100-41-4	Ethylbenzene	ND	5.00	700	ug/L
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**5.60**	**5.00**	**20**	**ug/L**
108-88-3	Toluene	ND	5.00	1000	ug/L

Sample Results

MW-2	**Collect Date**	09/02/2015 11:45	**GCAL ID**	21509044104
	Receive Date	09/04/2015 14:30	**Matrix**	Water

EPA 8260B (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	09/06/2015 16:23	CJR	567140

CAS#	Parameter	Result	LOQ	Reg Limit	Units
1330-20-7	Xylene (total)	ND	15.0	10000	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	47.7	ug/L	95	78 - 130
1868-53-7	Dibromofluoromethane	50	47.8	ug/L	96	77 - 127
2037-26-5	Toluene d8	50	52	ug/L	104	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	50.7	ug/L	101	71 - 127

EPA 8015C GRO

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	09/16/2015 10:44	BMR	567688

CAS#	Parameter	Result	LOQ	Reg Limit	Units
8006-61-9	Gasoline Range Organics	ND	100	150	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
106-39-8	Bromochlorobenzene	30	20.4	ug/L	68	49 - 136

MW-8	**Collect Date**	09/02/2015 13:15	**GCAL ID**	21509044105
	Receive Date	09/04/2015 14:30	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	09/06/2015 16:43	CJR	567140

CAS#	Parameter	Result	LOQ	Reg Limit	Units
71-43-2	Benzene	ND	5.00	5	ug/L
100-41-4	Ethylbenzene	ND	5.00	700	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	ND	5.00	20	ug/L
108-88-3	Toluene	ND	5.00	1000	ug/L

Sample Results

MW-8	**Collect Date**	09/02/2015 13:15	**GCAL ID**	21509044105
	Receive Date	09/04/2015 14:30	**Matrix**	Water

EPA 8260B (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	09/06/2015 16:43	CJR	567140

CAS#	Parameter	Result	LOQ	Reg Limit	Units
1330-20-7	Xylene (total)	ND	15.0	10000	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	48.2	ug/L	96	78 - 130
1868-53-7	Dibromofluoromethane	50	47.9	ug/L	96	77 - 127
2037-26-5	Toluene d8	50	52.2	ug/L	104	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	49.4	ug/L	99	71 - 127

EPA 8015C GRO

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	09/16/2015 10:53	BMR	567688

CAS#	Parameter	Result	LOQ	Reg Limit	Units
8006-61-9	Gasoline Range Organics	ND	100	150	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
106-39-8	Bromochlorobenzene	30	19.2	ug/L	64	49 - 136

MW-7	**Collect Date**	09/02/2015 13:40	**GCAL ID**	21509044106
	Receive Date	09/04/2015 14:30	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	09/06/2015 17:03	CJR	567140

CAS#	Parameter	Result	LOQ	Reg Limit	Units
71-43-2	Benzene	ND	5.00	5	ug/L
100-41-4	Ethylbenzene	ND	5.00	700	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	ND	5.00	20	ug/L
108-88-3	Toluene	ND	5.00	1000	ug/L

Sample Results

MW-7	**Collect Date**	09/02/2015 13:40	**GCAL ID**	21509044106
	Receive Date	09/04/2015 14:30	**Matrix**	Water

EPA 8260B (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	09/06/2015 17:03	CJR	567140

CAS#	Parameter	Result	LOQ	Reg Limit	Units
1330-20-7	Xylene (total)	ND	15.0	10000	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	47.3	ug/L	95	78 - 130
1868-53-7	Dibromofluoromethane	50	48.1	ug/L	96	77 - 127
2037-26-5	Toluene d8	50	51.8	ug/L	104	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	49.5	ug/L	99	71 - 127

EPA 8015C GRO

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	09/16/2015 11:10	BMR	567688

CAS#	Parameter	Result	LOQ	Reg Limit	Units
8006-61-9	Gasoline Range Organics	ND	100	150	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
106-39-8	Bromochlorobenzene	30	19.6	ug/L	65	49 - 136

MW-10	**Collect Date**	09/02/2015 14:00	**GCAL ID**	21509044107
	Receive Date	09/04/2015 14:30	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	09/06/2015 17:23	CJR	567140

CAS#	Parameter	Result	LOQ	Reg Limit	Units
71-43-2	Benzene	ND	5.00	5	ug/L
100-41-4	Ethylbenzene	ND	5.00	700	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	ND	5.00	20	ug/L
108-88-3	Toluene	ND	5.00	1000	ug/L

Sample Results

MW-10	**Collect Date**	09/02/2015 14:00	**GCAL ID**	21509044107
	Receive Date	09/04/2015 14:30	**Matrix**	Water

EPA 8260B (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	09/06/2015 17:23	CJR	567140

CAS#	Parameter	Result	LOQ	Reg Limit	Units
1330-20-7	Xylene (total)	ND	15.0	10000	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	47.3	ug/L	95	78 - 130
1868-53-7	Dibromofluoromethane	50	48.6	ug/L	97	77 - 127
2037-26-5	Toluene d8	50	52.1	ug/L	104	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	49.9	ug/L	100	71 - 127

EPA 8015C GRO

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	09/16/2015 11:23	BMR	567688

CAS#	Parameter	Result	LOQ	Reg Limit	Units
8006-61-9	Gasoline Range Organics	ND	100	150	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
106-39-8	Bromochlorobenzene	30	19.1	ug/L	64	49 - 136

MW-11	**Collect Date**	09/02/2015 14:40	**GCAL ID**	21509044108
	Receive Date	09/04/2015 14:30	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	09/06/2015 17:44	CJR	567140

CAS#	Parameter	Result	LOQ	Reg Limit	Units
71-43-2	Benzene	ND	5.00	5	ug/L
100-41-4	Ethylbenzene	ND	5.00	700	ug/L
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**79.8**	**5.00**	**20**	**ug/L**
108-88-3	Toluene	ND	5.00	1000	ug/L

Sample Results

MW-11	**Collect Date**	09/02/2015 14:40	**GCAL ID**	21509044108
	Receive Date	09/04/2015 14:30	**Matrix**	Water

EPA 8260B (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	09/06/2015 17:44	CJR	567140

CAS#	Parameter	Result	LOQ	Reg Limit	Units
1330-20-7	Xylene (total)	ND	15.0	10000	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	47.8	ug/L	96	78 - 130
1868-53-7	Dibromofluoromethane	50	47.8	ug/L	96	77 - 127
2037-26-5	Toluene d8	50	52.6	ug/L	105	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	50.1	ug/L	100	71 - 127

EPA 8015C GRO

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	09/16/2015 11:33	BMR	567688

CAS#	Parameter	Result	LOQ	Reg Limit	Units
8006-61-9	Gasoline Range Organics	ND	100	150	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
106-39-8	Bromochlorobenzene	30	19.7	ug/L	66	49 - 136

MW-9	**Collect Date**	09/02/2015 15:20	**GCAL ID**	21509044109
	Receive Date	09/04/2015 14:30	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	10	09/06/2015 20:28	CJR	567140

CAS#	Parameter	Result	LOQ	Reg Limit	Units
71-43-2	Benzene	ND	50.0	5	ug/L
100-41-4	Ethylbenzene	ND	50.0	700	ug/L
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**259**	**50.0**	**20**	**ug/L**
108-88-3	Toluene	ND	50.0	1000	ug/L

Sample Results

MW-9	**Collect Date**	09/02/2015 15:20	**GCAL ID**	21509044109
	Receive Date	09/04/2015 14:30	**Matrix**	Water

EPA 8260B (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	10	09/06/2015 20:28	CJR	567140

CAS#	Parameter	Result	LOQ	Reg Limit	Units
1330-20-7	Xylene (total)	ND	150	10000	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	500	469	ug/L	94	78 - 130
1868-53-7	Dibromofluoromethane	500	471	ug/L	94	77 - 127
2037-26-5	Toluene d8	500	522	ug/L	104	76 - 134
17060-07-0	1,2-Dichloroethane-d4	500	481	ug/L	96	71 - 127

EPA 8015C GRO

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	09/16/2015 11:49	BMR	567688

CAS#	Parameter	Result	LOQ	Reg Limit	Units
8006-61-9	**Gasoline Range Organics**	**417**	**100**	**150**	**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
106-39-8	Bromochlorobenzene	30	28	ug/L	93	49 - 136

MW-3	**Collect Date**	09/03/2015 14:40	**GCAL ID**	21509044110
	Receive Date	09/04/2015 14:30	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	5	09/08/2015 16:32	CLH	567187

CAS#	Parameter	Result	LOQ	Reg Limit	Units
71-43-2	**Benzene**	**59.3**	**5.00**	**5**	**ug/L**
100-41-4	**Ethylbenzene**	**304**	**5.00**	**700**	**ug/L**
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**848**	**5.00**	**20**	**ug/L**
108-88-3	**Toluene**	**152**	**5.00**	**1000**	**ug/L**

Sample Results

MW-3	**Collect Date**	09/03/2015 14:40	**GCAL ID**	21509044110
	Receive Date	09/04/2015 14:30	**Matrix**	Water

EPA 8260B (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	5	09/08/2015 16:32	CLH	567187

CAS#	Parameter	Result	LOQ	Reg Limit	Units
1330-20-7	**Xylene (total)**	**1540**	**15.0**	**10000**	**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	250	264	ug/L	106	78 - 130
1868-53-7	Dibromofluoromethane	250	232	ug/L	93	77 - 127
2037-26-5	Toluene d8	250	267	ug/L	107	76 - 134
17060-07-0	1,2-Dichloroethane-d4	250	239	ug/L	96	71 - 127

EPA 8015C GRO

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	5	09/16/2015 12:12	BMR	567688

CAS#	Parameter	Result	LOQ	Reg Limit	Units
8006-61-9	**Gasoline Range Organics**	**10000**	**500**	**150**	**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
106-39-8	Bromochlorobenzene	150	491	ug/L	327*	49 - 136

MW-6	**Collect Date**	09/03/2015 15:20	**GCAL ID**	21509044111
	Receive Date	09/04/2015 14:30	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	25	09/08/2015 16:52	CLH	567187

CAS#	Parameter	Result	LOQ	Reg Limit	Units
71-43-2	**Benzene**	**109**	**25.0**	**5**	**ug/L**
100-41-4	**Ethylbenzene**	**69.4**	**25.0**	**700**	**ug/L**
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**3960**	**25.0**	**20**	**ug/L**
108-88-3	**Toluene**	**317**	**25.0**	**1000**	**ug/L**

Sample Results

MW-6	**Collect Date**	09/03/2015 15:20	**GCAL ID**	21509044111
	Receive Date	09/04/2015 14:30	**Matrix**	Water

EPA 8260B (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	25	09/08/2015 16:52	CLH	567187

CAS#	Parameter	Result	LOQ	Reg Limit	Units
1330-20-7	**Xylene (total)**	**389**	**75.0**	**10000**	**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	1250	1300	ug/L	104	78 - 130
1868-53-7	Dibromofluoromethane	1250	1160	ug/L	93	77 - 127
2037-26-5	Toluene d8	1250	1320	ug/L	106	76 - 134
17060-07-0	1,2-Dichloroethane-d4	1250	1220	ug/L	98	71 - 127

EPA 8015C GRO

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	10	09/16/2015 12:28	BMR	567688

CAS#	Parameter	Result	LOQ	Reg Limit	Units
8006-61-9	**Gasoline Range Organics**	**8770**	**1000**	**150**	**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
106-39-8	Bromochlorobenzene	300	559	ug/L	186*	49 - 136

MW-6 FD	**Collect Date**	09/03/2015 15:20	**GCAL ID**	21509044112
	Receive Date	09/04/2015 14:30	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	25	09/08/2015 17:12	CLH	567187

CAS#	Parameter	Result	LOQ	Reg Limit	Units
71-43-2	**Benzene**	**123**	**25.0**	**5**	**ug/L**
100-41-4	**Ethylbenzene**	**64.6**	**25.0**	**700**	**ug/L**
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**4070**	**25.0**	**20**	**ug/L**
108-88-3	**Toluene**	**348**	**25.0**	**1000**	**ug/L**

Sample Results

MW-6 FD	**Collect Date**	09/03/2015 15:20	**GCAL ID**	21509044112
	Receive Date	09/04/2015 14:30	**Matrix**	Water

EPA 8260B (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	25	09/08/2015 17:12	CLH	567187

CAS#	Parameter	Result	LOQ	Reg Limit	Units
1330-20-7	**Xylene (total)**	**408**	**75.0**	**10000**	**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	1250	1230	ug/L	98	78 - 130
1868-53-7	Dibromofluoromethane	1250	1130	ug/L	90	77 - 127
2037-26-5	Toluene d8	1250	1300	ug/L	104	76 - 134
17060-07-0	1,2-Dichloroethane-d4	1250	1180	ug/L	94	71 - 127

EPA 8015C GRO

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	10	09/16/2015 12:40	BMR	567688

CAS#	Parameter	Result	LOQ	Reg Limit	Units
8006-61-9	**Gasoline Range Organics**	**8620**	**1000**	**150**	**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
106-39-8	Bromochlorobenzene	300	528	ug/L	176*	49 - 136

TRIP BLANK	**Collect Date**	09/03/2015 17:00	**GCAL ID**	21509044113
	Receive Date	09/04/2015 14:30	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	09/06/2015 03:33	CJR	567116

CAS#	Parameter	Result	LOQ	Reg Limit	Units
71-43-2	Benzene	ND	5.00	5	ug/L
100-41-4	Ethylbenzene	ND	5.00	700	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	ND	5.00	20	ug/L
108-88-3	Toluene	ND	5.00	1000	ug/L

Sample Results

TRIP BLANK	**Collect Date**	09/03/2015 17:00	**GCAL ID**	21509044113
	Receive Date	09/04/2015 14:30	**Matrix**	Water

EPA 8260B (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	09/06/2015 03:33	CJR	567116

CAS#	Parameter	Result	LOQ	Reg Limit	Units
1330-20-7	Xylene (total)	ND	15.0	10000	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	47.2	ug/L	94	78 - 130
1868-53-7	Dibromofluoromethane	50	49.2	ug/L	98	77 - 127
2037-26-5	Toluene d8	50	50.1	ug/L	100	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	48.8	ug/L	98	71 - 127

MW-5	**Collect Date**	09/03/2015 16:30	**GCAL ID**	21509044114
	Receive Date	09/04/2015 14:30	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	10	09/08/2015 17:32	CLH	567187

CAS#	Parameter	Result	LOQ	Reg Limit	Units
71-43-2	**Benzene**	**76.8**	**10.0**	**5**	**ug/L**
100-41-4	**Ethylbenzene**	**18.1**	**10.0**	**700**	**ug/L**
108-88-3	**Toluene**	**132**	**10.0**	**1000**	**ug/L**
1330-20-7	**Xylene (total)**	**83.7**	**30.0**	**10000**	**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	500	492	ug/L	98	78 - 130
1868-53-7	Dibromofluoromethane	500	470	ug/L	94	77 - 127
2037-26-5	Toluene d8	500	520	ug/L	104	76 - 134
17060-07-0	1,2-Dichloroethane-d4	500	483	ug/L	97	71 - 127

Sample Results

MW-5	Collect Date	09/03/2015 16:30	GCAL ID	21509044114
	Receive Date	09/04/2015 14:30	Matrix	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	100	09/08/2015 14:24	LBH	567187

CAS#	Parameter	Result	LOQ	Reg Limit	Units
1634-04-4	tert-Butyl methyl ether (MTBE)	2760	500	20	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	5000	4830	ug/L	97	78 - 130
1868-53-7	Dibromofluoromethane	5000	4880	ug/L	98	77 - 127
2037-26-5	Toluene d8	5000	5150	ug/L	103	76 - 134
17060-07-0	1,2-Dichloroethane-d4	5000	4900	ug/L	98	71 - 127

EPA 8015C GRO

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	10	09/16/2015 12:47	BMR	567688

CAS#	Parameter	Result	LOQ	Reg Limit	Units
8006-61-9	Gasoline Range Organics	3600	1000	150	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
106-39-8	Bromochlorobenzene	300	239	ug/L	80	49 - 136

GC/MS Volatiles QC Summary

Analytical Batch 567116			
Client ID	MB567116	LCS567116	LCSD567116
GCAL ID	1484458	1484459	1484460
Sample Type	MB	LCS	LCSD
Prep Date	NA	NA	NA
Analysis Date	09/05/2015 22:50	09/05/2015 21:29	09/05/2015 21:50
Matrix	Water	Water	Water

EPA 8260B		Units Result	ug/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Benzene	71-43-2	ND	5.00	50.0	54.1	108	70 - 129	50.0	53.7	107	1	20
Ethylbenzene	100-41-4	ND	5.00	50.0	55.5	111	74 - 126	50.0	55.7	111	0	30
tert-Butyl methyl ether (MTBE)	1634-04-4	ND	5.00	50.0	54.7	109	71 - 125	50.0	56.1	112	3	30
Toluene	108-88-3	ND	5.00	50.0	57.4	115	72 - 120	50.0	57.5	115	0	20
Xylene (total)	1330-20-7	ND	15.0	150	173	115	74 - 127	150	172	115	1	30
Surrogate												
1,2-Dichloroethane-d4	17060-07-0	49.4	99	50	47.9	96	71 - 127	50	48.6	97	1	NA
4-Bromofluorobenzene	460-00-4	47	94	50	48.8	98	78 - 130	50	49.3	99	1	NA
Dibromofluoromethane	1868-53-7	49.2	98	50	46.4	93	77 - 127	50	46.6	93	0	NA
Toluene d8	2037-26-5	50.4	101	50	49.9	100	76 - 134	50	50.8	102	2	NA

Analytical Batch 567140			
Client ID	MB567140	LCS567140	LCSD567140
GCAL ID	1484507	1484508	1484509
Sample Type	MB	LCS	LCSD
Prep Date	NA	NA	NA
Analysis Date	09/06/2015 14:52	09/06/2015 13:25	09/06/2015 13:51
Matrix	Water	Water	Water

EPA 8260B		Units Result	ug/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Benzene	71-43-2	ND	5.00	50.0	49.5	99	70 - 129	50.0	47.5	95	4	20
Ethylbenzene	100-41-4	ND	5.00	50.0	53.7	107	74 - 126	50.0	52.6	105	2	30
tert-Butyl methyl ether (MTBE)	1634-04-4	ND	5.00	50.0	50.7	101	71 - 125	50.0	50.8	102	0	30
Toluene	108-88-3	ND	5.00	50.0	54.9	110	72 - 120	50.0	53.9	108	2	20
Xylene (total)	1330-20-7	ND	15.0	150	167	111	74 - 127	150	163	109	2	30
Surrogate												
1,2-Dichloroethane-d4	17060-07-0	49.7	99	50	48.1	96	71 - 127	50	47.3	95	2	NA
4-Bromofluorobenzene	460-00-4	48	96	50	49.3	99	78 - 130	50	48.9	98	1	NA
Dibromofluoromethane	1868-53-7	48	96	50	47.2	94	77 - 127	50	46.2	92	2	NA
Toluene d8	2037-26-5	52.5	105	50	51.5	103	76 - 134	50	51.6	103	0	NA

Analytical Batch 567187			
Client ID	MB567187	LCS567187	LCSD567187
GCAL ID	1484624	1484625	1484626
Sample Type	MB	LCS	LCSD
Prep Date	NA	NA	NA
Analysis Date	09/08/2015 10:59	09/08/2015 09:38	09/08/2015 09:58
Matrix	Water	Water	Water

EPA 8260B		Units Result	ug/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Benzene	71-43-2	ND	1.00	50.0	48.9	98	70 - 129	50.0	48.9	98	0	20
Ethylbenzene	100-41-4	ND	1.00	50.0	53.0	106	74 - 126	50.0	51.8	104	2	30
tert-Butyl methyl ether (MTBE)	1634-04-4	ND	1.00	50.0	49.2	98	71 - 125	50.0	50.2	100	2	30
Toluene	108-88-3	ND	1.00	50.0	54.3	109	72 - 120	50.0	53.9	108	1	20
Xylene (total)	1330-20-7	ND	3.00	150	164	109	74 - 127	150	162	108	1	30
Surrogate												
1,2-Dichloroethane-d4	17060-07-0	49.4	99	50	47	94	71 - 127	50	46.2	92	2	NA
4-Bromofluorobenzene	460-00-4	49.7	99	50	51	102	78 - 130	50	51	102	0	NA
Dibromofluoromethane	1868-53-7	47.2	94	50	47.6	95	77 - 127	50	47.6	95	0	NA
Toluene d8	2037-26-5	52.9	106	50	51.5	103	76 - 134	50	52	104	1	NA

GC/MS Volatiles QC Summary

Analytical Batch 567187	Client ID GCAL ID Sample Type Prep Date Analysis Date Matrix	MW-87R 21508273804 SAMPLE NA 09/08/2015 11:19 Water		MW-87R MS 21508273805 MS NA 09/08/2015 12:00 Water				MW-87R MSD 21508273806 MSD NA 09/08/2015 12:21 Water				
EPA 8260B		Units Result	ug/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Benzene	71-43-2	0.00	1.00	50.0	48.7	97	70 - 129	50.0	47.7	95	2	20
Ethylbenzene	100-41-4	0.00	1.00	50.0	53.2	106	74 - 126	50.0	52.6	105	1	30
Toluene	108-88-3	0.00	1.00	50.0	54.7	109	72 - 120	50.0	53.4	107	2	20
Xylene (total)	1330-20-7	0.00	3.00	150	164	109	74 - 127	150	164	109	0	30
Surrogate												
1,2-Dichloroethane-d4	17060-07-0	47.2	94	50	49.2	98	71 - 127	50	48.6	97	1	NA
4-Bromofluorobenzene	460-00-4	49.4	99	50	51.3	103	78 - 130	50	49.7	99	3	NA
Dibromofluoromethane	1868-53-7	46.5	93	50	48.2	96	77 - 127	50	48.8	98	1	NA
Toluene d8	2037-26-5	52.5	105	50	51.5	103	76 - 134	50	51.8	104	1	NA

GC Volatiles QC Summary

Analytical Batch	Client ID	MB567688		LCS567688				LCSD567688				
567688	GCAL ID	1486940		1486941				1486942				
	Sample Type	MB		LCS				LCSD				
	Prep Date	NA		NA				NA				
	Analysis Date	09/16/2015 09:39		09/16/2015 09:12				09/16/2015 09:26				
	Matrix	Water		Water				Water				
EPA 8015C GRO		Units Result	ug/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Gasoline Range Organics	8006-61-9	ND	100	500	437	87	70 - 128	500	493	99	12	25
Surrogate												
Bromochlorobenzene	106-39-8	19	63	30	25.1	84	49 - 136	30	24.6	82	2	NA

GCAL ANALYTICAL LABORATORIES, LLC
7979 Innovation Park Dr., Baton Rouge, LA 70820-7402
Phone: 225.769.4900 • Fax: 225.767.5717 • www.gcal.com

CHAIN OF CUSTODY RECORD

Client ID: 2207 - AECOM - BTR
SDG: 215090441

Report to:
Client: AECOM
Address: 7389 Florida Blvd Baton Rouge, LA
Contact: William Hurdle
Phone: 225-922-5700
E-mail: william.hurdle@aecom.com

Bill to:
Client: Plantation Pipe Line
Address:
Contact: Greg Dempsey
Phone:
E-mail:

P.O. Number:
Project Name/Number: 60402697
Sampled By: Corey Burns

Analytical Requests & Method: MTBE, BTEX 8260 (HCL); TPH-GRO 8015 (HCL)

GCAL use only:
Custody Seal used ☐ yes ☐ no
intact ☐ yes ☐ no
Temperature °C 2.3 E26

☐ Dissolved Analysis Requested
☐ Field filtered
☐ Lab filtered

Matrix[1]	Date	Time (2400)	Comp	Grab	Sample Description	No Containers	MTBE, BTEX 8260	TPH-GRO 8015	Preservative
W	9-2	1000		X	P2-1	5	X	X	1
W	9-2	1030		X	~~1-R1~~ MW-1-R1 KBL*	5	X	X	2
W	9-2	1100		X	MW-4	5	X	X	3
W	9-2	1245		X	MW-2	5	X	X	4
W	9-2	1315		X	MW-8	5	X	X	5
W	9-2	1340		X	MW-7	5	X	X	6
W	9-2	1400		X	MW-10	5	X	X	7
W	9-2	1440		X	MW-11	5	X	X	8
W	9-2	1528		X	MW-9	5	X	X	9
W	9-3	1440		X	MW-3	5	X	X	10
W	9-3	1520		X	MW-6 / MW-6 FD	10	X	X	11 12
W	9-3	1700		X	Temp blank				
W	9-3	1700		X	Trip Blank	3	X		13

Air Bill No:

Turn Around Time (Business Days): ☐ 24h* ☐ 48h* ☐ 3 days* ☐ 1 week* ☒ Standard (Per Contract/Quote)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Corey Burns	9-4-15	1350	Jules Hebert	9-4-15	1350
Jules Hebert	9-4-15	1430	[signature]	9/4/15	1430

Note: Trip Blank had a bubble in one VOA.
* Sample ID correction per W. Hurdle/AECOM 9-17-15 KBL.

By submitting these samples, you agree to GCAL's terms and conditions contained in our most recent schedule of services.

Matrix[1]: W = water, S = solid, L = liquid, T = tissue

*Requires prior approval, rush charges may apply.

We cannot accept verbal changes. Please email written changes to your PM.

WHITE: CLIENT FINAL REPORT - CANARY: CLIENT

GCAL ANALYTICAL LABORATORIES, LLC
7979 Innovation Park Dr., Baton Rouge, LA 70820-7402
Phone: 225.769.4900 • Fax: 225.767.5717 • www.gcal.com

CHAIN OF CUSTODY RECORD

Client ID: 2207 - AECOM - BTR
SDG: 215090441

Report to:
Client: AECOM
Address: 7389 Florida Blvd, Baton Rouge, LA
Contact: William Hardie
Phone: 225-922-5700
E-mail: William.hardie@aecom.com

Bill to:
Client: Plantation Pipe Line
Address:
Contact: Greg Dempsey
Phone:
E-mail:

P.O. Number:
Project Name/Number: 60402697
Sampled By: Corey Burns

Analytical Requests & Method: HCL MTBE, BTEX 8260; HCL TPH-GRO 8015

GCAL use only:
Custody Seal used ☐ yes ☐ no
intact ☐ yes ☐ no
Temperature °C ______

☐ Dissolved Analysis Requested
☐ Field filtered
☐ Lab filtered

Matrix[1]	Date	Time (2400)	Comp	Grab	Sample Description	No Containers	MTBE, BTEX 8260	TPH-GRO 8015	Preservative
W	9-3	1630		X	MW-5	5	X	X	14

Air Bill No:

Turn Around Time (Business Days): ☐ 24h* ☐ 48h* ☐ 3 days* ☐ 1 week* ☑ Standard (Per Contract/Quote)

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Corey Burns	9-4-15	1350	Jules Hebert	9-4-15	1350
Jules Hebert	9-4-15	1430	[signature]	9/4/15	1430

Note:

By submitting these samples, you agree to GCAL's terms and conditions contained in our most recent schedule of services.

Matrix[1]: W = water, S = solid, L = liquid, T = tissue

*Requires prior approval, rush charges may apply.

We cannot accept verbal changes. Please email written changes to your PM.

WHITE: CLIENT FINAL REPORT - CANARY: CLIENT

GCAL ANALYTICAL LABORATORIES, LLC

SAMPLE RECEIVING CHECKLIST

215090441

SAMPLE DELIVERY GROUP 215090441

Client **PM** KBL 2207 - AECOM - BTR	**Transport Method** COURIER
Profile Number 261584	**Received By** Saucier, Charlotte M.
Line Item(s) 1 - Waters	**Receive Date(s)** 09/04/15

CHECKLIST	YES	NO	NA
Were all samples received using proper thermal preservation?	☑	☐	☐
When used, were all custody seals intact?	☐	☐	☑
Were all samples received in proper containers?	☑	☐	☐
Were all samples received using proper chemical preservation?	☑	☐	☐
Was preservative added to any container at the lab?	☐	☑	☐
Were all containers received in good condition?	☑	☐	☐
Were all VOA vials received with no head space?	☑	☐	☐
Do all sample labels match the Chain of Custody?	☑	☐	☐
Did the Chain of Custody list the sampling technician?	☑	☐	☐
Was the COC maintained i.e. all signatures, dates and time of receipt included?	☑	☐	☐

COOLERS

Airbill	Thermometer ID: E26	Temp(°C)
		2.3

DISCREPANCIES

None

LAB PRESERVATIONS

None

NOTES

Revision 1.4

Page 1 of 1

AECOM
10 Patewood Drive
Building 6
Greenville, SC 29615
864.234.3000 tel
864.234.3069 fax

February 23, 2017

South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia South Carolina 29201

Attention: Ms. Bobbi Coleman

Reference: **Monthly Sampling Report – January 2017 Results**
Plantation Pipe Line Company
Site ID #18570 – Anderson TOR Release
Anderson, South Carolina
AECOM Project No. 60533575

Dear Ms. Coleman:

AECOM, on behalf of Plantation Pipe Line Company (Plantation) is submitting this Monthly Sampling Report documenting sampling results from January 2017 for the Anderson TOR Release site located in Anderson, South Carolina. All site monitoring wells were gauged using a Geotech Environmental Equipment, Inc. interface probe on January 18, 2017. Groundwater samples were then collected from monitoring wells MW-5, MW-6, MW-8, MW-13, MW-16 and MW-18. The monitoring well locations are shown on **Figure 1** and water level NAPL information is summarized on **Table 1**.

The work is being conducted at the site in accordance with the Remediation System Effectiveness and Monitoring Plan submitted to the Department on December 9, 2016 by S&ME (and in compliance with QAPP dated May 20, 2016). Future work will continue as outlined in that plan.

The sampled wells were purged following low-flow/minimal drawdown sampling procedures. A low-flow peristaltic pump fitted with new polyethylene tubing was utilized. The pump discharged to an in-line water quality meter that monitored field parameters until they stabilized indicating that sampling could commence. Groundwater field parameters are recorded on the groundwater sampling logs, which are included in **Appendix A**. Prior to sample collection; the dedicated tubing for each well was disconnected from the water quality meter. Samples were then collected in preserved laboratory-provided bottles, labeled with unique sample identifiers, logged on a chain-of-custody record and stored on wet ice in a cooler. The samples were then shipped to ESC Lab Sciences of Mt. Juliet, Tennessee, a laboratory certified in the state of South Carolina. All groundwater samples were analyzed for benzene, ethylbenzene, toluene and total xylenes (BTEX) and naphthalene by EPA Method 8260B. A trip blank was also submitted for analysis.

Laboratory analytical results were compared to the South Carolina Risk-Based Screening Levels (RBSLs) for Groundwater (Table D1), Programmatic QAPP Rev. 3, May 2015 and the South Carolina Action Levels for Groundwater (Oxygenates) (Table D2), Programmatic QAPP Rev. 3, May 2015. Benzene concentrations exceeded the Maximum Contaminant Level (MCL) and RBSL of 5 micrograms per liter (µg/L) at MW-6 and MW-13 at concentrations of 34.60 µg/L and 1,220 µg/L, respectively. Toluene exceeded the MCL and RBSL of 1,000 µg/L at monitoring well MW-13 at a concentration of 4,670 µg/L. There were detections of ethylbenzene and xylenes at MW-6 and MW-13. However, neither of those detections exceeded the MCL or RBSL. Monitoring wells MW-5, MW-8, MW-16 and MW-18 were below detection limits (BDL) for all analyzed constituents.

Groundwater analytical results are included on **Figure 2** and summarized in **Table 2**. Laboratory analytical reports from ESC Lab Sciences are included in **Appendix B**.

Per the aforementioned Remediation System Effectiveness and Monitoring Plan, monitoring wells MW-5, MW-6, MW-8, MW-13, MW-16 and MW-18 were sampled again on February 16, 2017 and will be sampled monthly through June 2017. Quarterly sampling of all site wells with the exception of MW-2, MW-12 and MW-24 will begin in March 2017.

Please contact us at (864) 234-3032 or Greg Dempsey at (770) 751-4143 if you have any questions.

Sincerely,

AECOM Technical Services, Inc.

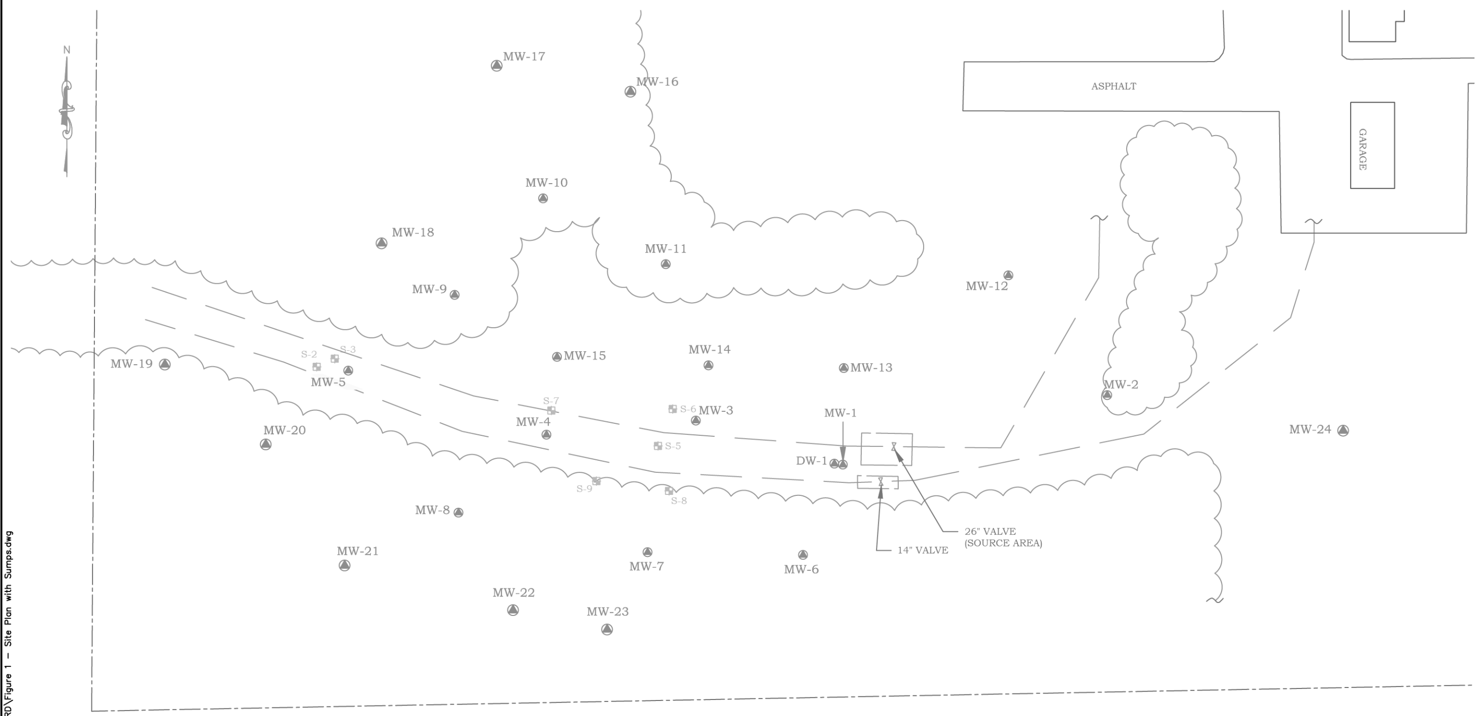
Aaron S. Council, STS
Site Manager
aaron.council@aecom.com

Bob Lunardini, Jr., PE
Senior Consulting Engineer
bob.lunardini@aecom.com

cc: Greg Dempsey, Plantation (Greg_Dempsey@kindermorgan.com)

Attachment: NAPL Gauging Table, Site Map

FIGURES



CAD FILE: C:\BROADWAY LAKE RD\Figure 1 – Site Plan with Sumps.dwg

LEGEND

ANDERSON COUNTY PARCEL LINE

EXISTING TREE LINE

REFINED PETROLEUM PIPELINE

MW-8 SOIL BORING/MONITORING WELL (INSTALLED JANUARY 2015)

S-3 SUMP LOCATION (ABANDONED)

0 70 140

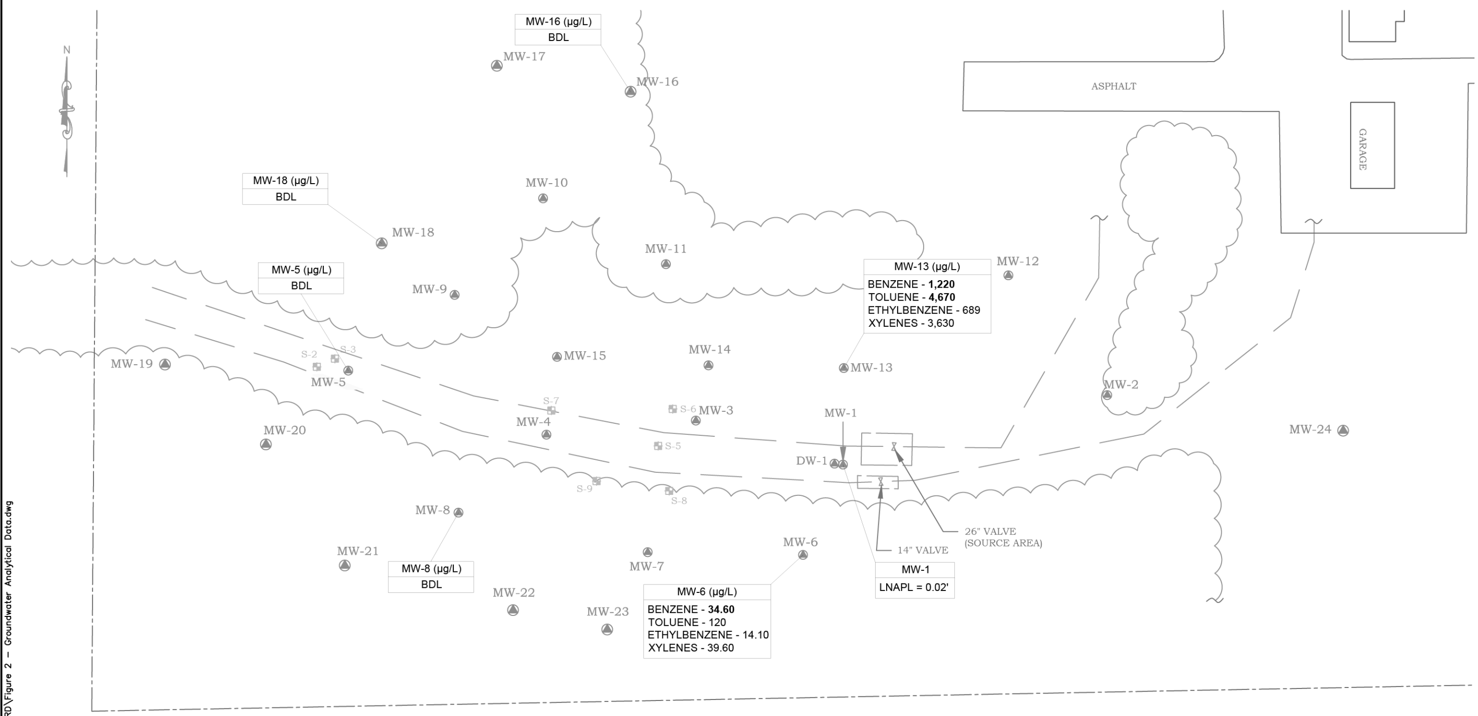
SCALE IN FEET

AECOM

10 Patewood Drive, Building 6, Suite 500
Greenville, SC 29615
T: (864) 234-3000 F: (864) 234-3069
www.aecom.com

FIGURE 1
ANDERSON TOR RELEASE
MONITORING WELL LOCATION MAP

BROADWAY LAKE ROAD
ANDERSON, SOUTH CAROLINA



CAD FILE: C:\BROADWAY LAKE RD\Figure 2 – Groundwater Analytical Data.dwg

LEGEND

ANDERSON COUNTY PARCEL LINE

EXISTING TREE LINE

REFINED PETROLEUM PIPELINE

MW-8 SOIL BORING/MONITORING WELL (INSTALLED JANUARY 2015)

S-3 SUMP LOCATION (ABANDONED)

SOUTH CAROLINA MCL/RBSLs/ACTION LEVELS (µg/L)
BENZENE = 5/5/--
TOLUENE = 1000/1000/--
ETHYLBENZENE = 700/700/--
XYLENES = 10000/10000/--
NAPHTHALENE = --/15/--

NOTES:

1. GROUNDWATER SAMPLES COLLECTED JANUARY 18, 2017
2. **BOLD** FONT INDICATES EXCEEDANCE OF THE APPLICABLE GROUNDWATER MCL/RBSL/ACTION LEVEL

0 70 140
SCALE IN FEET

AECOM
10 Patewood Drive, Building 6, Suite 500
Greenville, SC 29615
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www.aecom.com

FIGURE 2
ANDERSON TOR RELEASE
GROUNDWATER ANALYTICAL DATA
JANUARY 2017

BROADWAY LAKE ROAD
ANDERSON, SOUTH CAROLINA

TABLES

Table 1
Groundwater and NAPL Levels
Anderson TOR Release
Plantation Pipe Line
SCDHEC Release # 18570
AECOM Project 60504035

WELL OR SUMP NUMBER	TOP OF CASING ELEVATION (ft.)	SCREENED INTERVAL (ft., bgs)	SCREENED INTERVAL ELEVATION (ft., msl)	DEPTH TO NAPL (ft.)	DEPTH TO WATER (ft.)	NAPL THICKNESS (ft.)	ASSUMED SPECIFIC GRAVITY	CORRECTED GROUNDWATER ELEVATION
MW-1								
01/14/15	734.01	10.0 - 20.0	724.01 - 714.01	12.59	13.65	1.06	0.80	721.21
07/07/15	734.01	10.0 - 20.0	724.01 - 714.01	12.45	14.50	2.05	0.80	721.15
08/12/15	734.01	10.0 - 20.0	724.01 - 714.01	13.42	14.92	1.50	0.80	720.29
09/04/15	734.01	10.0 - 20.0	724.01 - 714.01	13.94	15.28	1.34	0.80	719.80
10/06/15	734.01	10.0 - 20.0	724.01 - 714.01	14.06	14.93	0.87	0.80	719.78
11/02/15	734.01	10.0 - 20.0	724.01 - 714.01	13.50	14.35	0.85	0.80	720.34
12/02/15	734.01	10.0 - 20.0	724.01 - 714.01	12.50	13.19	0.69	0.80	721.37
01/04/16	734.01	10.0 - 20.0	724.01 - 714.01	11.69	11.89	0.20	0.80	722.28
02/02/16	734.01	10.0 - 20.0	724.01 - 714.01	---	11.39	0.00	0.80	722.62
03/02/16	734.01	10.0 - 20.0	724.01 - 714.01	---	10.79	0.00	0.80	723.22
04/04/16	734.01	10.0 - 20.0	724.01 - 714.01	---	10.62	0.00	0.80	723.39
05/03/16	734.01	10.0 - 20.0	724.01 - 714.01	---	10.68	0.00	0.80	723.33
06/02/16	734.01	10.0 - 20.0	724.01 - 714.01	10.68	10.78	0.10	0.80	723.31
07/05/16	734.01	10.0 - 20.0	724.01 - 714.01	11.92	12.16	0.24	0.80	722.04
07/12/16	734.01	10.0 - 20.0	724.01 - 714.01	12.25	12.39	0.14	0.80	721.73
08/02/16	734.01	10.0 - 20.0	724.01 - 714.01	12.59	12.83	0.24	0.80	721.37
09/01/16	734.01	10.0 - 20.0	724.01 - 714.01	12.99	13.31	0.32	0.80	720.96
10/03/16	734.01	10.0 - 20.0	724.01 - 714.01	13.64	14.41	0.77	0.80	720.22
11/02/16	734.01	10.0 - 20.0	724.01 - 714.01	---	14.80	0.00	0.80	719.21
12/01/16	734.01	10.0 - 20.0	724.01 - 714.01	14.98	16.09	1.11	0.80	718.81
01/05/17	734.01	10.0 - 20.0	724.01 - 714.01	14.91	15.69	0.78	0.80	718.94
01/18/17	734.01	10.0 - 20.0	724.01 - 714.01	14.69	14.71	0.02	0.80	719.32
MW-3								
01/14/15	723.69	3.0 - 13.0	720.69 - 710.69	---	2.35	0.00	0.80	721.34
07/07/15	723.69	3.0 - 13.0	720.69 - 710.69	3.60	4.00	0.40	0.80	720.01
08/12/15	723.69	3.0 - 13.0	720.69 - 710.69	3.97	4.63	0.66	0.80	719.59
09/04/15	723.69	3.0 - 13.0	720.69 - 710.69	5.10	7.99	2.89	0.80	718.01
10/06/15	723.69	3.0 - 13.0	720.69 - 710.69	---	1.81	0.00	0.80	721.88
11/02/15	723.69	3.0 - 13.0	720.69 - 710.69	---	0.08	0.00	0.80	723.61
12/02/15	723.69	3.0 - 13.0	720.69 - 710.69	---	3.81	0.00	0.80	719.88
01/04/16	723.69	3.0 - 13.0	720.69 - 710.69	---	1.86	0.00	0.80	721.83
02/02/16	723.69	3.0 - 13.0	720.69 - 710.69	---	2.59	0.00	0.80	721.10
03/02/16	723.69	3.0 - 13.0	720.69 - 710.69	---	2.02	0.00	0.80	721.67
04/04/16	723.69	3.0 - 13.0	720.69 - 710.69	---	2.62	0.00	0.80	721.07
05/03/16	723.69	3.0 - 13.0	720.69 - 710.69	---	3.09	0.00	0.80	720.60
06/02/16	723.69	3.0 - 13.0	720.69 - 710.69	---	3.18	0.00	0.80	720.51
07/05/16	723.69	3.0 - 13.0	720.69 - 710.69	---	4.58	0.00	0.80	719.11
07/12/16	723.69	3.0 - 13.0	720.69 - 710.69	4.73	4.75	0.02	0.80	718.96
08/02/16	723.69	3.0 - 13.0	720.69 - 710.69	---	3.71	0.00	0.80	719.98
09/01/16	723.69	3.0 - 13.0	720.69 - 710.69	---	4.53	0.00	0.80	719.16
10/03/16	723.69	3.0 - 13.0	720.69 - 710.69	5.25	5.30	0.05	0.80	718.43
11/02/16	723.69	3.0 - 13.0	720.69 - 710.69	6.14	6.55	0.41	0.80	717.47
12/01/16	723.69	3.0 - 13.0	720.69 - 710.69	6.43	6.55	0.12	0.80	717.24
01/05/17	723.69	3.0 - 13.0	720.69 - 710.69	2.12	2.26	0.14	0.80	721.54
01/18/17	723.69	3.0 - 13.0	720.69 - 710.69	NM	NM	--	0.80	--

Table 1
Groundwater and NAPL Levels
Anderson TOR Release
Plantation Pipe Line
SCDHEC Release # 18570
AECOM Project 60504035

WELL OR SUMP NUMBER	TOP OF CASING ELEVATION (ft.)	SCREENED INTERVAL (ft., bgs)	SCREENED INTERVAL ELEVATION (ft., msl)	DEPTH TO NAPL (ft.)	DEPTH TO WATER (ft.)	NAPL THICKNESS (ft.)	ASSUMED SPECIFIC GRAVITY	CORRECTED GROUNDWATER ELEVATION
MW-4								
01/13/15	719.91	1.0 - 6.0	718.91 - 713.91	---	1.85	0.00	0.80	718.06
07/07/15	719.91	1.0 - 6.0	718.91 - 713.91	---	2.92	0.00	0.80	716.99
08/12/15	719.91	1.0 - 6.0	718.91 - 713.91	---	2.65	0.00	0.80	717.26
09/04/15	719.91	1.0 - 6.0	718.91 - 713.91	---	3.99	0.00	0.80	715.92
10/06/15	719.91	1.0 - 6.0	718.91 - 713.91	---	2.00	0.00	0.80	717.91
11/02/15	719.91	1.0 - 6.0	718.91 - 713.91	---	1.85	0.00	0.80	718.06
12/02/15	719.91	1.0 - 6.0	718.91 - 713.91	---	2.01	0.00	0.80	717.90
01/04/16	719.91	1.0 - 6.0	718.91 - 713.91	---	1.90	0.00	0.80	718.01
02/02/16	719.91	1.0 - 6.0	718.91 - 713.91	---	1.92	0.00	0.80	717.99
03/02/16	719.91	1.0 - 6.0	718.91 - 713.91	---	1.90	0.00	0.80	718.01
04/04/16	719.91	1.0 - 6.0	718.91 - 713.91	---	2.05	0.00	0.80	717.86
05/03/16	719.91	1.0 - 6.0	718.91 - 713.91	---	1.92	0.00	0.80	717.99
06/02/16	719.91	1.0 - 6.0	718.91 - 713.91	---	2.73	0.00	0.80	717.18
07/05/16	719.91	1.0 - 6.0	718.91 - 713.91	---	4.15	0.00	0.80	715.76
07/12/16	719.91	1.0 - 6.0	718.91 - 713.91	---	4.35	0.00	0.80	715.56
08/02/16	719.91	1.0 - 6.0	718.91 - 713.91	---	2.44	0.00	0.80	717.47
09/01/16	719.91	1.0 - 6.0	718.91 - 713.91	---	3.59	0.00	0.80	716.32
10/03/16	719.91	1.0 - 6.0	718.91 - 713.91	---	3.48	0.00	0.80	716.43
11/02/16	719.91	1.0 - 6.0	718.91 - 713.91	---	4.22	0.00	0.80	715.69
12/01/16	719.91	1.0 - 6.0	718.91 - 713.91	---	2.25	0.00	0.80	717.66
01/05/17	719.91	1.0 - 6.0	718.91 - 713.91	---	2.10	0.00	0.80	717.81
01/18/17	719.91	1.0 - 6.0	718.91 - 713.91	---	2.11	0.00	0.80	717.80
MW-5								
01/13/15	717.93	0.6 - 5.6	717.33 - 712.33	---	3.32	0.00	0.80	714.61
07/07/15	717.93	0.6 - 5.6	717.33 - 712.33	---	4.44	0.00	0.80	713.49
08/12/15	717.93	0.6 - 5.6	717.33 - 712.33	---	4.04	0.00	0.80	713.89
09/04/15	717.93	0.6 - 5.6	717.33 - 712.33	---	5.99	0.00	0.80	711.94
10/06/15	717.93	0.6 - 5.6	717.33 - 712.33	---	3.30	0.00	0.80	714.63
11/02/15	717.93	0.6 - 5.6	717.33 - 712.33	---	2.97	0.00	0.80	714.96
12/02/15	717.93	0.6 - 5.6	717.33 - 712.33	---	3.15	0.00	0.80	714.78
01/04/16	717.93	0.6 - 5.6	717.33 - 712.33	---	3.11	0.00	0.80	714.82
02/02/16	717.93	0.6 - 5.6	717.33 - 712.33	---	3.05	0.00	0.80	714.88
03/02/16	717.93	0.6 - 5.6	717.33 - 712.33	---	3.14	0.00	0.80	714.79
04/04/16	717.93	0.6 - 5.6	717.33 - 712.33	---	3.52	0.00	0.80	714.41
05/03/16	717.93	0.6 - 5.6	717.33 - 712.33	---	3.35	0.00	0.80	714.58
06/02/16	717.93	0.6 - 5.6	717.33 - 712.33	---	4.77	0.00	0.80	713.16
07/05/16	717.93	0.6 - 5.6	717.33 - 712.33	---	6.56	0.00	0.80	711.37
07/12/16	717.93	0.6 - 5.6	717.33 - 712.33	---	6.79	0.00	0.80	711.14
08/02/16	717.93	0.6 - 5.6	717.33 - 712.33	---	4.88	0.00	0.80	713.05
09/01/16	717.93	0.6 - 5.6	717.33 - 712.33	---	5.49	0.00	0.80	712.44
10/03/16	717.93	0.6 - 5.6	717.33 - 712.33	---	5.45	0.00	0.80	712.48
11/02/16	717.93	0.6 - 5.6	717.33 - 712.33	---	6.21	0.00	0.80	711.72
12/01/16	717.93	0.6 - 5.6	717.33 - 712.33	---	3.75	0.00	0.80	714.18
01/05/17	717.93	0.6 - 5.6	717.33 - 712.33	---	3.40	0.00	0.80	714.53
01/08/17	717.93	0.6 - 5.6	717.33 - 712.33	---	3.63	0.00	0.80	714.30

Table 1
Groundwater and NAPL Levels
Anderson TOR Release
Plantation Pipe Line
SCDHEC Release # 18570
AECOM Project 60504035

WELL OR SUMP NUMBER	TOP OF CASING ELEVATION (ft.)	SCREENED INTERVAL (ft., bgs)	SCREENED INTERVAL ELEVATION (ft., msl)	DEPTH TO NAPL (ft.)	DEPTH TO WATER (ft.)	NAPL THICKNESS (ft.)	ASSUMED SPECIFIC GRAVITY	CORRECTED GROUNDWATER ELEVATION
MW-6								
01/13/15	734.68	8.0 - 18.0	726.68 - 716.68	---	13.60	0.00	0.80	721.08
07/07/15	734.68	8.0 - 18.0	726.68 - 716.68	---	13.77	0.00	0.80	720.91
08/12/15	734.68	8.0 - 18.0	726.68 - 716.68	---	14.63	0.00	0.80	720.05
09/04/15	734.68	8.0 - 18.0	726.68 - 716.68	---	15.09	0.00	0.80	719.59
10/06/15	734.68	8.0 - 18.0	726.68 - 716.68	---	15.14	0.00	0.80	719.54
11/02/15	734.68	8.0 - 18.0	726.68 - 716.68	---	14.55	0.00	0.80	720.13
12/02/15	734.68	8.0 - 18.0	726.68 - 716.68	---	13.33	0.00	0.80	721.35
01/04/16	734.68	8.0 - 18.0	726.68 - 716.68	---	12.20	0.00	0.80	722.48
02/02/16	734.68	8.0 - 18.0	726.68 - 716.68	---	11.71	0.00	0.80	722.97
03/02/16	734.68	8.0 - 18.0	726.68 - 716.68	---	11.25	0.00	0.80	723.43
04/04/16	734.68	8.0 - 18.0	726.68 - 716.68	---	11.20	0.00	0.80	723.48
05/03/16	734.68	8.0 - 18.0	726.68 - 716.68	---	11.47	0.00	0.80	723.21
06/02/16	734.68	8.0 - 18.0	726.68 - 716.68	---	11.51	0.00	0.80	723.17
07/05/16	734.68	8.0 - 18.0	726.68 - 716.68	---	12.76	0.00	0.80	721.92
07/12/16	734.68	8.0 - 18.0	726.68 - 716.68	---	13.01	0.00	0.80	721.67
08/02/16	734.68	8.0 - 18.0	726.68 - 716.68	---	13.48	0.00	0.80	721.20
09/01/16	734.68	8.0 - 18.0	726.68 - 716.68	---	13.85	0.00	0.80	720.83
10/03/16	734.68	8.0 - 18.0	726.68 - 716.68	---	14.64	0.00	0.80	720.04
11/02/16	734.68	8.0 - 18.0	726.68 - 716.68	---	15.48	0.00	0.80	719.20
12/01/16	734.68	8.0 - 18.0	726.68 - 716.68	---	16.06	0.00	0.80	718.62
01/05/17	734.68	8.0 - 18.0	726.68 - 716.68	---	15.89	0.00	0.80	718.79
01/18/17	734.68	8.0 - 18.0	726.68 - 716.68	---	14.85	0.00	0.80	719.83
MW-7								
01/13/15	726.44	3.9 - 13.9	722.54 - 712.54	---	6.22	0.00	0.80	720.22
07/07/15	726.44	3.9 - 13.9	722.54 - 712.54	---	7.20	0.00	0.80	719.24
08/12/15	726.44	3.9 - 13.9	722.54 - 712.54	---	8.01	0.00	0.80	718.43
09/04/15	726.44	3.9 - 13.9	722.54 - 712.54	---	8.68	0.00	0.80	717.76
10/06/15	726.44	3.9 - 13.9	722.54 - 712.54	---	6.98	0.00	0.80	719.46
11/02/15	726.44	3.9 - 13.9	722.54 - 712.54	---	4.49	0.00	0.80	721.95
12/02/15	726.44	3.9 - 13.9	722.54 - 712.54	---	6.70	0.00	0.80	719.74
01/04/16	726.44	3.9 - 13.9	722.54 - 712.54	---	5.49	0.00	0.80	720.95
02/02/16	726.44	3.9 - 13.9	722.54 - 712.54	---	5.72	0.00	0.80	720.72
03/02/16	726.44	3.9 - 13.9	722.54 - 712.54	---	5.16	0.00	0.80	721.28
04/04/16	726.44	3.9 - 13.9	722.54 - 712.54	---	5.42	0.00	0.80	721.02
05/03/16	726.44	3.9 - 13.9	722.54 - 712.54	---	5.63	0.00	0.80	720.81
06/02/16	726.44	3.9 - 13.9	722.54 - 712.54	---	5.73	0.00	0.80	720.71
07/05/16	726.44	3.9 - 13.9	722.54 - 712.54	---	6.74	0.00	0.80	719.70
07/16/16	726.44	3.9 - 13.9	722.54 - 712.54	---	6.99	0.00	0.80	719.45
08/02/16	726.44	3.9 - 13.9	722.54 - 712.54	---	7.06	0.00	0.80	719.38
09/01/16	726.44	3.9 - 13.9	722.54 - 712.54	---	7.53	0.00	0.80	718.91
10/03/16	726.44	3.9 - 13.9	722.54 - 712.54	---	8.22	0.00	0.80	718.22
11/02/16	726.44	3.9 - 13.9	722.54 - 712.54	---	9.10	0.00	0.80	717.34
12/01/16	726.44	3.9 - 13.9	722.54 - 712.54	---	9.34	0.00	0.80	717.10
01/05/17	726.44	3.9 - 13.9	722.54 - 712.54	---	7.59	0.00	0.80	718.85
01/18/17	726.44	3.9 - 13.9	722.54 - 712.54	---	7.65	0.00	0.80	718.79

Table 1
Groundwater and NAPL Levels
Anderson TOR Release
Plantation Pipe Line
SCDHEC Release # 18570
AECOM Project 60504035

WELL OR SUMP NUMBER	TOP OF CASING ELEVATION (ft.)	SCREENED INTERVAL (ft., bgs)	SCREENED INTERVAL ELEVATION (ft., msl)	DEPTH TO NAPL (ft.)	DEPTH TO WATER (ft.)	NAPL THICKNESS (ft.)	ASSUMED SPECIFIC GRAVITY	CORRECTED GROUNDWATER ELEVATION
MW-8								
01/13/15	722.00	6.4 - 16.4	715.60 - 705.60	---	4.02	0.00	0.80	717.98
07/07/15	722.00	6.4 - 16.4	715.60 - 705.60	---	4.90	0.00	0.80	717.10
08/12/15	722.00	6.4 - 16.4	715.60 - 705.60	---	5.62	0.00	0.80	716.38
09/04/15	722.00	6.4 - 16.4	715.60 - 705.60	---	6.31	0.00	0.80	715.69
10/06/15	722.00	6.4 - 16.4	715.60 - 705.60	---	5.24	0.00	0.80	716.76
11/02/15	722.00	6.4 - 16.4	715.60 - 705.60	---	4.40	0.00	0.80	717.60
12/02/15	722.00	6.4 - 16.4	715.60 - 705.60	---	4.23	0.00	0.80	717.77
01/04/16	722.00	6.4 - 16.4	715.60 - 705.60	---	3.11	0.00	0.80	718.89
02/02/16	722.00	6.4 - 16.4	715.60 - 705.60	---	3.07	0.00	0.80	718.93
03/02/16	722.00	6.4 - 16.4	715.60 - 705.60	---	2.65	0.00	0.80	719.35
04/04/16	722.00	6.4 - 16.4	715.60 - 705.60	---	2.81	0.00	0.80	719.19
05/03/16	722.00	6.4 - 16.4	715.60 - 705.60	---	3.15	0.00	0.80	718.85
06/02/16	722.00	6.4 - 16.4	715.60 - 705.60	---	3.24	0.00	0.80	718.76
07/05/16	722.00	6.4 - 16.4	715.60 - 705.60	---	4.61	0.00	0.80	717.39
07/12/16	722.00	6.4 - 16.4	715.60 - 705.60	---	4.86	0.00	0.80	717.14
08/02/16	722.00	6.4 - 16.4	715.60 - 705.60	---	4.91	0.00	0.80	717.09
09/01/16	722.00	6.4 - 16.4	715.60 - 705.60	---	5.31	0.00	0.80	716.69
10/03/16	722.00	6.4 - 16.4	715.60 - 705.60	---	5.94	0.00	0.80	716.06
11/02/16	722.00	6.4 - 16.4	715.60 - 705.60	---	6.73	0.00	0.80	715.27
12/01/16	722.00	6.4 - 16.4	715.60 - 705.60	---	6.82	0.00	0.80	715.18
01/05/17	722.00	6.4 - 16.4	715.60 - 705.60	---	6.71	0.00	0.80	715.29
01/18/17	722.00	6.4 - 16.4	715.60 - 705.60	---	4.45	0.00	0.80	717.55
MW-10								
01/14/15	723.17	1.7 - 11.7	721.47 - 711.47	---	2.39	0.00	0.80	720.78
07/07/15	723.17	1.7 - 11.7	721.47 - 711.47	---	4.00	0.00	0.80	719.17
07/12/16	723.17	1.7 - 11.7	721.47 - 711.47	4.47	4.53	0.06	0.80	718.69
08/02/16	723.17	1.7 - 11.7	721.47 - 711.47	3.43	3.45	0.02	0.80	719.74
09/01/16	723.17	1.7 - 11.7	721.47 - 711.47	4.49	4.51	0.02	0.80	718.68
10/03/16	723.17	1.7 - 11.7	721.47 - 711.47	---	4.80	0.00	0.80	718.37
11/02/16	723.17	1.7 - 11.7	721.47 - 711.47	---	6.05	0.00	0.80	717.12
12/01/16	723.17	1.7 - 11.7	721.47 - 711.47	---	4.32	0.00	0.80	718.85
01/05/17	723.17	1.7 - 11.7	721.47 - 711.47	2.52	2.54	0.02	0.80	720.65
01/18/17	723.17	1.7 - 11.7	721.47 - 711.47	---	3.91	0.00	0.80	719.26

Table 1
Groundwater and NAPL Levels
Anderson TOR Release
Plantation Pipe Line
SCDHEC Release # 18570
AECOM Project 60504035

WELL OR SUMP NUMBER	TOP OF CASING ELEVATION (ft.)	SCREENED INTERVAL (ft., bgs)	SCREENED INTERVAL ELEVATION (ft., msl)	DEPTH TO NAPL (ft.)	DEPTH TO WATER (ft.)	NAPL THICKNESS (ft.)	ASSUMED SPECIFIC GRAVITY	CORRECTED GROUNDWATER ELEVATION
MW-11								
01/14/15	727.45	2.0 - 12.0	725.45 - 715.45	---	6.59	0.00	0.80	720.86
07/07/15	727.45	2.0 - 12.0	725.45 - 715.45	---	7.95	0.00	0.80	719.50
08/12/15	727.45	2.0 - 12.0	725.45 - 715.45	---	8.69	0.00	0.80	718.76
09/04/15	727.45	2.0 - 12.0	725.45 - 715.45	---	9.48	0.00	0.80	717.97
10/06/15	727.45	2.0 - 12.0	725.45 - 715.45	---	5.63	0.00	0.80	721.82
11/02/15	727.45	2.0 - 12.0	725.45 - 715.45	---	3.36	0.00	0.80	724.09
12/02/15	727.45	2.0 - 12.0	725.45 - 715.45	---	7.82	0.00	0.80	719.63
01/04/16	727.45	2.0 - 12.0	725.45 - 715.45	---	5.28	0.00	0.80	722.17
02/02/16	727.45	2.0 - 12.0	725.45 - 715.45	---	6.52	0.00	0.80	720.93
03/02/16	727.45	2.0 - 12.0	725.45 - 715.45	---	6.03	0.00	0.80	721.42
04/04/16	727.45	2.0 - 12.0	725.45 - 715.45	---	2.21	0.00	0.80	725.24
05/03/16	727.45	2.0 - 12.0	725.45 - 715.45	---	6.54	0.00	0.80	720.91
06/02/16	727.45	2.0 - 12.0	725.45 - 715.45	---	6.65	0.00	0.80	720.80
07/05/16	727.45	2.0 - 12.0	725.45 - 715.45	---	7.92	0.00	0.80	719.53
07/12/16	727.45	2.0 - 12.0	725.45 - 715.45	---	8.18	0.00	0.80	719.27
08/02/16	727.45	2.0 - 12.0	725.45 - 715.45	---	7.60	0.00	0.80	719.85
09/01/16	727.46	2.0 - 12.0	725.45 - 715.45	---	8.50	0.00	0.80	718.96
10/03/16	727.46	2.0 - 12.0	725.45 - 715.45	---	9.15	0.00	0.80	718.31
11/02/16	727.46	2.0 - 12.0	725.45 - 715.45	---	10.08	0.00	0.80	717.38
12/01/16	727.46	2.0 - 12.0	725.45 - 715.45	---	9.92	0.00	0.80	717.54
01/05/17	727.46	2.0 - 12.0	725.45 - 715.45	---	6.57	0.00	0.80	720.89
01/18/17	727.46	2.0 - 12.0	725.45 - 715.45	---	6.95	0.00	0.80	720.51
MW-14								
01/14/15	724.89	2.5 - 12.5	722.39 - 712.39	---	2.32	0.00	0.80	722.57
07/07/15	724.89	2.5 - 12.5	722.39 - 712.39	4.82	4.92	0.10	0.80	720.05
08/12/15	724.89	2.5 - 12.5	722.39 - 712.39	5.74	5.79	0.05	0.80	719.14
09/04/15	724.89	2.5 - 12.5	722.39 - 712.39	6.46	6.75	0.29	0.80	718.37
10/06/15	724.89	2.5 - 12.5	722.39 - 712.39	---	2.50	0.00	0.80	722.39
11/02/15	724.89	2.5 - 12.5	722.39 - 712.39	---	0.08	0.00	0.80	724.81
12/02/15	724.89	2.5 - 12.5	722.39 - 712.39	---	4.90	0.00	0.80	719.99
01/04/16	724.89	2.5 - 12.5	722.39 - 712.39	---	2.96	0.00	0.80	721.93
02/02/16	724.89	2.5 - 12.5	722.39 - 712.39	---	3.82	0.00	0.80	721.07
03/02/16	724.89	2.5 - 12.5	722.39 - 712.39	---	3.12	0.00	0.80	721.77
04/04/16	724.89	2.5 - 12.5	722.39 - 712.39	---	3.88	0.00	0.80	721.01
05/03/16	724.89	2.5 - 12.5	722.39 - 712.39	---	4.23	0.00	0.80	720.66
06/02/16	724.89	2.5 - 12.5	722.39 - 712.39	---	4.45	0.00	0.80	720.44
07/05/16	724.89	2.5 - 12.5	722.39 - 712.39	---	5.64	0.00	0.80	719.25
07/12/16	724.89	2.5 - 12.5	722.39 - 712.39	---	5.88	0.00	0.80	719.01
08/02/16	724.89	2.5 - 12.5	722.39 - 712.39	---	4.92	0.00	0.80	719.97
09/01/16	724.89	2.5 - 12.5	722.39 - 712.39	---	5.69	0.00	0.80	719.20
10/03/16	724.89	2.5 - 12.5	722.39 - 712.39	---	6.09	0.00	0.80	718.80
11/02/16	724.89	2.5 - 12.5	722.39 - 712.39	7.27	7.38	0.11	0.80	717.60
12/01/16	724.89	2.5 - 12.5	722.39 - 712.39	7.64	7.66	0.02	0.80	717.25
01/05/17	724.89	2.5 - 12.5	722.39 - 712.39	---	3.36	0.00	0.80	721.53
01/18/17	724.89	2.5 - 12.5	722.39 - 712.39	---	4.98	0.00	0.80	719.91

Table 1
Groundwater and NAPL Levels
Anderson TOR Release
Plantation Pipe Line
SCDHEC Release # 18570
AECOM Project 60504035

WELL OR SUMP NUMBER	TOP OF CASING ELEVATION (ft.)	SCREENED INTERVAL (ft., bgs)	SCREENED INTERVAL ELEVATION (ft., msl)	DEPTH TO NAPL (ft.)	DEPTH TO WATER (ft.)	NAPL THICKNESS (ft.)	ASSUMED SPECIFIC GRAVITY	CORRECTED GROUNDWATER ELEVATION
MW-15								
01/13/15	719.32	1.3 - 11.3	718.02 - 708.02	---	0.75	0.00	0.80	718.57
07/07/15	719.32	1.3 - 11.3	718.02 - 708.02	---	1.35	0.00	0.80	717.97
08/12/15	719.32	1.3 - 11.3	718.02 - 708.02	---	1.10	0.00	0.80	718.22
09/04/15	719.32	1.3 - 11.3	718.02 - 708.02	---	2.75	0.00	0.80	716.57
10/06/15	719.32	1.3 - 11.3	718.02 - 708.02	---	0.00	0.00	0.80	719.32
11/02/15	719.32	1.3 - 11.3	718.02 - 708.02	---	0.00	0.00	0.80	719.32
12/02/15	719.32	1.3 - 11.3	718.02 - 708.02	---	0.35	0.00	0.80	718.97
01/04/16	719.32	1.3 - 11.3	718.02 - 708.02	---	0.02	0.00	0.80	719.30
02/02/16	719.32	1.3 - 11.3	718.02 - 708.02	---	0.19	0.00	0.80	719.13
03/02/16	719.32	1.3 - 11.3	718.02 - 708.02	---	0.00	0.00	0.80	719.32
04/04/16	719.32	1.3 - 11.3	718.02 - 708.02	---	0.59	0.00	0.80	718.73
05/03/16	719.32	1.3 - 11.3	718.02 - 708.02	---	1.32	0.00	0.80	718.00
06/02/16	719.32	1.3 - 11.3	718.02 - 708.02	---	1.90	0.00	0.80	717.42
07/05/16	719.32	1.3 - 11.3	718.02 - 708.02	---	2.54	0.00	0.80	716.78
07/12/16	719.32	1.3 - 11.3	718.02 - 708.02	---	2.60	0.00	0.80	716.72
08/02/16	719.32	1.3 - 11.3	718.02 - 708.02	---	1.72	0.00	0.80	717.60
09/01/16	719.32	1.3 - 11.3	718.02 - 708.02	---	2.30	0.00	0.80	717.02
10/03/16	719.32	1.3 - 11.3	718.02 - 708.02	---	2.20	0.00	0.80	717.12
11/02/16	719.32	1.3 - 11.3	718.02 - 708.02	3.11	3.56	0.45	0.80	716.12
12/01/16	719.32	1.3 - 11.3	718.02 - 708.02	---	1.45	0.00	0.80	717.87
01/05/17	719.32	1.3 - 11.3	718.02 - 708.02	---	1.22	0.00	0.80	718.10
01/18/17	719.32	1.3 - 11.3	718.02 - 708.02	---	0.85	0.00	0.80	718.47

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WELL OR SUMP NUMBER	TOP OF CASING ELEVATION (ft.)	SCREENED INTERVAL (ft., bgs)	SCREENED INTERVAL ELEVATION (ft., msl)	DEPTH TO NAPL (ft.)	DEPTH TO WATER (ft.)	NAPL THICKNESS (ft.)	ASSUMED SPECIFIC GRAVITY	CORRECTED GROUNDWATER ELEVATION
S-2								
05/29/14	717.65	3.89 - 7.89	713.76 - 709.76	---	4.56	0.00	0.80	713.09
05/30/14	717.65	3.89 - 7.89	713.76 - 709.76	---	4.67	0.00	0.80	712.98
06/09/14	717.65	3.89 - 7.89	713.76 - 709.76	---	5.16	0.00	0.80	712.49
06/12/14	717.65	3.89 - 7.89	713.76 - 709.76	---	5.31	0.00	0.80	712.34
08/01/14	717.65	3.89 - 7.89	713.76 - 709.76	---	3.26	0.00	0.80	714.39
10/15/14	717.65	3.89 - 7.89	713.76 - 709.76	---	3.38	0.00	0.80	714.27
03/13/15	717.65	3.89 - 7.89	713.76 - 709.76	---	3.46	0.00	0.80	714.19
06/16/15	717.65	3.89 - 7.89	713.76 - 709.76	---	4.73	0.00	0.80	712.92
07/07/15	717.65	3.89 - 7.89	713.76 - 709.76	---	4.30	0.00	0.80	713.35
08/12/15	717.65	3.89 - 7.89	713.76 - 709.76	---	4.86	0.00	0.80	712.79
09/04/15	717.65	3.89 - 7.89	713.76 - 709.76	---	5.81	0.00	0.80	711.84
10/06/15	717.65	3.89 - 7.89	713.76 - 709.76	---	3.57	0.00	0.80	714.08
11/02/15	717.65	3.89 - 7.89	713.76 - 709.76	---	3.03	0.00	0.80	714.62
12/02/15	717.65	3.89 - 7.89	713.76 - 709.76	---	3.40	0.00	0.80	714.25
01/04/16	717.65	3.89 - 7.89	713.76 - 709.76	---	3.09	0.00	0.80	714.56
02/02/16	717.65	3.89 - 7.89	713.76 - 709.76	---	3.14	0.00	0.80	714.51
03/02/16	717.65	3.89 - 7.89	713.76 - 709.76	---	3.24	0.00	0.80	714.41
04/04/16	717.65	3.89 - 7.89	713.76 - 709.76	---	3.60	0.00	0.80	714.05
05/03/16	717.65	3.89 - 7.89	713.76 - 709.76	---	3.31	0.00	0.80	714.34
06/02/16	717.65	3.89 - 7.89	713.76 - 709.76	---	4.38	0.00	0.80	713.27
07/05/16	717.65	3.89 - 7.89	713.76 - 709.76	---	6.18	0.00	0.80	711.47
08/02/16	717.65	3.89 - 7.89	713.76 - 709.76	---	5.34	0.00	0.80	712.31
08/12/16	Sump Abandoned							

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WELL OR SUMP NUMBER	TOP OF CASING ELEVATION (ft.)	SCREENED INTERVAL (ft., bgs)	SCREENED INTERVAL ELEVATION (ft., msl)	DEPTH TO NAPL (ft.)	DEPTH TO WATER (ft.)	NAPL THICKNESS (ft.)	ASSUMED SPECIFIC GRAVITY	CORRECTED GROUNDWATER ELEVATION
S-3								
05/29/14	718.06	3.82 - 7.82	714.24 - 710.24	---	4.77	0.00	0.80	713.29
05/30/14	718.06	3.82 - 7.82	714.24 - 710.24	---	4.86	0.00	0.80	713.20
06/09/14	718.06	3.82 - 7.82	714.24 - 710.24	---	5.33	0.00	0.80	712.73
06/12/14	718.06	3.82 - 7.82	714.24 - 710.24	---	5.46	0.00	0.80	712.60
08/01/14	718.06	3.82 - 7.82	714.24 - 710.24	---	3.32	0.00	0.80	714.74
10/15/14	718.06	3.82 - 7.82	714.24 - 710.24	---	3.41	0.00	0.80	714.65
03/13/15	718.06	3.82 - 7.82	714.24 - 710.24	---	3.48	0.00	0.80	714.58
06/16/15	718.06	3.82 - 7.82	714.24 - 710.24	---	4.97	0.00	0.80	713.09
07/07/15	718.06	3.82 - 7.82	714.24 - 710.24	---	4.40	0.00	0.80	713.66
08/12/15	718.06	3.82 - 7.82	714.24 - 710.24	---	4.60	0.00	0.80	713.46
09/04/15	718.06	3.82 - 7.82	714.24 - 710.24	---	5.80	0.00	0.80	712.26
10/06/15	718.06	3.82 - 7.82	714.24 - 710.24	---	3.57	0.00	0.80	714.49
11/02/15	718.06	3.82 - 7.82	714.24 - 710.24	---	3.13	0.00	0.80	714.93
12/02/15	718.06	3.82 - 7.82	714.24 - 710.24	---	3.34	0.00	0.80	714.72
01/04/16	718.06	3.82 - 7.82	714.24 - 710.24	---	3.20	0.00	0.80	714.86
02/02/16	718.06	3.82 - 7.82	714.24 - 710.24	---	3.17	0.00	0.80	714.89
03/02/16	718.06	3.82 - 7.82	714.24 - 710.24	---	3.31	0.00	0.80	714.75
04/04/16	718.06	3.82 - 7.82	714.24 - 710.24	---	3.74	0.00	0.80	714.32
05/03/16	718.06	3.82 - 7.82	714.24 - 710.24	---	3.54	0.00	0.80	714.52
06/02/16	718.06	3.82 - 7.82	714.24 - 710.24	---	4.55	0.00	0.80	713.51
07/05/16	718.06	3.82 - 7.82	714.24 - 710.24	---	6.42	0.00	0.80	711.64
08/02/16	718.06	3.82 - 7.82	714.24 - 710.24	---	5.45	0.00	0.80	712.61
08/12/16	Sump Abandoned							

Table 1
Groundwater and NAPL Levels
Anderson TOR Release
Plantation Pipe Line
SCDHEC Release # 18570
AECOM Project 60504035

WELL OR SUMP NUMBER	TOP OF CASING ELEVATION (ft.)	SCREENED INTERVAL (ft., bgs)	SCREENED INTERVAL ELEVATION (ft., msl)	DEPTH TO NAPL (ft.)	DEPTH TO WATER (ft.)	NAPL THICKNESS (ft.)	ASSUMED SPECIFIC GRAVITY	CORRECTED GROUNDWATER ELEVATION
S-5								
05/29/14	725.02	4.85 - 9.85	720.17 - 715.17	6.13	6.55	0.42	0.80	718.81
05/30/14	725.02	4.85 - 9.85	720.17 - 715.17	6.19	6.64	0.45	0.80	718.74
06/09/14	725.02	4.85 - 9.85	720.17 - 715.17	6.08	6.49	0.41	0.80	718.86
06/12/14	725.02	4.85 - 9.85	720.17 - 715.17	6.05	6.38	0.33	0.80	718.90
08/01/14	725.02	4.85 - 9.85	720.17 - 715.17	2.58	2.66	0.08	0.80	722.42
10/15/14	725.02	4.85 - 9.85	720.17 - 715.17	4.26	4.28	0.02	0.80	720.76
03/13/15	725.02	4.85 - 9.85	720.17 - 715.17	4.61	4.62	0.01	0.80	720.41
06/16/15	725.02	4.85 - 9.85	720.17 - 715.17	---	5.62	0.00	0.80	719.40
07/07/15	725.02	4.85 - 9.85	720.17 - 715.17	---	5.02	0.00	0.80	720.00
08/12/15	725.02	4.85 - 9.85	720.17 - 715.17	---	5.40	0.00	0.80	719.62
09/04/15	725.02	4.85 - 9.85	720.17 - 715.17	---	6.43	0.00	0.80	718.59
10/06/15	725.02	4.85 - 9.85	720.17 - 715.17	---	2.94	0.00	0.80	722.08
11/02/15	725.02	4.85 - 9.85	720.17 - 715.17	---	2.55	0.00	0.80	722.47
12/02/15	725.02	4.85 - 9.85	720.17 - 715.17	---	5.00	0.00	0.80	720.02
01/04/16	725.02	4.85 - 9.85	720.17 - 715.17	---	3.14	0.00	0.80	721.88
02/02/16	725.02	4.85 - 9.85	720.17 - 715.17	---	3.92	0.00	0.80	721.10
03/02/16	725.02	4.85 - 9.85	720.17 - 715.17	---	3.31	0.00	0.80	721.71
04/04/16	725.02	4.85 - 9.85	720.17 - 715.17	---	3.85	0.00	0.80	721.17
05/03/16	725.02	4.85 - 9.85	720.17 - 715.17	---	4.41	0.00	0.80	720.61
06/02/16	725.02	4.85 - 9.85	720.17 - 715.17	---	4.51	0.00	0.80	720.51
07/05/16	725.02	4.85 - 9.85	720.17 - 715.17	---	5.94	0.00	0.80	719.08
08/02/16	725.02	4.85 - 9.85	720.17 - 715.17	---	4.88	0.00	0.80	720.14
08/12/16	Sump Abandoned							

Table 1
Groundwater and NAPL Levels
Anderson TOR Release
Plantation Pipe Line
SCDHEC Release # 18570
AECOM Project 60504035

WELL OR SUMP NUMBER	TOP OF CASING ELEVATION (ft.)	SCREENED INTERVAL (ft., bgs)	SCREENED INTERVAL ELEVATION (ft., msl)	DEPTH TO NAPL (ft.)	DEPTH TO WATER (ft.)	NAPL THICKNESS (ft.)	ASSUMED SPECIFIC GRAVITY	CORRECTED GROUNDWATER ELEVATION
S-6								
05/29/14	725.26	5.30 - 10.30	719.96 - 714.96	6.21	6.45	0.24	0.80	719.00
05/30/14	725.26	5.30 - 10.30	719.96 - 714.96	6.26	6.54	0.28	0.80	718.94
06/09/14	725.26	5.30 - 10.30	719.96 - 714.96	6.37	6.77	0.40	0.80	718.81
06/12/14	725.26	5.30 - 10.30	719.96 - 714.96	6.35	6.77	0.42	0.80	718.83
08/01/14	725.26	5.30 - 10.30	719.96 - 714.96	2.55	2.80	0.25	0.80	722.66
10/15/14	725.26	5.30 - 10.30	719.96 - 714.96	4.33	4.45	0.12	0.80	720.91
03/13/15	725.26	5.30 - 10.30	719.96 - 714.96	4.84	4.90	0.06	0.80	720.41
06/16/15	725.26	5.30 - 10.30	719.96 - 714.96	---	5.35	0.00	0.80	719.91
07/07/15	725.26	5.30 - 10.30	719.96 - 714.96	---	5.25	0.00	0.80	720.01
08/12/15	725.26	5.30 - 10.30	719.96 - 714.96	5.58	5.68	0.10	0.80	719.66
09/04/15	725.26	5.30 - 10.30	719.96 - 714.96	6.72	6.87	0.15	0.80	718.51
10/06/15	725.26	5.30 - 10.30	719.96 - 714.96	0.94	1.40	0.46	0.80	724.23
11/02/15	725.26	5.30 - 10.30	719.96 - 714.96	---	2.43	0.00	0.80	722.83
12/02/15	725.26	5.30 - 10.30	719.96 - 714.96	---	5.26	0.00	0.80	720.00
01/04/16	725.26	5.30 - 10.30	719.96 - 714.96	---	3.42	0.00	0.80	721.84
02/02/16	725.26	5.30 - 10.30	719.96 - 714.96	---	4.16	0.00	0.80	721.10
03/02/16	725.26	5.30 - 10.30	719.96 - 714.96	---	3.54	0.00	0.80	721.72
04/04/16	725.26	5.30 - 10.30	719.96 - 714.96	---	4.09	0.00	0.80	721.17
05/03/16	725.26	5.30 - 10.30	719.96 - 714.96	---	4.68	0.00	0.80	720.58
06/02/16	725.26	5.30 - 10.30	719.96 - 714.96	---	4.79	0.00	0.80	720.47
07/05/16	725.26	5.30 - 10.30	719.96 - 714.96	---	6.25	0.00	0.80	719.01
08/02/16	725.26	5.30 - 10.30	719.96 - 714.96	---	13.48	0.00	0.80	711.78
08/12/16	Sump Abandoned							

Table 1
Groundwater and NAPL Levels
Anderson TOR Release
Plantation Pipe Line
SCDHEC Release # 18570
AECOM Project 60504035

WELL OR SUMP NUMBER	TOP OF CASING ELEVATION (ft.)	SCREENED INTERVAL (ft., bgs)	SCREENED INTERVAL ELEVATION (ft., msl)	DEPTH TO NAPL (ft.)	DEPTH TO WATER (ft.)	NAPL THICKNESS (ft.)	ASSUMED SPECIFIC GRAVITY	CORRECTED GROUNDWATER ELEVATION
S-7								
05/29/14	720.55	4.63 - 9.63	715.92 - 710.92	4.65	4.66	0.01	0.80	715.90
05/30/14	720.55	4.63 - 9.63	715.92 - 710.92	5.37	5.38	0.01	0.80	715.18
06/09/14	720.55	4.63 - 9.63	715.92 - 710.92	4.75	4.79	0.04	0.80	715.79
06/12/14	720.55	4.63 - 9.63	715.92 - 710.92	4.56	4.59	0.03	0.80	715.98
08/01/14	720.55	4.63 - 9.63	715.92 - 710.92	---	3.42	0.00	0.80	717.13
10/15/14	720.55	4.63 - 9.63	715.92 - 710.92	---	2.51	0.00	0.80	718.04
03/13/15	720.55	4.63 - 9.63	715.92 - 710.92	---	2.78	0.00	0.80	717.77
06/16/15	720.55	4.63 - 9.63	715.92 - 710.92	---	3.13	0.00	0.80	717.42
07/07/15	720.55	4.63 - 9.63	715.92 - 710.92	---	3.42	0.00	0.80	717.13
08/12/15	720.55	4.63 - 9.63	715.92 - 710.92	---	3.22	0.00	0.80	717.33
09/04/15	720.55	4.63 - 9.63	715.92 - 710.92	---	4.60	0.00	0.80	715.95
10/06/15	720.55	4.63 - 9.63	715.92 - 710.92	---	2.61	0.00	0.80	717.94
11/02/15	720.55	4.63 - 9.63	715.92 - 710.92	---	2.31	0.00	0.80	718.24
12/02/15	720.55	4.63 - 9.63	715.92 - 710.92	---	2.62	0.00	0.80	717.93
01/04/16	720.55	4.63 - 9.63	715.92 - 710.92	---	2.48	0.00	0.80	718.07
02/02/16	720.55	4.63 - 9.63	715.92 - 710.92	---	2.46	0.00	0.80	718.09
03/02/16	720.55	4.63 - 9.63	715.92 - 710.92	---	2.48	0.00	0.80	718.07
04/04/16	720.55	4.63 - 9.63	715.92 - 710.92	---	2.63	0.00	0.80	717.92
05/03/16	720.55	4.63 - 9.63	715.92 - 710.92	---	1.62	0.00	0.80	718.93
06/02/16	720.55	4.63 - 9.63	715.92 - 710.92	---	3.31	0.00	0.80	717.24
07/05/16	720.55	4.63 - 9.63	715.92 - 710.92	---	4.81	0.00	0.80	715.74
08/02/16	720.55	4.63 - 9.63	715.92 - 710.92	---	3.09	0.00	0.80	717.46
08/12/16	Sump Abandoned							

Table 1
Groundwater and NAPL Levels
Anderson TOR Release
Plantation Pipe Line
SCDHEC Release # 18570
AECOM Project 60504035

WELL OR SUMP NUMBER	TOP OF CASING ELEVATION (ft.)	SCREENED INTERVAL (ft., bgs)	SCREENED INTERVAL ELEVATION (ft., msl)	DEPTH TO NAPL (ft.)	DEPTH TO WATER (ft.)	NAPL THICKNESS (ft.)	ASSUMED SPECIFIC GRAVITY	CORRECTED GROUNDWATER ELEVATION
S-8								
05/29/14	726.38	6.13 - 11.13	720.25 - 715.25	6.80	6.82	0.02	0.80	719.58
05/30/14	726.38	6.13 - 11.13	720.25 - 715.25	6.83	6.84	0.01	0.80	719.55
06/09/14	726.38	6.13 - 11.13	720.25 - 715.25	---	7.11	0.00	0.80	719.27
06/12/14	726.38	6.13 - 11.13	720.25 - 715.25	---	7.14	0.00	0.80	719.24
08/01/14	726.38	6.13 - 11.13	720.25 - 715.25	---	5.30	0.00	0.80	721.08
10/15/14	726.38	6.13 - 11.13	720.25 - 715.25	---	7.12	0.00	0.80	719.26
03/13/15	726.38	6.13 - 11.13	720.25 - 715.25	---	6.36	0.00	0.80	720.02
06/16/15	726.38	6.13 - 11.13	720.25 - 715.25	---	6.98	0.00	0.80	719.40
07/07/15	726.38	6.13 - 11.13	720.25 - 715.25	---	7.00	0.00	0.80	719.38
08/12/15	726.38	6.13 - 11.13	720.25 - 715.25	---	7.92	0.00	0.80	718.46
09/04/15	726.38	6.13 - 11.13	720.25 - 715.25	---	8.62	0.00	0.80	717.76
10/06/15	726.38	6.13 - 11.13	720.25 - 715.25	---	6.61	0.00	0.80	719.77
11/02/15	726.38	6.13 - 11.13	720.25 - 715.25	---	4.51	0.00	0.80	721.87
12/02/15	726.38	6.13 - 11.13	720.25 - 715.25	---	6.64	0.00	0.80	719.74
01/04/16	726.38	6.13 - 11.13	720.25 - 715.25	---	5.48	0.00	0.80	720.90
02/02/16	726.38	6.13 - 11.13	720.25 - 715.25	---	5.64	0.00	0.80	720.74
03/02/16	726.38	6.13 - 11.13	720.25 - 715.25	---	5.14	0.00	0.80	721.24
04/04/16	726.38	6.13 - 11.13	720.25 - 715.25	---	5.25	0.00	0.80	721.13
05/03/16	726.38	6.13 - 11.13	720.25 - 715.25	---	5.54	0.00	0.80	720.84
06/02/16	726.38	6.13 - 11.13	720.25 - 715.25	---	5.62	0.00	0.80	720.76
07/05/16	726.38	6.13 - 11.13	720.25 - 715.25	---	6.73	0.00	0.80	719.65
08/02/16	726.38	6.13 - 11.13	720.25 - 715.25	---	6.86	0.00	0.80	719.52
08/12/16	Sump Abandoned							

Table 1
Groundwater and NAPL Levels
Anderson TOR Release
Plantation Pipe Line
SCDHEC Release # 18570
AECOM Project 60504035

WELL OR SUMP NUMBER	TOP OF CASING ELEVATION (ft.)	SCREENED INTERVAL (ft., bgs)	SCREENED INTERVAL ELEVATION (ft., msl)	DEPTH TO NAPL (ft.)	DEPTH TO WATER (ft.)	NAPL THICKNESS (ft.)	ASSUMED SPECIFIC GRAVITY	CORRECTED GROUNDWATER ELEVATION
S-9								
05/29/14	722.88	5.35 - 10.35	717.53 - 712.53	5.34	5.39	0.05	0.80	717.53
05/30/14	722.88	5.35 - 10.35	717.53 - 712.53	5.04	5.14	0.10	0.80	717.82
06/09/14	722.88	5.35 - 10.35	717.53 - 712.53	4.13	4.20	0.07	0.80	718.74
06/12/14	722.88	5.35 - 10.35	717.53 - 712.53	4.20	4.28	0.08	0.80	718.66
08/01/14	722.88	5.35 - 10.35	717.53 - 712.53	2.70	2.71	0.01	0.80	720.18
10/15/14	722.88	5.35 - 10.35	717.53 - 712.53	---	3.37	0.00	0.80	719.51
03/13/15	722.88	5.35 - 10.35	717.53 - 712.53	---	3.39	0.00	0.80	719.49
06/16/15	722.88	5.35 - 10.35	717.53 - 712.53	---	3.85	0.00	0.80	719.03
07/07/15	722.88	5.35 - 10.35	717.53 - 712.53	---	3.50	0.00	0.80	719.38
08/12/15	722.88	5.35 - 10.35	717.53 - 712.53	---	4.30	0.00	0.80	718.58
09/04/15	722.88	5.35 - 10.35	717.53 - 712.53	---	5.46	0.00	0.80	717.42
10/06/15	722.88	5.35 - 10.35	717.53 - 712.53	---	3.09	0.00	0.80	719.79
11/02/15	722.88	5.35 - 10.35	717.53 - 712.53	---	2.67	0.00	0.80	720.21
12/02/15	722.88	5.35 - 10.35	717.53 - 712.53	---	3.39	0.00	0.80	719.49
01/04/16	722.88	5.35 - 10.35	717.53 - 712.53	---	3.19	0.00	0.80	719.69
02/02/16	722.88	5.35 - 10.35	717.53 - 712.53	---	3.23	0.00	0.80	719.65
03/02/16	722.88	5.35 - 10.35	717.53 - 712.53	---	3.04	0.00	0.80	719.84
04/04/16	722.88	5.35 - 10.35	717.53 - 712.53	---	3.22	0.00	0.80	719.66
05/03/16	722.88	5.35 - 10.35	717.53 - 712.53	---	3.29	0.00	0.80	719.59
06/02/16	722.88	5.35 - 10.35	717.53 - 712.53	---	3.40	0.00	0.80	719.48
07/05/16	722.88	5.35 - 10.35	717.53 - 712.53	---	4.29	0.00	0.80	718.59
08/02/16	722.88	5.35 - 10.35	717.53 - 712.53	---	3.86	0.00	0.80	719.02
08/12/16	Sump Abandoned							

Table 2
Groundwater Analytical Data - VOCs
Anderson TOR Release
Plantation Pipe Line
SCDHEC Release # 18570
AECOM Project 60533575

WELL NUMBER	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYLBENZENE (µg/L)	XYLENES (µg/L)	MTBE (µg/L)	NAPHTHALENE - 8260 (µg/L)	DIPE (µg/L)	ETBA (µg/L)	EtBE (µg/L)	tAME (µg/L)	tBA (µg/L)	tAA (µg/L)	tBF (µg/L)	ETHANOL (µg/L)
SC MCL	5.00	1000	700	10000	-	-	-	-	-	-	-	-	-	-
[1]SC RBSLs	5.00	1000	700	10000	40.0	25.0	-	-	-	-	-	-	-	-
[2]SC Action Level	-	-	-	-	-	-	150	—	47.0	128	1400	240	—	10000
MW-1														
01/14/15	NON-AQUEOUS PHASE LIQUID (NAPL) - 1.06'													
07/13/16	NON-AQUEOUS PHASE LIQUID (NAPL) - 0.14'													
DW-1														
01/14/15	<5.00	<5.00	<5.00	<10.0	<5.00	<5.00	<5.00	NA	NA	NA	NA	NA	NA	NA
07/13/16	<1.00	<5.00	<1.00	<3.00	<1.00	<5.00	<1.00	<100	<1.00	<1.00	<5.00	<50.0	<20.0	<100
DUP - 7/13/16	<1.00	<5.00	<1.00	<3.00	<1.00	<5.00	<1.00	<100	<1.00	<1.00	<5.00	<50.0	<20.0	<100
MW-2														
01/13/15	<5.00	<5.00	<5.00	<10.0	<5.00	<5.00	<5.00	NA	NA	NA	NA	NA	NA	NA
07/13/16	<1.00	<5.00	<1.00	<3.00	<1.00	<5.00	<1.00	<100	<1.00	<1.00	<5.00	<50.0	<20.0	<100
MW-3														
01/14/15	**18000**	**37500**	**2390**	**12900**	<1000	<1000	**1780**	NA	NA	NA	NA	NA	NA	NA
07/13/16	NON-AQUEOUS PHASE LIQUID (NAPL) - 0.02'													
MW-4														
01/13/15	**7150**	**16900**	**1760**	8510	<625	<625	<625	NA	NA	NA	NA	NA	NA	NA
07/13/16	**2760**	**3300**	**854**	4240	50.4	**140**	**250**	<500	<5.00	44.0	63.5	**737**	<100	<500
MW-5														
01/13/15	**8.30**	<5.00	<5.00	<10.0	<5.00	<5.00	<5.00	NA	NA	NA	NA	NA	NA	NA
07/13/16	<1.00	7.15	<1.00	3.94	<1.00	<5.00	3.00	<100	<1.00	<1.00	<5.00	<50.0	<20.0	<100
01/18/17	<1.00	<1.00	<1.00	<3.00	NA	<5.00	NA	NA	NA	NA	NA	NA	NA	NA
MW-6														
01/13/15	<5.00	<5.00	<5.00	<10.0	<5.00	<5.00	<5.00	NA	NA	NA	NA	NA	NA	NA
07/13/16	<1.00	<5.00	<1.00	<3.00	<1.00	<5.00	<1.00	<100	<1.00	<1.00	<5.00	<50.0	<20.0	<100
01/18/17	**34.60**	120.00	14.10	39.60	NA	<5.00	NA	NA	NA	NA	NA	NA	NA	NA
MW-7														
01/13/15	**50.6**	185	<25.0	225	<25.0	<25.0	<25.0	NA	NA	NA	NA	NA	NA	NA
07/13/16	**7.80**	<5.00	<1.00	3.22	<1.00	<5.00	<1.00	<100	<1.00	<1.00	<5.00	<50.0	<20.0	<100
MW-8														
01/15/15	<5.00	<5.00	<5.00	<10.0	<5.00	<5.00	<5.00	NA	NA	NA	NA	NA	NA	NA
07/12/16	<1.00	<5.00	<1.00	<3.00	1.17	<5.00	<1.00	<100	<1.00	<1.00	<5.00	<50.0	<20.0	<100
01/18/17	<1.00	<1.00	<1.00	<3.00	NA	<5.00	NA	NA	NA	NA	NA	NA	NA	NA
MW-9														
01/14/15	**5.30**	<5.00	<5.00	<10.0	<5.00	<5.00	<5.00	NA	NA	NA	NA	NA	NA	NA
07/13/16	<1.00	<5.00	<1.00	<3.00	<1.00	<5.00	<1.00	<100	<1.00	<1.00	<5.00	<50.0	<20.0	<100
MW-10														
01/14/15	**2680**	**15900**	**1700**	**10100**	<1000	<1000	<1000	NA	NA	NA	NA	NA	NA	NA
07/13/16	NON-AQUEOUS PHASE LIQUID (NAPL) - 0.06'													
MW-11														
01/14/15	**3840**	**17400**	<1000	9700	<1000	<1000	<1000	NA	NA	NA	NA	NA	NA	NA
07/13/16	**431**	150	336	1960	<1.00	**70.4**	28.0	<100	<1.00	5.29	41.2	**569**	<20.0	<100
MW-12														
01/13/15	<5.00	<5.00	<5.00	<10.0	<5.00	<5.00	<5.00	NA	NA	NA	NA	NA	NA	NA
07/13/16	<1.00	<5.00	<1.00	<3.00	<1.00	<5.00	<1.00	<100	<1.00	<1.00	<5.00	<50.0	<20.0	<100
DUP - 7/13/16	<1.00	<5.00	<1.00	<3.00	<1.00	<5.00	<1.00	<100	<1.00	<1.00	<5.00	<50.0	<20.0	<100
MW-13														
01/14/15	**1270**	**5710**	235	2490	<125	<125	<125	NA	NA	NA	NA	NA	NA	NA
07/13/16	**4880**	**18900**	**1850**	9580	<50.0	<250	221	<5000	<50.0	<50.0	<250	**3410**	<1000	<5000
01/18/17	**1220**	**4670**	689	3630	NA	<1000	NA	NA	NA	NA	NA	NA	NA	NA
MW-14														
01/14/15	**14000**	**29900**	**1510**	**10600**	<1250	<1250	**1680**	NA	NA	NA	NA	NA	NA	NA
07/13/16	**8560**	**27300**	**1890**	**11800**	**155**	**390**	**707**	<5000	<50.0	**147**	410	**5750**	<1000	<5000

Table 2
Groundwater Analytical Data - VOCs
Anderson TOR Release
Plantation Pipe Line
SCDHEC Release # 18570
AECOM Project 60533575

WELL NUMBER	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYLBENZENE (µg/L)	XYLENES (µg/L)	MTBE (µg/L)	NAPHTHALENE - 8260 (µg/L)	DIPE (µg/L)	ETBA (µg/L)	EtBE (µg/L)	tAME (µg/L)	tBA (µg/L)	tAA (µg/L)	tBF (µg/L)	ETHANOL (µg/L)
SC MCL	**5.00**	**1000**	**700**	**10000**	-	-	-	-	-	-	-	-	-	-
[1]SC RBSLs	**5.00**	**1000**	**700**	**10000**	**40.0**	**25.0**	-	-	-	-	-	-	-	-
[2]SC Action Level	-	-	-	-	-	-	**150**	—	**47.0**	**128**	**1400**	**240**	—	**10000**
MW-15														
01/13/15	**12700**	**21100**	**1520**	7360	<625	<625	**1450**	NA	NA	NA	NA	NA	NA	NA
07/13/16	**767**	**1790**	197	940	11.5	22.1	60.5	<100	<1.00	10.7	38.3	**669**	<20.0	<100
MW-16														
06/30/15	<1.00	<5.00	<1.00	<3.00	<1.00	<5.00	NA	NA	NA	NA	NA	NA	NA	NA
07/13/16	<1.00	<5.00	<1.00	<3.00	<1.00	<5.00	<1.00	<100	<1.00	<1.00	<5.00	<50.0	<20.0	<100
01/18/17	<1.00	<1.00	<1.00	<3.00	NA	<5.00	NA	NA	NA	NA	NA	NA	NA	NA
MW-17														
06/30/15	<1.00	<5.00	<1.00	<3.00	<1.00	<5.00	NA	NA	NA	NA	NA	NA	NA	NA
07/12/16	<1.00	<5.00	<1.00	<3.00	<1.00	<5.00	<1.00	<100	<1.00	<1.00	<5.00	<50.0	<20.0	<100
MW-18														
06/30/15	<1.00	<5.00	<1.00	<3.00	<1.00	<5.00	NA	NA	NA	NA	NA	NA	NA	NA
07/12/16	<1.00	<5.00	<1.00	<3.00	<1.00	<5.00	<1.00	<100	<1.00	<1.00	<5.00	<50.0	<20.0	<100
01/18/17	<1.00	<1.00	<1.00	<3.00	NA	<5.00	NA	NA	NA	NA	NA	NA	NA	NA
MW-19														
06/30/15	**16.0**	76.0	6.20	120	<1.00	<5.00	NA	NA	NA	NA	NA	NA	NA	NA
07/12/16	**440**	479	152	1190	<1.00	19.4	20.7	<100	<1.00	<1.00	<5.00	439	<20.0	<100
MW-20														
06/30/15	<1.00	<5.00	<1.00	<3.00	4.80	<5.00	NA	NA	NA	NA	NA	NA	NA	NA
07/12/16	<1.00	<5.00	<1.00	<3.00	3.45	<5.00	8.89	<100	<1.00	1.30	<5.00	<50.0	<20.0	<100
MW-21														
06/30/15	<1.00	<5.00	<1.00	<3.00	<1.00	<5.00	NA	NA	NA	NA	NA	NA	NA	NA
DUP - 6/30/15	<1.00	<5.00	<1.00	<3.00	<1.00	<5.00	NA	NA	NA	NA	NA	NA	NA	NA
07/12/16	<1.00	<5.00	<1.00	<3.00	<1.00	<5.00	<1.00	<100	<1.00	<1.00	<5.00	<50.0	<20.0	<100
MW-22														
06/30/15	<1.00	<5.00	<1.00	<3.00	<1.00	<5.00	NA	NA	NA	NA	NA	NA	NA	NA
07/12/16	<1.00	<5.00	<1.00	<3.00	<1.00	<5.00	<1.00	<100	<1.00	<1.00	<5.00	<50.0	<20.0	<100
MW-23														
06/30/15	<1.00	<5.00	<1.00	<3.00	<1.00	<5.00	NA	NA	NA	NA	NA	NA	NA	NA
07/13/16	<1.00	<5.00	<1.00	<3.00	<1.00	<5.00	<1.00	<100	<1.00	<1.00	<5.00	<50.0	<20.0	<100
MW-24														
06/30/15	<1.00	<5.00	<1.00	<3.00	<1.00	<5.00	NA	NA	NA	NA	NA	NA	NA	NA
07/13/16	<1.00	<5.00	<1.00	<3.00	<1.00	<5.00	<1.00	<100	<1.00	<1.00	<5.00	<50.0	<20.0	<100

[1]SC RBSLs - South Carolina RBSLs for Groundwater (Table D1), Programmatic QAPP Rev. 3, May 2015.

[2]SC Action Levels - South Carolina Action Levels for Groundwater (Oxygenates) (Table D2), Programmatic QAPP Rev. 3, May 2015.

BOLD font indicates exceedance of the groundwater MCL/RBSL/Action Level.

NA - Not Analyzed

APPENDIX A

AECOM

Field Data Information Log for Groundwater Sampling

Page 1 of 1

Well ID # MW-5
Site Name PPL Anderson
Date 1-18-17
Field Personnel Marc McFarland
Job # 60504035
Weather Conditions Sunny
Air Temperature 65 °F
Total Well Depth (TWD) 6 1/100 ft
Depth to Ground Water (DGW) 3.63 1/100 ft
Length of Water Column (LWC) = TWD – DGW 2.37 1/100 ft
1 Casing Volume = LWC x 0.163 = 0.39 gal
3 Casing Volumes 1.17 gal = Standard Evacuation Volume
Method of Well Excavation Peristaltic Pump and Tubing
Method of Sample Collection Peristaltic Pump and Tubing
Total Volume of Water Removed ~0.75 gallons

Casing Diameter 2.0 Inches
Casing Material PVC
Measuring Point Elevation 1/100 ft
Land Surface Elevation 1/100 ft
Screened Interval 1/100 ft
Dedicated Pump or Bailer YES ___ NO X Type ___
Locking Cap YES X NO ___
Well Integrity Satisfactory YES ___ NO ___
Well Yield LOW ___ MODERATE ___ HIGH ___
Remarks Sampled @ 1405

BTEX and Naph.

FIELD ANALYSES

VOLUME PURGED (gallons)	0	0.25	0.5	0.75			
TIME (military)	1346	1351	1356	1401			
PH (S.U.)	3.32	3.19	3.21	3.17			
Sp. Cond. (units: Ms/cm)	0.061	0.062	0.061	0.061			
Water Temp. (°C)	13.85	13.72	13.29	13.26			
TURBIDITY (ntu)	116.3	67.76	27.52	21.47			
ORP (mV)	288.0	290.1	286.5	300.1			
Dissolved Oxygen (mg/L)	0.48	0.48	1.09	1.02			
Salinity	-	-	-	-			
Water Level	3.78	3.82	3.88	3.93			

COMMENTS/OBSERVATIONS:

1" – 0.041, 2" – 0.163, 3" – 0.367, 4" – 0.653, 6" – 1.469, 8" – 2.611

AECOM

Field Data Information Log for Groundwater Sampling

Well ID # MW-6

Site Name PPL Anderson

Date 1-18-17

Field Personnel Marc McFarland

Job # 60504035

Weather Conditions Sunny

Air Temperature 65 °F

Total Well Depth (TWD) 18 1/100 ft

Depth to Ground Water (DGW) 14.85 1/100 ft

Length of Water Column (LWC) = TWD – DGW 3.15 1/100 ft

1 Casing Volume = LWC x 0.163 = 0.51 gal

3 Casing Volumes 1.53 gal = Standard Evacuation Volume

Method of Well Excavation Peristaltic Pump and Tubing

Method of Sample Collection Peristaltic Pump and Tubing

Total Volume of Water Removed ~0.75 gallons

Casing Diameter 2.0 Inches

Casing Material PVC

Measuring Point Elevation 734.68 1/100 ft

Land Surface Elevation ______ 1/100 ft

Screened Interval 726.68 – 716.68 1/100 ft

Dedicated Pump or Bailer YES ____ NO X Type ____

Locking Cap YES X NO ____

Well Integrity Satisfactory YES ____ NO ____

Well Yield LOW ____ MODERATE ____ HIGH ____

Remarks Sampled @ 1055

DUP-1 sampled @ 1055

BTEX and Naph.

FIELD ANALYSES

VOLUME PURGED (gallons)	0	0.25	0.5	0.75			
TIME (military)	1038	1043	1048	1053			
PH (S.U.)	2.90	2.90	2.81	2.83			
Sp. Cond. (units: Ms/cm)	0.028	0.027	0.027	0.027			
Water Temp. (°C)	17.48	17.69	17.76	17.76			
TURBIDITY (ntu)	993.5	118.9	54.83	21.74			
ORP (mV)	410.3	425.7	442.3	443.7			
Dissolved Oxygen (mg/L)	3.54	4.05	4.14	4.08			
Salinity	-	-	-	-			
Water Level	14.71	14.70	14.71	14.71			

COMMENTS/OBSERVATIONS:

1" – 0.041, 2" – 0.163, 3" – 0.367, 4" – 0.653, 6" – 1.469, 8" – 2.611

AECOM

Field Data Information Log for Groundwater Sampling

Well ID # MW-8

Site Name PPL Anderson

Date 1-18-17

Field Personnel Marc McFarland

Job # 60504035

Weather Conditions Sunny

Air Temperature 65 °F

Total Well Depth (TWD) 18.5 1/100 ft

Depth to Ground Water (DGW) 4.45 1/100 ft

Length of Water Column (LWC) = TWD – DGW 14.05 1/100 ft

1 Casing Volume = LWC x 0.163 = 2.3 gal

3 Casing Volumes 6.9 gal = Standard Evacuation Volume

Method of Well Excavation Peristaltic Pump and Tubing

Method of Sample Collection Peristaltic Pump and Tubing

Total Volume of Water Removed ~1.0 gallons

Casing Diameter 2.0 Inches

Casing Material PVC

Measuring Point Elevation 722.00 1/100 ft

Land Surface Elevation ____ 1/100 ft

Screened Interval 715.60 – 705.60 1/100 ft

Dedicated Pump or Bailer YES ____ NO X Type ____

Locking Cap YES X NO ____

Well Integrity Satisfactory YES ____ NO ____

Well Yield LOW ____ MODERATE ____ HIGH ____

Remarks Sampled @ 1020

BTEX and Naph.

FIELD ANALYSES

VOLUME PURGED (gallons)	0	0.25	0.5	0.75	1.0		
TIME (military)	0958	1003	1008	1013	1018		
PH (S.U.)	4.17	3.50	3.49	3.62	3.62		
Sp. Cond. (units: Ms/cm)	0.055	0.054	0.054	0.055	0.055		
Water Temp. (°C)	14.64	14.89	15.05	15.21	15.27		
TURBIDITY (ntu)	222.2	220.1	99.29	20.06	16.27		
ORP (mV)	314.4	356.9	378.3	376.0	383.6		
Dissolved Oxygen (mg/L)	12.3	11.10	11.82	11.26	10.90		
Salinity	-	-	-	-	-		
Water Level	4.18	4.74	5.74	6.76	7.71		

COMMENTS/OBSERVATIONS:

1" – 0.041, 2" – 0.163, 3" – 0.367, 4" – 0.653, 6" – 1.469, 8" – 2.611

AECOM

Field Data Information Log for Groundwater Sampling

Well ID # MW-13
Site Name PPL Anderson
Date 1-18-17
Field Personnel Marc McFarland
Job # 60504035
Weather Conditions Sunny
Air Temperature 65 °F
Total Well Depth (TWD) 23 1/100 ft
Depth to Ground Water (DGW) 14.90 1/100 ft
Length of Water Column (LWC) = TWD – DGW 8.10 1/100 ft
1 Casing Volume = LWC x 0.163 = 1.32 gal
3 Casing Volumes 3.96 gal = Standard Evacuation Volume
Method of Well Excavation Peristaltic Pump and Tubing
Method of Sample Collection Peristaltic Pump and Tubing
Total Volume of Water Removed ~1.0 gallons

Casing Diameter 2.0 Inches
Casing Material PVC
Measuring Point Elevation 734.59 1/100 ft
Land Surface Elevation ______ 1/100 ft
Screened Interval 721.59 – 711.59 1/100 ft
Dedicated Pump or Bailer YES ____ NO X Type ____
Locking Cap YES X NO ____
Well Integrity Satisfactory YES ____ NO ____
Well Yield LOW ____ MODERATE ____ HIGH ____
Remarks Sampled @ 1450
EB sampled @ 1500

BTEX and Naph.

FIELD ANALYSES

VOLUME PURGED (gallons)	0	0.25	0.5	0.75	1.0		
TIME (military)	1426	1431	1436	1441	1446		
PH (S.U.)	4.40	4.21	4.18	4.15	4.14		
Sp. Cond. (units: Ms/cm)	0.090	0.086	0.084	0.079	0.078		
Water Temp. (°C)	19.70	20.17	2.018	20.25	20.18		
TURBIDITY (ntu)	25.74	11.14	11.29	6.16	5.76		
ORP (mV)	112.5	115.2	117.7	124.1	125.0		
Dissolved Oxygen (mg/L)	0.57	0.56	0.62	0.71	0.77		
Salinity	-	-	-	-	-		
Water Level	14.73	14.73	14.73	14.73	14.73		

COMMENTS/OBSERVATIONS: Strong odor

1" – 0.041, 2" – 0.163, 3" – 0.367, 4" – 0.653, 6" – 1.469, 8" – 2.611

AECOM

Field Data Information Log for Groundwater Sampling

Well ID # MW-16

Site Name PPL Anderson

Date 1-18-17

Field Personnel Marc McFarland

Job # 60504035

Weather Conditions Sunny

Air Temperature 65 °F

Total Well Depth (TWD) 14 1/100 ft

Depth to Ground Water (DGW) 7.51 1/100 ft

Length of Water Column (LWC) = TWD – DGW 6.49 1/100 ft

1 Casing Volume = LWC x 0.163 = 1.06 gal

3 Casing Volumes 3.18 gal = Standard Evacuation Volume

Method of Well Excavation Peristaltic Pump and Tubing

Method of Sample Collection Peristaltic Pump and Tubing

Total Volume of Water Removed ~1.0 gallons

Casing Diameter 2.0 Inches

Casing Material PVC

Measuring Point Elevation 725.54 1/100 ft

Land Surface Elevation ____ 1/100 ft

Screened Interval 721.54 – 711.54 1/100 ft

Dedicated Pump or Bailer YES ____ NO X Type ____

Locking Cap YES X NO ____

Well Integrity Satisfactory YES ____ NO ____

Well Yield LOW ____ MODERATE ____ HIGH ____

Remarks Sampled @ 1320

BTEX and Naph.

FIELD ANALYSES

VOLUME PURGED (gallons)	0	0.25	0.5	0.75	1.0		
TIME (military)	1257	1302	1307	1312	1317		
PH (S.U.)	2.83	2.71	2.80	2.53	2.67		
Sp. Cond. (units: Ms/cm)	0.026	0.025	0.025	0.025	0.025		
Water Temp. (°C)	18.43	18.42	18.26	18.22	18.22		
TURBIDITY (ntu)	87.73	38.31	24.77	24.37	22.51		
ORP (mV)	379.6	402.1	401.9	416.7	418.2		
Dissolved Oxygen (mg/L)	4.13	3.86	3.81	3.78	3.63		
Salinity	-	-	-	-	-		
Water Level	7.58	7.71	7.81	7.89	7.96		

COMMENTS/OBSERVATIONS:

1" – 0.041, 2" – 0.163, 3" – 0.367, 4" – 0.653, 6" – 1.469, 8" – 2.611

AECOM

Field Data Information Log for Groundwater Sampling

Well ID # MW-18

Site Name PPL Anderson

Date 1-18-17

Field Personnel Marc McFarland

Job # 60504035

Weather Conditions Sunny

Air Temperature 65 °F

Total Well Depth (TWD) 14 1/100 ft

Depth to Ground Water (DGW) 9.93 1/100 ft

Length of Water Column (LWC) = TWD – DGW 4.07 1/100 ft

1 Casing Volume = LWC x 0.163 = 0.66 gal

3 Casing Volumes 1.98 gal = Standard Evacuation Volume

Method of Well Excavation Peristaltic Pump and Tubing

Method of Sample Collection Peristaltic Pump and Tubing

Total Volume of Water Removed ~0.75 gallons

Casing Diameter 2.0 Inches

Casing Material PVC

Measuring Point Elevation 723.18 1/100 ft

Land Surface Elevation ______ 1/100 ft

Screened Interval 719.18 – 709.18 1/100 ft

Dedicated Pump or Bailer YES ____ NO X Type ____

Locking Cap YES X NO ____

Well Integrity Satisfactory YES ____ NO ____

Well Yield LOW ____ MODERATE ____ HIGH ____

Remarks Sampled @ 1140

BTEX and Naph.

FIELD ANALYSES

VOLUME PURGED (gallons)	0	0.25	0.5	0.75			
TIME (military)	1122	1127	1132	1137			
PH (S.U.)	3.88	3.74	3.90	3.83			
Sp. Cond. (units: Ms/cm)	0.069	0.069	0.069	0.070			
Water Temp. (°C)	17.12	17.20	17.44	17.54			
TURBIDITY (ntu)	520.9	201.1	105.3	108.0			
ORP (mV)	381.6	379.8	359.5	358.5			
Dissolved Oxygen (mg/L)	5.59	5.39	5.21	5.22			
Salinity	-	-	-	-			
Water Level	10.11	10.24	10.25	10.25			

COMMENTS/OBSERVATIONS:

1" – 0.041, 2" – 0.163, 3" – 0.367, 4" – 0.653, 6" – 1.469, 8" – 2.611

APPENDIX B

ANALYTICAL REPORT

January 25, 2017

Kinder Morgan -Atlanta GA

Sample Delivery Group:	L884846
Samples Received:	01/19/2017
Project Number:	60504035
Description:	PPL Anderson
Report To:	Mr. Aaron Council 10 Patewood Dr. Building 6 Suite 500 Greenville, SC 29615

Entire Report Reviewed By:

T. Alan Harvill

Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.esclabsciences.com

TABLE OF CONTENTS

MW-5 L884846-01 GW

Collected by	Collected date/time	Received date/time
Marc McFarland	01/18/17 14:05	01/19/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG945478	1	01/21/17 22:43	01/21/17 22:43	JBE

MW-6 L884846-02 GW

Collected by	Collected date/time	Received date/time
Marc McFarland	01/18/17 10:55	01/19/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG945478	1	01/21/17 23:05	01/21/17 23:05	JBE

MW-8 L884846-03 GW

Collected by	Collected date/time	Received date/time
Marc McFarland	01/18/17 10:20	01/19/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG945478	1	01/21/17 23:26	01/21/17 23:26	JBE

MW-13 L884846-04 GW

Collected by	Collected date/time	Received date/time
Marc McFarland	01/18/17 14:50	01/19/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG945478	200	01/21/17 23:47	01/21/17 23:47	JBE

MW-16 L884846-05 GW

Collected by	Collected date/time	Received date/time
Marc McFarland	01/18/17 13:20	01/19/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG945478	1	01/22/17 01:13	01/22/17 01:13	JBE

MW-18 L884846-06 GW

Collected by	Collected date/time	Received date/time
Marc McFarland	01/18/17 11:40	01/19/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG945478	1	01/22/17 01:34	01/22/17 01:34	JBE

TRIP BLANK L884846-07 GW

Collected by	Collected date/time	Received date/time
Marc McFarland	01/18/17 00:00	01/19/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG945478	1	01/21/17 17:36	01/21/17 17:36	JBE

DUP-1 L884846-08 GW

Collected by	Collected date/time	Received date/time
Marc McFarland	01/18/17 10:55	01/19/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG945478	1	01/22/17 01:56	01/22/17 01:56	JBE

	Collected by	Collected date/time	Received date/time
EB L884846-09 GW	Marc McFarland	01/18/17 15:00	01/19/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG945478	1	01/22/17 02:17	01/22/17 02:17	JBE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

T. Alan Harvill
Technical Service Representative

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Benzene	ND		1.00	1	01/21/2017 22:43	WG945478
Toluene	ND		1.00	1	01/21/2017 22:43	WG945478
Ethylbenzene	ND		1.00	1	01/21/2017 22:43	WG945478
Xylenes, Total	ND		3.00	1	01/21/2017 22:43	WG945478
Naphthalene	ND		5.00	1	01/21/2017 22:43	WG945478
(S) Toluene-d8	*100*		*80.0-120*		*01/21/2017 22:43*	WG945478
(S) Dibromofluoromethane	*84.7*		*76.0-123*		*01/21/2017 22:43*	WG945478
(S) a,a,a-Trifluorotoluene	*90.4*		*80.0-120*		*01/21/2017 22:43*	WG945478
(S) 4-Bromofluorobenzene	*97.4*		*80.0-120*		*01/21/2017 22:43*	WG945478

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Benzene	34.6		1.00	1	01/21/2017 23:05	WG945478
Toluene	120		1.00	1	01/21/2017 23:05	WG945478
Ethylbenzene	14.1		1.00	1	01/21/2017 23:05	WG945478
Xylenes, Total	39.6		3.00	1	01/21/2017 23:05	WG945478
Naphthalene	ND		5.00	1	01/21/2017 23:05	WG945478
(S) Toluene-d8	*99.9*		*80.0-120*		*01/21/2017 23:05*	WG945478
(S) Dibromofluoromethane	*86.0*		*76.0-123*		*01/21/2017 23:05*	WG945478
(S) a,a,a-Trifluorotoluene	*91.4*		*80.0-120*		*01/21/2017 23:05*	WG945478
(S) 4-Bromofluorobenzene	*97.7*		*80.0-120*		*01/21/2017 23:05*	WG945478

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Benzene	ND		1.00	1	01/21/2017 23:26	WG945478
Toluene	ND		1.00	1	01/21/2017 23:26	WG945478
Ethylbenzene	ND		1.00	1	01/21/2017 23:26	WG945478
Xylenes, Total	ND		3.00	1	01/21/2017 23:26	WG945478
Naphthalene	ND		5.00	1	01/21/2017 23:26	WG945478
(S) Toluene-d8	*99.9*		*80.0-120*		*01/21/2017 23:26*	WG945478
(S) Dibromofluoromethane	*85.2*		*76.0-123*		*01/21/2017 23:26*	WG945478
(S) a,a,a-Trifluorotoluene	*91.5*		*80.0-120*		*01/21/2017 23:26*	WG945478
(S) 4-Bromofluorobenzene	*98.3*		*80.0-120*		*01/21/2017 23:26*	WG945478

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Benzene	1220		200	200	01/21/2017 23:47	WG945478
Toluene	4670	J5	200	200	01/21/2017 23:47	WG945478
Ethylbenzene	689		200	200	01/21/2017 23:47	WG945478
Xylenes, Total	3630		600	200	01/21/2017 23:47	WG945478
Naphthalene	ND		1000	200	01/21/2017 23:47	WG945478
(S) Toluene-d8	*101*		*80.0-120*		*01/21/2017 23:47*	WG945478
(S) Dibromofluoromethane	*86.0*		*76.0-123*		*01/21/2017 23:47*	WG945478
(S) a,a,a-Trifluorotoluene	*91.6*		*80.0-120*		*01/21/2017 23:47*	WG945478
(S) 4-Bromofluorobenzene	*98.5*		*80.0-120*		*01/21/2017 23:47*	WG945478

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Benzene	ND		1.00	1	01/22/2017 01:13	WG945478
Toluene	ND		1.00	1	01/22/2017 01:13	WG945478
Ethylbenzene	ND		1.00	1	01/22/2017 01:13	WG945478
Xylenes, Total	ND		3.00	1	01/22/2017 01:13	WG945478
Naphthalene	ND		5.00	1	01/22/2017 01:13	WG945478
(S) Toluene-d8	*99.9*		*80.0-120*		*01/22/2017 01:13*	WG945478
(S) Dibromofluoromethane	*84.2*		*76.0-123*		*01/22/2017 01:13*	WG945478
(S) a,a,a-Trifluorotoluene	*92.0*		*80.0-120*		*01/22/2017 01:13*	WG945478
(S) 4-Bromofluorobenzene	*98.5*		*80.0-120*		*01/22/2017 01:13*	WG945478

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Benzene	ND		1.00	1	01/22/2017 01:34	WG945478
Toluene	ND		1.00	1	01/22/2017 01:34	WG945478
Ethylbenzene	ND		1.00	1	01/22/2017 01:34	WG945478
Xylenes, Total	ND		3.00	1	01/22/2017 01:34	WG945478
Naphthalene	ND		5.00	1	01/22/2017 01:34	WG945478
(S) Toluene-d8	*100*		*80.0-120*		*01/22/2017 01:34*	WG945478
(S) Dibromofluoromethane	*83.0*		*76.0-123*		*01/22/2017 01:34*	WG945478
(S) a,a,a-Trifluorotoluene	*91.3*		*80.0-120*		*01/22/2017 01:34*	WG945478
(S) 4-Bromofluorobenzene	*98.1*		*80.0-120*		*01/22/2017 01:34*	WG945478

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Benzene	ND		1.00	1	01/21/2017 17:36	WG945478
Toluene	ND		1.00	1	01/21/2017 17:36	WG945478
Ethylbenzene	ND		1.00	1	01/21/2017 17:36	WG945478
Xylenes, Total	ND		3.00	1	01/21/2017 17:36	WG945478
Naphthalene	ND		5.00	1	01/21/2017 17:36	WG945478
(S) Toluene-d8	*100*		*80.0-120*		*01/21/2017 17:36*	WG945478
(S) Dibromofluoromethane	*83.7*		*76.0-123*		*01/21/2017 17:36*	WG945478
(S) a,a,a-Trifluorotoluene	*90.9*		*80.0-120*		*01/21/2017 17:36*	WG945478
(S) 4-Bromofluorobenzene	*97.1*		*80.0-120*		*01/21/2017 17:36*	WG945478

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Benzene	33.7		1.00	1	01/22/2017 01:56	WG945478
Toluene	120		1.00	1	01/22/2017 01:56	WG945478
Ethylbenzene	14.4		1.00	1	01/22/2017 01:56	WG945478
Xylenes, Total	40.0		3.00	1	01/22/2017 01:56	WG945478
Naphthalene	ND		5.00	1	01/22/2017 01:56	WG945478
(S) Toluene-d8	*102*		*80.0-120*		*01/22/2017 01:56*	WG945478
(S) Dibromofluoromethane	*83.9*		*76.0-123*		*01/22/2017 01:56*	WG945478
(S) a,a,a-Trifluorotoluene	*92.7*		*80.0-120*		*01/22/2017 01:56*	WG945478
(S) 4-Bromofluorobenzene	*98.3*		*80.0-120*		*01/22/2017 01:56*	WG945478

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Benzene	ND		1.00	1	01/22/2017 02:17	WG945478
Toluene	ND		1.00	1	01/22/2017 02:17	WG945478
Ethylbenzene	ND		1.00	1	01/22/2017 02:17	WG945478
Xylenes, Total	ND		3.00	1	01/22/2017 02:17	WG945478
Naphthalene	ND		5.00	1	01/22/2017 02:17	WG945478
(S) Toluene-d8	*101*		*80.0-120*		*01/22/2017 02:17*	WG945478
(S) Dibromofluoromethane	*85.2*		*76.0-123*		*01/22/2017 02:17*	WG945478
(S) a,a,a-Trifluorotoluene	*90.9*		*80.0-120*		*01/22/2017 02:17*	WG945478
(S) 4-Bromofluorobenzene	*97.9*		*80.0-120*		*01/22/2017 02:17*	WG945478

Method Blank (MB)

(MB) R3192562-3 01/21/17 17:10

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Benzene	U		0.331	1.00
Ethylbenzene	U		0.384	1.00
Naphthalene	U		1.00	5.00
Toluene	U		0.412	1.00
Xylenes, Total	U		1.06	3.00
(S) Toluene-d8	*98.4*			*80.0-120*
(S) Dibromofluoromethane	*83.7*			*76.0-123*
(S) a,a,a-Trifluorotoluene	*89.6*			*80.0-120*
(S) 4-Bromofluorobenzene	*97.6*			*80.0-120*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3192562-1 01/21/17 16:05 • (LCSD) R3192562-2 01/21/17 16:27

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	25.0	21.0	20.9	84.2	83.7	70.0-130			0.530	20
Ethylbenzene	25.0	24.4	24.3	97.7	97.3	70.0-130			0.410	20
Naphthalene	25.0	25.1	24.5	100	98.2	70.0-130			2.29	20
Toluene	25.0	23.9	23.5	95.6	94.1	70.0-130			1.60	20
Xylenes, Total	75.0	71.8	71.6	95.8	95.5	70.0-130			0.260	20
(S) Toluene-d8				*105*	*102*	*80.0-120*				
(S) Dibromofluoromethane				*82.6*	*81.2*	*76.0-123*				
(S) a,a,a-Trifluorotoluene				*91.7*	*90.9*	*80.0-120*				
(S) 4-Bromofluorobenzene				*101*	*99.4*	*80.0-120*				

L884846-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L884846-04 01/21/17 23:47 • (MS) R3192562-4 01/22/17 00:09 • (MSD) R3192562-5 01/22/17 00:30

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	25.0	1220	5360	4950	82.9	74.6	200	54.3-133			7.99	20
Ethylbenzene	25.0	689	5010	4410	86.4	74.3	200	61.4-133			12.8	20
Naphthalene	25.0	ND	3750	3210	75.0	64.2	200	58.0-135			15.5	25.5
Toluene	25.0	4670	11200	10800	131	123	200	61.4-130	J5		3.87	20
Xylenes, Total	75.0	3630	17000	15600	89.2	79.9	200	63.3-131			8.58	20
(S) Toluene-d8					*102*	*102*		*80.0-120*				
(S) Dibromofluoromethane					*85.2*	*85.6*		*76.0-123*				
(S) a,a,a-Trifluorotoluene					*91.6*	*90.8*		*80.0-120*				
(S) 4-Bromofluorobenzene					*100*	*99.9*		*80.0-120*				

Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.

Qualifier	Description
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.

ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE.**
***** Not all certifications held by the laboratory are applicable to the results reported in the attached report.

State Accreditations

Alabama	40660
Alaska	UST-080
Arizona	AZ0612
Arkansas	88-0469
California	01157CA
Colorado	TN00003
Conneticut	PH-0197
Florida	E87487
Georgia	NELAP
Georgia [1]	923
Idaho	TN00003
Illinois	200008
Indiana	C-TN-01
Iowa	364
Kansas	E-10277
Kentucky [1]	90010
Kentucky [2]	16
Louisiana	AI30792
Maine	TN0002
Maryland	324
Massachusetts	M-TN003
Michigan	9958
Minnesota	047-999-395
Mississippi	TN00003
Missouri	340
Montana	CERT0086
Nebraska	NE-OS-15-05

Nevada	TN-03-2002-34
New Hampshire	2975
New Jersey–NELAP	TN002
New Mexico	TN00003
New York	11742
North Carolina	Env375
North Carolina [1]	DW21704
North Carolina [2]	41
North Dakota	R-140
Ohio–VAP	CL0069
Oklahoma	9915
Oregon	TN200002
Pennsylvania	68-02979
Rhode Island	221
South Carolina	84004
South Dakota	n/a
Tennessee [14]	2006
Texas	T 104704245-07-TX
Texas [5]	LAB0152
Utah	6157585858
Vermont	VT2006
Virginia	109
Washington	C1915
West Virginia	233
Wisconsin	9980939910
Wyoming	A2LA

Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01
A2LA – ISO 17025 [5]	1461.02
Canada	1461.01
EPA–Crypto	TN00003

AIHA	100789
DOD	1461.01
USDA	S-67674

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [n/a] Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**

Kinder Morgan -Atlanta GA

10 Patewood Dr.
Building 6 Suite 500
Greenville, SC 89615

Report to:
Mr. Aaron Council

Billing Information & Quote Number:
Mr. Greg Dempsey
1000 Windward Concourse
Suite 450
Alpharetta, GA 30005

Email To: aaron.council@aecom.com

Chain of Custody Page 1 of 1

ESC LAB SCIENCES — YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# 884846

C040

Acctnum: KINSTAAGA
Template: T119380
Prelogin: P584712
TSR: 364 - T. Alan Harvill
PB: 1-13-17
Shipped Via: FedEX Ground

Project Description: PPL Anderson

City/State Collected: Anderson, SC

Phone: 864-234-3032
Fax:

Client Project # 60504035

Lab Project # KINSTAAGA-PPL

Collected by (print): Marc McFarland

Site/Facility ID #

P.O. #

Collected by (signature): [signature]

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed: Standard TAT

Email? ___No X Yes
FAX? ___No ___Yes

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	V8260BTEXNSC 40mlAmb-HCl	V8260BTEXNSC 40mlAmb-HCl-Blk	Rem./Contaminant	Sample # (lab only)
MW-5	G	GW		1-18-17	1405	3	X			-01
MW-6	G	GW		1-18-17	1055	3	X			-02
MW-8	G	GW		1-18-17	1020	3	X			-03
MW-13	G	GW		1-18-17	1450	3	X			-04
MW-16	G	GW		1-18-17	1320	3	X			-05
MW-18	G	GW		1-18-17	1140	3	X			-06
TRIP BLANK		GW				1		X		-07
Dup-1	G	GW		1-18-17	1055	3	X			-08
EB	G	GW		1-18-17	1500	3	X			-09

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other___

Remarks:

pH ______ Temp ______
Flow ______ Other ______

Hold #

Condition: (lab use only) OK

Samples returned via: ☐ UPS ☑ FedEx ☐ Courier ☐ ____

Temp: 3.3 °C Bottles Received: 25

COC Seal Intact: ✓ Y ___N ___NA

pH Checked: NCF:

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
[signature]	1-18-17	1530	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature) [signature]

Date: 1-19-17 Time: 09:00

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Cooler Receipt Form

Client: KINSTAAGA SDG# 884846

Cooler Received/Opened On: **1/ 19 /17** Temperature Upon Receipt: 5.3 °c

Received By: Michael Lowe

Signature: [signature]

Receipt Check List	Yes	No	N/A
Were custody seals on outside of cooler and intact?	✓		
Were custody papers properly filled out?	✓		
Did all bottles arrive in good condition?	✓		
Were correct bottles used for the analyses requested?	✓		
Was sufficient amount of sample sent in each bottle?	✓		
Were all applicable sample containers correctly preserved and checked for preservation? (Any not in accepted range noted on COC)			✓
If applicable, was an observable VOA headspace present?		✓	
Non Conformance Generated. (If yes see attached NCF)			

Appendix B
Startup Plan for Surface Water Protection Measures – Revision 2

CH2M Raleigh
3120 Highwoods Boulevard
Suite 214
Raleigh, NC 27604
O +1 919 875 4311
F +1 919 875 8491
www.ch2m.com

February 23, 2017

Delivered via FedEx Overnight Delivery

Ms. Bobbi Coleman
South Carolina Department of Health and Environmental Control (SCDHEC)
Assessment Section, UST Management Division
Bureau of Land and Waste Management
2600 Bull Street
Columbia, SC 29201

Subject: *Startup Plan for Surface Water Protection Measures - Revision 2*
Lewis Drive Remediation
Plantation Pipe Line Company
Belton, South Carolina
Site ID #18693, "Kinder Morgan Belton Pipeline Release"

Dear Ms. Coleman,

On behalf of Plantation Pipe Line Company (Plantation), CH2M HILL Engineers, Inc. (CH2M) has prepared this revision to the *Startup Plan for Surface Water Protection Measures* submitted on February 10, 2017. This document describes the proposed injection and monitoring sequence to safely and effectively initiate operation of the recently constructed biosparging system at the site. The proposed initial flow rates are biosparging rates to limit volatilization of hydrocarbons. Air injection is planned to be gradually increased over time to optimize system performance. Monitoring will be conducted to evaluate system performance and will take various forms, including visual observations, field measurements, and analytical results.

Air Monitoring

As detailed in the attached Air Monitoring Plan, two fixed air monitoring stations will be established at Brown's Creek and Cupboard Creek in order to monitor for and identify indications of potential vapor problems that may occur due to operation of the biosparging system. Mobile ambient air monitoring will also be performed in select areas along Brown's Creek and Cupboard Creek at and down-gradient of biosparging wells.

Water Table and Product Monitoring

Potential mounding of the water table will be monitored, in part, by four continuous water level data loggers (In Situ Rugged TROLL 100) installed in MW-12 and MW-15 near Brown's Creek, at MW-20 near Cupboard Creek, and MW-02. Baseline gauging using an oil-water interface probe will be performed before startup (to establish baseline conditions). Then gauging will be performed daily during Week 1 of the injection and weekly for the remainder of Month 1, as detailed in **Table 1** below. Dissolved oxygen (DO) will be measured at the end of Month 1 with an optical DO probe.

Table 1. Water Table and Product Monitoring Schedule
Lewis Drive Remediation Site

Location	Baseline	Twice/Day on Day 1	Daily for Week 1	Weekly for Month 1	End of Month 1
Cupboard Creek					
MW-19	WL	WL	WL	WL	WL, DO
MW-20*	WL	WL	WL	WL	WL, DO
MW-29	WL	WL	WL	WL	WL, DO
TW-67	WL	WL	WL	WL	WL, DO
TW-73	WL	WL	WL	WL	WL, DO
Brown's Creek					
MW-12*	WL	WL	WL	WL	WL, DO
MW-12B	WL	--	--	--	WL, DO
MW-15*	WL	WL	WL	WL	WL, DO
MW-15B	WL	--	--	--	WL, DO
MW-25	WL	WL	WL	WL	WL, DO
MW-25B	WL	--	--	--	WL, DO
MW-28	WL	WL	WL	WL	WL, DO
MW-35	WL	WL	WL**	WL	WL, DO
MW-39	WL	WL	WL**	WL	WL, DO
MW-41	WL	WL	WL**	WL	WL, DO
TW-59	WL	WL	WL	WL	WL, DO
TW-60	WL	WL	WL	WL	WL, DO
TW-66	WL	WL	WL	WL	WL, DO

Notes:
-- indicates that this does not apply.
WL = water level and product gauging
DO = dissolved oxygen
* Monitoring wells MW-02, MW-12, MW-15, and MW-20 will have dedicated loggers (TROLL 100) for continuous water level logging.
** Monitoring wells MW-35, MW-39, and MW-41 will be gauged daily for 2 weeks, after which the gauging frequency will be reevaluated.

Analytical Monitoring of Groundwater

Groundwater samples will be collected weekly during startup from the 24 monitoring wells listed in **Table 2** below. These locations are also depicted on **Figure 1**. Per approval from SCDHEC, samples will be collected using no-purge HydraSleeve samplers. However, if there is not sufficient depth of water column in the well for HydraSleeve sampling (16 inches of water column is typically required), the groundwater must be sampled using low-flow purge sampling. Samples will be analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX), methyl tertiary butyl ether (MTBE), 1,2-dichloroethane (1,2-DCA), and naphthalene by Environmental Protection Agency (EPA) Methods 8011 and 8260B. Samples will be collected in accordance with a revised Quality Assurance Project Plan (QAPP) to be submitted to SCDHEC under separate cover.

Table 2. Analytical Groundwater Monitoring Schedule
Lewis Drive Remediation Site

Brown's Creek Monitoring Wells		**Cupboard Creek monitoring wells**	
MW-12	MW-34 (to be installed)	MW-19	MW-26
MW-12B	MW-35	MW-20	MW-26B
MW-15	MW-38	MW-21	MW-29
MW-15B	MW-39	MW-23	MW-45
MW-25	MW-40	MW-23B	MW-45B
MW-25B	MW-41	MW-17	
MW-28	MW-42	MW-17B	

Analytical Monitoring of Surface Water

Surface water samples will be collected from all surface water sampling locations at the site weekly during startup. Samples will be collected in accordance with the QAPP and analyzed for BTEX and naphthalene by EPA Method 8260B.

Startup Sequence

The proposed sequence for startup operations is as follows:

Week 1

- The sparging system operator-in-charge (OIC) will initiate one of the two Sullair compressors and open valves in manifold legs for the two stream bubblers and for the 45 vertical sparging wells. Low flow rates of 1 standard cubic foot per minute (scfm) per sparge well/surface water aerator have been selected to build up the assimilative capacity of the vadose zone and to minimize water table mounding and vapor generation. The stream aerators will run 24/7. A pulsing sequence in the vertical sparge well network of 6 hours per injection row will be used to treat from "outside-in", i.e., inject for 6 hours into the most downgradient injection row at Brown's Creek/Cupboard Creek, then inject for 6 hours into the next upgradient row, then inject for 6 hours into the most upgradient row, and then re-initiate the cycle.
- Surface water will be monitored daily for potential disturbances from aerators. If any sustained disturbance beyond bubbling of air (e.g., increased turbidity) is observed, the OIC will reduce the flow rate and should disturbances continue, ultimately cease injections.
- Ambient air monitoring will be performed daily with a handheld photoionization detector (PID), in particular the areas around MW-19, MW-40, and MW-09, and also the City of Belton water branch line valve to the former residence at 112 Lewis Drive.
- Product recovery will continue on a twice per week basis.
- Fixed air monitoring station data will be logged continually and downloaded twice per week. Fixed air monitoring station data will be evaluated per the attached Air Monitoring Plan.
- Daily water table monitoring will be performed as described above and detailed in **Table 1**.
- Data from TROLLs will be downloaded at the end of Week 1.
- Groundwater and surface water samples will be collected once in Week 1 as described above and detailed in Table 2.

- Visual inspections will be performed weekly for evidence of a petroleum sheen on surface waters, odors in the area, and/or distressed vegetation or biota on all areas of the site, including along Brown's Creek and Cupboard Creek. If any of these are detected which have not been previously reported, the consultant project manager will be notified immediately by phone. A description of the observation, the time it occurred, its location, and any response actions taken will be included in regular reports to SCDHEC according to the reporting schedule described below.

Week 2

- Starting week 2, the OIC of the system will increase flows from 1 to 2 scfm for each vertical sparging well and surface water aerator, maintaining the same pulsing schedule in the vertical sparge wells as before (assuming no adverse conditions were observed) and continuing to run the aerators 24/7.
- Surface water and ambient air monitoring will be performed daily as above. Fixed air monitoring station data will continue to be downloaded twice weekly.
- Water table and product monitoring will be performed once weekly as described above and detailed in **Table 1**.
- Data from TROLLs will be downloaded at the end of Week 2.
- Groundwater and surface water samples will be collected once in Week 2 as described above and detailed in Table 2.
- Visual inspections will be performed weekly as described above.

Week 3

- Week 3 will essentially be a repeat of Week 2. The injection flow rate in the vertical sparging wells and surface water aerators will increase to 3 scfm each, and CH2M will continue to monitor surface water, groundwater, and ambient air. and conduct visual inspections as described for Weeks 1 and 2.

Week 4

- Week 4 will be the same as previous weeks, with the addition of enhanced monitoring for influence from the system. The injection sequence will increase to 4 scfm for each vertical sparging well and surface water aerator, and CH2M will continue to monitor surface water, groundwater, and ambient air and conduct visual inspections as described for Weeks 1 and 2..
- Finally, after completion of the first month, staff will measure DO with an optical probe in select wells to assess the effects of sparging. These measurements will be conducted while the system remains operational to better assess the potential zone of influence.

Reporting

Data transmittals consisting of field data sheets (including observations out of the norm), lab reports (including chains of custody), summary tables, and figures will be provided to SCDHEC on a weekly basis as soon as analytical data are received and evaluated. Data transmittals will be by e-mail and followed up by hardcopy.

If you have any further questions or concerns, please call me at 919-760-1777, Mr. Scott Powell/CH2M at 678-530-4457, or Mr. Jerry Aycock/Plantation at 770-751-4165.

Regards,
CH2M HILL Engineers, Inc.

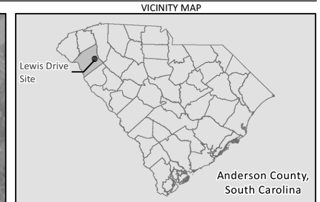
William M. Waldron, P.E.
Senior Project Manager

Enclosures:
Figure 1 – Weekly Groundwater Sampling Locations During Startup
Air Monitoring Plan

cc: Jerry Aycock, Plantation (Digital, Jerry_Aycock@kindermorgan.com)
Mary Clair Lyons, Esq., Plantation (Digital, Mary_Lyons@kindermorgan.com)
Richard Morton, Esq., Womble Carlyle Sandridge & Rice, PLLC (Digital, rmorton@wcsr.com)
File

Figure

VICINITY MAP



LEGEND

- Release Point
- New Shallow Monitoring Well (not yet surveyed)
- New Bedrock Monitoring Well (not yet surveyed)
- Residuum Monitoring Well
- Bedrock Monitoring Well
- Piezometer ("R" indicates Replacement)
- Recovery Sump
- Recovery Trench Point
- Recovery Well (4" diameter)
- Surface Water Sampling Location
- Monitoring Wells to be sampled weekly during startup
- Pipeline
- Recovery Trench
- Stream (NHD)
- Horizontal Air Sparging Well Riser (not yet surveyed)
- Horizontal Air Sparging Well Screen (not yet surveyed)

Source Data:
Environmental Systems Research Institute (ESRI)
World Imagery Layer, 2015
United States Geological Survey (USGS) National Hydrography Dataset (NHD)

N

0 175 350
Scale in feet

Figure 1. Weekly Groundwater Sampling Locations During Startup
Lewis Drive Remediation, Belton, South Carolina
Site ID #18693 "Kinder Morgan Belton Pipeline Release"

\\CANOPUS\GROUPS\GIS\00_PROJ\K\KINDER_MORGAN\654558LEWISDR_ER\GIS\MAPS\CORRECTIVE_ACTION_PLAN\FIGURE1_PROPOSEDMWS_BDRCKSPARGINGWELLS_REV.MXD AUTHOR: AG 12/22/2016

ch2m

Attachment – Air Monitoring Plan

Air Monitoring Plan

Lewis Drive Remediation, Belton, South Carolina

This Plan presents the Vapor Monitoring Plan for the Lewis Drive site (The Site) in Belton, South Carolina. The plan was prepared on behalf of Plantation Pipe Line Company (Plantation) by CH2M Engineers, Inc. (CH2M).

Background

On December 8, 2014 a gasoline release was discovered from Plantation's 26-inch product pipeline near Lewis Drive in Belton, South Carolina. Plantation performed initial response actions from December 8, 2014 through February 2, 2015. An Interim Corrective Action Plan (CAP) was submitted to SCDHEC on March 5, 2015 and a Site Assessment Report was submitted to DHEC on September 9, 2015. A site wide CAP was submitted to SCDHEC on September 1, 2016.

A biosparging remedial system was constructed at the Site to treat the gasoline release. System construction is nearly complete. System shakedown and startup is scheduled for February 2017.

Air Monitoring Plan

Air monitoring will be performed to identify indications of vapor problems that are due to operation of the biosparging system. The goal is to show that startup and operation of the biosparging system is being performed in a manner that does not adversely affect nearby receptors by producing excessive vapors. Excessive vapors would be considered 5 parts per million (ppm) VOCs on the perimeter of the site area or in the vicinity of any of the roads running through the site.

Monitoring for vapors generated by biosparging will be performed through use of fixed air monitoring stations and mobile ambient air monitoring. Descriptions of these two air monitoring techniques and the schedule for air monitoring using each technique are provided in the following sections.

Fixed Air Monitoring Stations

Two fixed air monitoring stations will be established at the site. One air monitoring station will be established immediately above biosparging wells at Brown's Creek and a second station will be established immediately above biosparging wells at Cupboard Creek. The locations of these two proposed air monitoring stations are shown on **Figure 1**.

Each air monitoring stations will consist of a MiniRae photoionization detector (PID) and explosive atmosphere meter in a Pelican Case enclosure. A cut sheet for the MiniRae is attached. The MiniRae PID measures volatile organic compounds (VOCs) and hydrogen sulfide in air at concentrations from 0 to 15,000 ppm. The PID will be programmed to log VOC concentration at 10 minute intervals. Although the PID can capture more than 59 months of data when logging at 10-minute intervals, the data will be downloaded at routine intervals and reviewed.

The PID will be placed in a Pelican Case for protection from elements and weather. The Pelican Case will be attached to a tree or other fixed object at an elevation between 3 and 6 feet above ground surface (the breathing zone).

Prior to deployment each PID will be turned on, allowed to reach ambient operating temperature, and then calibrated in accordance with manufacturer's instructions. Canisters of 1 ppm hydrogen sulfide and 10 ppm isobutylene calibration gas will be used to calibrate the PID to achieve measurement confidence in the range of 0.1 to 0.5 ppm. A calibration log will be maintained for each instrument.

The MiniRae nominal battery life is between 12 and 16 hours. MiniRaes deployed in fixed air monitoring stations will be connected to a marine battery, which extends the operational period to one week.

Fixed air monitoring stations will be deployed and operating for a minimum of 96 hours prior to operating the biosparging system. Logged data will be downloaded at the following frequencies:

- Daily during the first week of biosparging system operation,
- Three times per week during the second and third weeks of biosparging system operation
- Twice per week during the fourth week of biosparging system operation

If air monitoring results indicate that startup and operation of the biosparging system is being performed in a manner that does not adversely affect nearby receptors by producing vapors or odors, then the fixed air monitoring stations will be demobilized after a month of data collection.

Mobile Ambient Air Monitoring

Mobile ambient air monitoring will be performed in select areas along Brown's Creek and Cupboard Creek at and down-gradient of biosparging wells. These areas are identified on **Figure 1**.

Mobile ambient air monitoring will consist of a person walking through the area looking for indications of biosparging causing vapors to emanate at ground surface, for hydrocarbon sheens on surface water, and for odors. The person will use a PID to monitor for VOCs at the following locations:

- Surface water sampling locations (SW-03, SW-06, SW-12)
- Where the creek passes under Lewis Drive
- General area of the 45 vertical biosparge wells

At each location, a reading will be taken once the PID readout has stabilized, or after 3 minutes, whichever is sooner. Ambient air monitoring results will be maintained in a logbook or on data sheets. Ambient air monitoring will be performed for a minimum of 96 hours prior to operating the biosparging system. After startup of the biosparging system, the frequency of ambient air monitoring will be:

- Daily during the first week of biosparging system operation
- Three times per week until one week after the maximum desired air flow has been achieved in the biosparging system (anticipated to be a month after startup)
- Monthly for the second and third months of biosparging system operation
- Quarterly thereafter when the biosparging system is operating

The frequency of air monitoring will reset if there are major changes to biosparging system operation, or after a prolonged period (e.g. more than two months) when the system is not operated.

Air Monitoring Reporting

Results of air monitoring will be provided to SCDHEC in data submittals weekly for the first month, monthly for the next two months, and quarterly thereafter. Data submittals will consist of a brief narrative addressing the monitoring period, type of data collected, map with sampling station locations, and tables of results. Quarterly reports will provide a discussion of the results and recommendations for warranted changes to the monitoring plan.

Data submittals will be provided at the following frequency:

- Weekly emails during the first month of air monitoring (followed up by hardcopy submittal)
- Monthly emails during the second and third months of air monitoring (followed up by hardcopy submittal)

Quarterly reports will be provided to SCDHEC within one month following the end of the air monitoring period covered by the report.

Response to Detections

The response to detections of VOCs or hydrogen sulfide in air will depend on the nature, magnitude, and relative location of the detection.

If VOCs are detected by air monitoring at locations above biosparging wells will be responded to by shutting off or decreasing the air flow rate to wells. Supplemental air monitoring results at the same location will be reviewed to verify that the reduced air flow to biosparging wells eliminates the VOC detections.

If VOCs are detected at locations away from biosparging wells, observations will be made to search for indications of air discharges at ground surface or other sources of the VOCs. The specific response to these potential VOC sources will be developed based on conditions encountered in the field.

RAE SYSTEMS by Honeywell

MiniRAE 3000

Portable Handheld VOC Monitor

The MiniRAE 3000 is a comprehensive handheld VOC (Volatile Organic Compound) monitor that uses a third-generation patented PID technology to accurately measure more ionizable chemicals than any other device on the market. It provides full-range measurement from 0 to 15,000 ppm of VOCs.

The MiniRAE 3000 has a built-in wireless modem that allows real-time data connectivity with the ProRAE Guardian command center located up to 2 miles (3 km) away through a Bluetooth connection to a RAELink 3* portable modem or optionally via Mesh Network.

KEY FEATURES

- Third-generation patented PID technology
- VOC detection range from 0 to 15,000 ppm
- 3-second response time
- Humidity compensation with built-in humidity and temperature sensors
- Six-month datalogging
- Real-time wireless built-in – Bluetooth (and optional RAELink3 portable modem) or Mesh Network support
- Large graphic display with integrated flashlight
- Multi-language support with 10 languages encoded
- IP- 67 waterproof design

APPLICATIONS

- Oil and Gas
- HazMat
- Industrial Safety
- Civil Defense
- Environmental and Indoor Air Quality

- **Highly accurate VOC maeasurements**
- **Patented PID sensor**
- **Low maintenance—easy access to lamp and sensor**
- **Low cost of ownership**
- **3-year 10.6eV lamp warranty**

Workers can quickly measure VOCs and wirelessly transmit data via Bluetooth or optional Mesh radio.

*RAELink 3 modem is sold separately.

Wireless | AutoRAE 2 Compatible | ATEX | ISO 9001 CERTIFIED

MiniRAE 3000

Portable Handheld VOC Monitor

RAE SYSTEMS by Honeywell

SPECIFICATIONS

Instrument Specifications

Size	10" L x 3.0" W x 2.5" H (25.5 cm x 7.6 cm x 6.4 cm)
Weight	26 oz (738 g)
Sensors	Photoionization sensor with standard 10.6 eV or optional 9.8 eV or 11.7 eV lamp
Battery	• Rechargeable, external field-replaceable Lithium-Ion battery pack • Alkaline battery adapter
Running time	16 hours of operation (12 hours with alkaline battery adapter)
Display Graphic	4 lines, 28 x 43 mm, with LED backlight for enhanced display readability
Keypad	1 operation and 2 programming keys, 1 flashlight on/off
Direct Readout	Instantaneous reading • VOCs as ppm by volume (mg/m3) • High values • STEL and TWA • Battery and shutdown voltage • Date, time, temperature
Alarms	95dB at 12" (30 cm) buzzer and flashing red LED to indicate exceeded preset limits • High: 3 beeps and flashes per second • Low: 2 beeps and flashes per second • STEL and TWA: 1 beep and flash per second • Alarms latching with manual override or automatic reset • Additional diagnostic alarm and display message for low battery and pump stall
EMC/RFI	Compliant with EMC directive (2004/108/EC) EMI and ESD test: 100MHz to 1GHz 30V/m, no alarm Contact: ±4kV Air: ±8kV, no alarm
IP Rating	• IP-67 unit off and without flexible probe • IP-65 unit running
Datalogging	Standard 6 months at one-minute intervals
Calibration	Two-point or three-point calibration for zero and span. Calibration memory for 8 calibration gases, alarm limits, span values and calibration dates
Sampling Pump	• Internal, integrated flow rate at 500 cc/mn • Sample from 100' (30m) horizontally or vertically
Low Flow Alarm	Auto pump shutoff at low-flow condition
Communication & Data Download	• Download data and upload instrument set-up from PC through charging cradle or optional Bluetooth™ • Wireless data transmission through built-in RF modem
Wireless Network	Mesh RAE Systems Dedicated Wireless Network
Wireless Range (Typical)	EchoView Host: LOS > 660 ft (200 m) ProRAE Guardian & RAEMesh Reader: LOS > 660 ft (200 m) ProRAE Guardian & RAELink3 Mesh: LOS > 330 ft (100 m)
Safety Certifications	**US and Canada:** CSA, Classified as Intrinsically Safe for use in Class I, Division 1 Groups A, B, C, D **Europe:** ATEX II 2G EEx ia IIC T4
Temperature	-4° to 122° F (-20° to 50° C)
Humidity	0% to 95% relative humidity (non-condensing)

[1] Contact RAE Systems for country-specific wireless approvals and certificates.
Specifications are subject to change.

Attachments	Durable bright yellow rubber boot
Warranty	3 years for 10.6 eV lamp, 1 year for pump, battery, sensor and instrument
Wireless Frequency	ISM license-free band. IEEE 802.15.4 Sub 1GHz
Wireless Approvals	FCC Part 15, CE R&TTE, Others[1]
Radio Module	Supports Bluetooth or RM900

Sensor Specifications

Gas Monitor	Range	Resolution	Response Time T90
VOCs	0 to 999.9 ppm 1,000 to 15,000 ppm	0.1 ppm 1 ppm	< 3 s < 3 s

MONITOR ONLY INCLUDES:

- MiniRAE 3000 Monitor, Model PGM-7320
- Wireless communication module built in, as specified
- Datalogging with ProRAE Studio II Package
- Charging/download adapter
- RAE UV lamp, as specified
- Flex-I-Probe™
- External filter
- Rubber boot
- Alkaline battery adapter
- Lamp-cleaning kit
- Tool kit
- Operation CD-ROM
- Operation and Maintenance manual
- Soft leather case

OPTIONAL CALIBRATION KIT ADDS:

- 100 ppm isobutylene calibration gas, 34L
- Calibration regulator and flow controller

OPTIONAL GUARANTEED COST-OF-OWNERSHIP PROGRAM:

- 4-year repair and replacement guarantee
- Annual maintenance service

CORPORATE HEADQUARTERS
RAE Systems by Honeywell
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RAE-InsideSales@honeywell.com

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Appendix C
Request for Authorization to Initiate Remediation in the Hayfield Zone

CH2M Raleigh
3120 Highwoods Boulevard
Suite 214
Raleigh, NC 27604
O +1 919 875 4311
F +1 919 875 8491
www.ch2m.com

April 11, 2017

Delivered via E-mail and FedEx Overnight Delivery

Ms. Bobbi Coleman
South Carolina Department of Health and Environmental Control (SCDHEC)
Assessment Section, UST Management Division
Bureau of Land and Waste Management
2600 Bull Street
Columbia, SC 29201

Subject: *Request for Authorization to Initiate Remediation in the Hayfield Zone*
Lewis Drive Remediation
Plantation Pipe Line Company
Belton, South Carolina
Site ID #18693, "Kinder Morgan Belton Pipeline Release"

Dear Ms. Coleman,

On behalf of Plantation Pipe Line Company (Plantation), CH2M HILL Engineers, Inc. (CH2M) is requesting authorization to initiate operation of the three horizontal biosparging wells (HAS-01, HAS-02, and HAS-03) in the Hayfield Zone at the Lewis Drive site. The Startup Plan for Surface Water Protection Measures (Revision 2) was approved by SCDHEC on March 1, 2017. Operation of these zones (protecting Brown's Creek and Cupboard Creek) is ongoing. Operation of the horizontal wells in the Hayfield Zone will enhance remediation of the site. Authorization from SCDHEC is requested in sufficient time to facilitate a horizontal biosparging start-up date of April 17, 2017.

As detailed in the Corrective Action Plan (September 2016), the three horizontal wells will initiate at 0.05 scfm per foot of screen and will run continuously. The as-built screen lengths for the three wells were approximately 752 feet, 715 feet, and 377 feet, respectively. Therefore, the total initial injection rate in the Hayfield Zone will be approximately 92 scfm.

These proposed initial flow rates for the horizontal wells are biosparging rates to limit volatilization of hydrocarbons. Air injection is planned to be gradually increased over time to optimize system performance. It is anticipated that the injection rate in the Hayfield Zone may be increased after one month, depending on results. Monitoring and reporting of the Hayfield Zone operation will be performed per the Corrective Action Plan Addendum.

In addition, this correspondence requests authorization to increase flows to each of the diffusion aerators in Brown's Creek up to 12 standard cubic feet per minute (scfm), to continue to improve oxygenation of the surface water and reduce dissolved hydrocarbon concentrations. Flow to the diffusion aerators will be stepped up gradually over time, by 1 scfm each per week, similar to the first four weeks of the approved Startup Plan.

If you have any further questions or concerns, please call me at 919-760-1777, Mr. Scott Powell/CH2M at 678-530-4457, or Mr. Jerry Aycock/Plantation at 770-751-4165.

Regards,

CH2M HILL Engineers, Inc.

William M. Waldron, P.E.
Senior Project Manager

CC: Jerry Aycock, Plantation (Digital, Jerry_Aycock@kindermorgan.com)
Mary Clair Lyons, Esq., Plantation (Digital, Mary_Lyons@kindermorgan.com)
Richard Morton, Esq., Womble Carlyle Sandridge & Rice, PLLC (Digital, rmorton@wcsr.com)
File

Appendix D
Shallow Bedrock Zone – Biosparging Pilot Study Plan

CH2M
3120 Highwoods Boulevard
Suite 214
Raleigh, NC 27604
O +1 919 875 4311
F +1 919 875 8491
www.ch2m.com

May 8, 2017

Delivered via FedEx Overnight Delivery

Ms. Bobbi Coleman
South Carolina Department of Health and Environmental Control (SCDHEC)
Assessment Section, UST Management Division
Bureau of Land and Waste Management
2600 Bull Street
Columbia, SC 29201

Subject: *Shallow Bedrock Zone – Biosparging Pilot Study Plan*
Lewis Drive Remediation
Plantation Pipe Line Company
Belton, South Carolina
Site ID #18693, "Kinder Morgan Belton Pipeline Release"

Dear Ms. Coleman,

On behalf of Plantation Pipe Line Company (Plantation), CH2M HILL Engineers, Inc. (CH2M) has prepared this letter to document the approach for pilot testing the recently constructed bedrock biosparging wells at the Lewis Drive site. This correspondence augments the discussion of bedrock biosparging that was included in the Corrective Action Plan (September 2016) and Corrective Action Plan Addendum (March 2017). The primary objective of pilot testing is to evaluate full-scale design parameters for bedrock biosparging, particularly injection pressure, flow rate, propagation of air in the subsurface (i.e., influence), and spacing between wells.

As presented in the Corrective Action Plan, bedrock biosparging was proposed for the area of the site with shallow bedrock and a thin saturated zone (the Shallow Bedrock Zone of the site). Spacing of 100 feet between bedrock biosparge wells was assumed as the design basis. The wells will be installed in phases, with spacing to be verified based on data from the pilot testing. The field data will include measurement of dissolved oxygen (DO) and observation of air bubbling in surrounding wells and potentially the surface when wet. This data will be used to evaluate distribution of air in the fractured bedrock and overlying saprolite (both saturated and unsaturated zones). The biosparge wells will be tested individually and as a group to assess relative performance, in terms of zone of influence.

To facilitate the first phase of bedrock sparging, a licensed driller installed three bedrock biosparging wells (VBS-01, 02, and 03) in March 2017 under the Underground Injection Control (UIC) permit-to-construct #SCHE03020469M. The permit-to-operate these three wells was received shortly after installation was complete and well construction records were provided to SCDHEC in a subsequent Monthly Status Report. As detailed in the Corrective Action Plan, the wells were installed by coring into rock until water-producing fractures were encountered, then the well was constructed using a two-foot long, 2-inch ID, 0.006-inch slotted well screen, with 40/70 filter sand installed around the screen. The annular space above the sand pack was sealed with hydrated bentonite pellets (5 ft thick), with cement-bentonite grout to surface. The average as-built injection interval for the three wells was 31 to 33 feet below ground surface (ft bgs). The wells were later connected via field piping to the biosparging system. The three bedrock biosparging locations are shown on **Figure 1**.

The bedrock biosparging pilot study will be conducted in a series of two phases, as follows:

Phase 1 – Individual Biosparge Well Testing

During Phase 1, air will be injected into VBS-01, VBS-02, and VBS-03, with the objective of evaluating influence zones for individual biosparge wells.

- The first test will be conducted at VBS-02, using the other two bedrock biosparging wells as monitoring points.
- The target initial flow rate will be 5 standard cubic feet per minute (scfm). Sparging at 5 scfm will continue for approximately 4 - 6 hours, then the flow rate will be increased to 15 scfm and maintained for the remainder of the day (4 hours or more). Based on observations in the field, sparging may continue overnight.
- CH2M will periodically measure water table elevations and dissolved oxygen levels in nearby monitoring points and recovery wells per **Table 1**. As shown in **Figure 1**, there are at least 20 monitoring points in the vicinity of the bedrock biosparging wells, including piezometers, recovery sumps, recovery wells, and monitoring wells. A down-well transducer will also be installed in one piezometer to continuously monitor water levels.
- Following the flow increase to 15 scfm, depending on observations in the field, the target flow rate may be increased to 25-30 scfm. However, if excessive water table displacement occurs, the lower flowrate will be decreased to maintain reasonable displacement. CH2M will continue to monitor site conditions per **Table 1** for the remainder of the test.
- CH2M will repeat the process outlined above for VBS-01 and VBS-03.
- The first phase of testing is expected to last up to 5 to 8 days.

Phase 2 – Combined Biosparge Well Testing

During Phase 2, air will be injected into VBS-01, VBS-02, and VBS-03 simultaneously, with the objective of evaluating the overall zone of influence for multiple wells, assuming air flow through interconnecting bedrock fractures. The target flow rate will be based on observations during Phase 1. Dissolved oxygen, air bubbling in wells, and water levels will be periodically checked in other wells, as summarized in **Table 1**. Phase 2 is expected to last from 2 to up to 4 days.

The proposed injection rates described above and monitoring frequencies (Table 1) are subject to change based on field observations. The density of fractures present in the vicinity of each bedrock biosparging well may limit the volume of air that can be injected.

Table 1. Bedrock Biosparge Pilot Test Monitoring Schedule
Lewis Drive Remediation Site

Monitoring Point[1]	Screen Interval (ft bgs)[2]	Monitoring Parameter[3,4]	Monitoring Frequency
Surface Conditions	N/A	Visual Observations	Hourly during testing
VBS-01	34.5 – 36.5	DTW, DO	Every two hours, when not in use
VBS-02	27.0 – 29.0	DTW, DO	Every two hours, when not in use
VBS-03	32.2 – 34.2	DTW, DO	Every two hours, when not in use
MW-01	3.0 – 13.0	DTW, DO	Twice per day during testing
MW-01B	18.5 – 38.5	DTW, DO	Twice per day during testing
MW-22	6.0 – 11.0	DTW, DO	Twice per day during testing
MW-44	5.0 – 10.0	DTW, DO	Twice per day during testing
MW-44B	16.1 - 37.1	DTW, DO	Twice per day during testing
TW-4R	2.5 – 5.5	DTW, DO	Twice per day during testing
TW-5R	2.8 – 8.9	DTW, DO	Twice per day during testing
TW-14R[5]	2.5 – 6.3	DTW, DO	Twice per day during testing
TW-15R	2.0 – 4.9	DTW, DO	Twice per day during testing
TW-21	4.0 – 9.4	DTW, DO	Twice per day during testing
TW-81	2.0 – 7.0	DTW, DO	Twice per day during testing
TW-82	2.0 – 10.2	DTW, DO	Twice per day during testing
TW-83	2.0 – 17.1	DTW, DO	Twice per day during testing
TW-84	3.5 – 13.7	DTW, DO	Twice per day during testing
TW-86	2.0 – 6.2	DTW, DO	Twice per day during testing
TW-87	2.0 – 7.1	DTW, DO	Twice per day during testing
RS-19	2.0 – 14.0	DTW, DO	Twice per day during testing
RW-1	2.0 – 17.0	DTW, DO	Twice per day during testing
RW-2	13.0 – 23.0	DTW, DO	Twice per day during testing
RW-3	16.2 – 31.2	DTW, DO	Twice per day during testing

Notes:
DTW = depth to water, measured with an interface probe
DO = dissolved oxygen, measured with an optical DO probe (YSI ProODO)
N/A = not applicable
[1] Temporary wells (TW) are nominal one-inch diameter. Monitoring wells (MW) are nominal two-inch diameter. Recovery wells (RW) and recovery sumps (RS) are nominal four-inch diameter. All are Schedule 40 PVC.
[2] Screen intervals for bedrock biosparging wells are the sealed injection interval below the packer. Screen intervals for bedrock monitoring wells are open borehole construction.
[3] Visual observations will be performed at the surface in the area of bedrock biosparging. Evidence of biosparging at the surface is typically air bubbling through the soil matrix, and/or buoyant diffusion of air through ponded water. A water source will be procured for the test to facilitate these observations, as needed.
[4] DO measurements will only be performed if gasoline product is not detected with the interface probe, as pure-phase product will damage the DO probe.
[5] An in-situ TROLL 500 will be installed in TW-14R to continuously monitor water table fluctuations.

After the pilot has been completed, results will be presented in a brief Technical Memorandum (TM) for SCDHEC's review. This TM will provide conclusions about the pilot effectiveness and impact on the full-scale design for bedrock biosparging.

If you have any further questions or concerns, please call me at (919) 760-1777, Mr. Scott Powell/CH2M at (678) 530-4457, or Mr. Jerry Aycock/Plantation at (770) 751-4165.

Regards,

CH2M HILL Engineers, Inc.

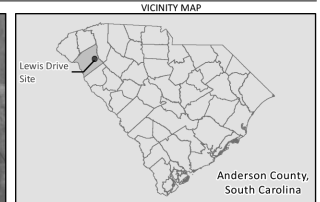
William M. Waldron, P.E.
Senior Project Manager

Attachments:
Figure 1 – Bedrock Biosparging Site Plan

c: Jerry Aycock, Plantation (Digital, Jerry_Aycock@kindermorgan.com)
Mary Clair Lyons, Esq., Plantation (Digital, Mary_Lyons@kindermorgan.com)
Richard Morton, Esq., Womble Carlyle Sandridge & Rice, PLLC (Digital, rmorton@wcsr.com)
File

Figure

VICINITY MAP



LEGEND

- Release Point
- Residuum Monitoring Well
- Bedrock Monitoring Well
- Proposed Shallow Monitoring Well
- Piezometer ("R" indicates Replacement)
- Recovery Sump
- Recovery Trench Point
- Recovery Well (4" diameter)
- Surface Water Sampling Location
- Vertical Saprolite Sparging Well
- Vertical Bedrock Sparging Well
- Horizontal Sparging Well Riser
- Horizontal Sparging Well Screen
- Pipeline
- Stream (NHD)
- Inspection Route for Sheen or Distressed Vegetation
- Remediation Zone

Source Data:
United States Department of Agriculture (USDA), Farm Service Agency (FSA), National Agriculture Imagery Program (NAIP), Published 8/19/2015
United States Geological Survey (USGS) National Hydrography Dataset (NHD)

Figure 1. Bedrock Biosparging Site Plan
Corrective Action Plan Addendum
Lewis Drive Release, Belton, South Carolina
Site ID #18693 "Kinder Morgan Belton Pipeline Release"

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Appendix E
Surface Water Protection Plan Addendum and Approval Letter

Healthy People. Healthy Communities.

USТ 160 DOCKETING

JERRY AYCOCK
PLANTATION PIPE LINE
1000 WINDWARD CONCOURSE
SUITE 450
ALPHARETTA GA 30005

FEB 10 2017

Re: Surface Water Protection Plan Addendum Approval
Plantation Pipe Line Lewis Drive Release, 112 Lewis Dr., Belton SC
Site #18693
Petroleum Pipeline Release December 8, 2014
Surface Water Protection Plan Addendum (1/20/17), received January 23, 2017
Anderson County

Dear Mr. Aycock,

The Underground Storage Tank (UST) Management Division of the South Carolina Department of Health and Environmental Control (Agency) has reviewed the referenced addendum which proposes to address seep areas located adjacent to Brown's Creek with reactive core mats (RCM). Based upon the information provided, the Agency agrees to Plantation Pipe Line's proposal to address seeps located adjacent to Brown's Creek with RCM. In the event that breakthrough occurs with RCM, another alternative to address seeps will need to be proposed. A report that provides a scaled map illustrating where RCMs were installed and documentation with latitude and longitude where the RCMs were installed will need to be provided within 30 days of the date stamped on this correspondence.

Documents should continue to be provided in paper format and pdf via a disk with Site ID # 18693 and Plantation Pipeline Lewis Drive Release noted in a prominent location. Should you have any questions, I can be reached at (803) 898-0628 or colemabj@dhec.sc.gov. Faxes can be sent to (803) 898-0673.

Sincerely,

B. Coleman

Bobbi Coleman, Hydrogeologist
Assessment Section
Underground Storage Tank Management Division
Bureau of Land and Waste Management

CC: Chris McCluskey, Upstate Region EQC (Anderson Office)
William Waldron, CH2M Hill, 3120 Highwoods Blvd., Suite 214, Raleigh NC, 27604
Gary Poliakoff, Poliakoff & Associates, PO Box 1571, Spartanburg SC, 29304
Scott Lewis, 15 Edgewood Dr., Williamston SC 29697
Eric Lewis, 421 Reedy Fork Rd., Greenville SC 29605
Technical File

CH2M Raleigh
3120 Highwoods Boulevard
Suite 214
Raleigh, NC 27604
O +1 919 875 4311
F +1 919 875 8491
www.ch2m.com

January 20, 2017

Delivered via FedEx

Ms. Bobbi Coleman
South Carolina Department of Health and Environmental Control
Assessment Section, UST Management Division
Bureau of Land and Waste Management
2600 Bull Street
Columbia, SC 29201

Subject: Surface Water Protection Plan Addendum
Lewis Drive Release
Plantation Pipe Line Company
Belton, South Carolina
Site ID #18693, "Kinder Morgan Belton Pipeline Release"

Dear Ms. Coleman,

On behalf of Plantation Pipe Line Company (Plantation), CH2M HILL Engineers, Inc. (CH2M) has prepared this addendum to the Surface Water Protection Plan for the Lewis Drive Release Site dated April 19, 2016. **Figures 1** and **2** show the site features in relation to the release point. The pipeline release resulted in impacts to soil, groundwater, and surface water quality.

The primary component of this corrective action is to install reactive core mat (RCM) in layers over two seeps identified in the vicinity of Brown's Creek, in the eastern portion of the site. Seep 1 measures 30 feet long by 12 feet wide and is located approximately 20 feet up the slope from Brown's Creek. A product recovery trench and a berm stand between Seep 1 and the creek. Seep 2 measures 12 feet by 12 feet and is located adjacent to Brown's Creek. The seep locations are indicated on **Figure 2**. The total footprint of the proposed mitigation effort is approximately 500 square feet (0.01 acres), and the total length that is parallel to Brown's Creek is approximately 42 linear feet.

The RCM contains granular activated carbon and is designed to passively control embankment seepage. The carbon is integrated in the RCM between sheets of geotextile that are needle-punched together to keep the carbon contained, regardless of how the material is cut to shape for the application. A cut sheet for the RCM is provided. The conceptual design includes four layers of RCM interbedded with 3-inch layers of sand to be installed as indicated on **Figure 3**. The matting for Seep 1 will also be installed over a 6-inch bed of #57 stone. An erosion control blanket will be installed at the surface for both seeps. The RCM is to be overlaid on the existing ground with no earthwork cut. The edges of the system will be tapered to tie into existing grade. The RCM and erosion control mat will be anchored with pins according to the manufacturer's recommendation. Vegetation will not need to be removed to apply the RCM to the seeps.

This activity will be implemented under the U.S. Army Corps of Engineers Nationwide Permit 3, part (c), which authorizes the use of temporary fill for site maintenance. Per the requirement of the permit, the proposed temporary measure will consist of materials that are placed in a manner that will not be eroded by expected high flows. After concentrations in Brown's Creek have abated, indicating that the seep is no longer impacting the creek, this temporary fill will be removed in its entirety and the affected areas will be regraded to pre-construction elevations and revegetated. The proposed temporary activities covered under part (c) of Nationwide Permit 3 do not require pre-construction notification.

If you have any further questions or concerns, please contact me at 919-760-1777 or Mr. Jerry Aycock with Plantation at 770-751-4165.

Regards,
CH2M HILL Engineers, Inc.

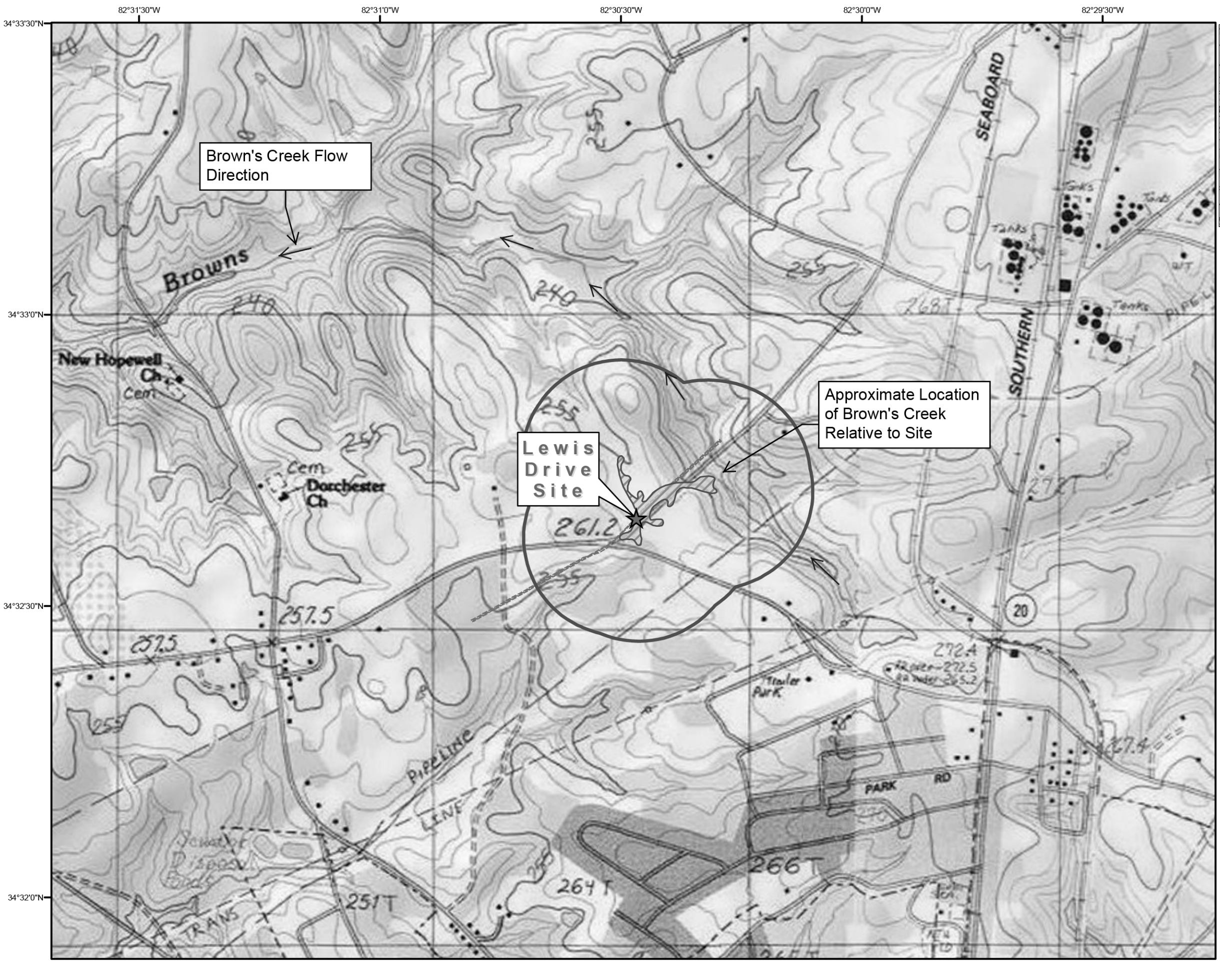
William M. Waldron, P.E.
Senior Project Manager

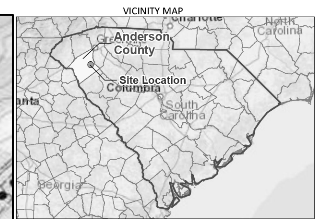
Enclosures

- Figure 1 - Site Location Map – USGS 7.5-minute Topographic Quadrangle
- Figure 2 - Product Thickness and Seep Location Map with Aerial Site Image
- Figure 3 – Seep Remediation with Reactive Core Mat
- Attachment 1 - Cut Sheet for Reactive Core Mat

Cc (via e-mail):
Jerry Aycock – Plantation Pipe Line Company, email: Jerry_Aycock@kindermorgan.com
Mary Clair Lyons, Esq. – Plantation Pipe Line Company, email: Mary_Lyons@kindermorgan.com
Richard Morton, Esq. – Womble Carlyle Sandridge & Rice, PLLC, email: rmorton@wcsr.com
File

Figures





LEGEND:

Release Point

Pipeline

Approximate Extent of Product >0.01' Thickness (based on May 2016 data)

1,000 ft. Offset from Product Plume

Note:
Contour Interval in Meters.

BASE MAP SOURCE::
USGS 7.5-minute Topographic Quadrangle
Belton East, SC (published 1984) and
Belton West, SC (published 1984).

N

0 1,000 2,000
Approximate scale in feet

Figure 1. Topography of Lewis Drive Area
Lewis Drive Release, Belton, South Carolina
Site ID #18693 "Kinder Morgan Belton Pipeline Release"

ch2m.

\\canopus\Groups\GIS\00_Proj\K\Kinder_Morgan\654558LewisDr_ER\GIS\Maps\2016_SiteAssessment\Figure2_Site_Topography.mxd AG017958 7/11/2016

LEGEND

- ☆ Release Point
- Monitoring Well
- Bedrock Monitoring Well
- Recovery Sump
- Abandoned Recovery Sump
- Piezometer ("R" indicates Replacement)
- Abandoned Temporary Piezometer
- Recovery Well (4" diameter)
- Surface Water Sampling Location
- Septic Tank
- Recovery Trench Point
- Recovery Trench
- Surface Water Flow Direction
- Pipeline
- Soft Boom
- Hard Boom
- Interpreted Product Thickness base on 5/06/2016 and 5/10/2016 data
- Stream (NHD)
- Delineated Wetland
- Beaver Dam
- Detail Area
- **0.04** Product Thickness in feet as of 5/06/2016 and 5/10/16.
- **NP** No Product detected

Source Data:
ESRI World Imagery Layer, 2015
USGS National Hydrography Dataset (NHD)

N

0 175 350
Scale in Feet

Figure 2. Product Thickness and Seep Location Map, May 2016
Lewis Drive Release, Belton, South Carolina
Site ID #18693 "Kinder Morgan Belton Pipeline Release"

\\CANOPUS\GROUPS\GIS\00_PROJ\K\KINDER_MORGAN\654558LEWISDR_ER\GIS\MAPS\CORRECTIVE_ACTION_PLAN\FIGURE7_PRODUCT_THICKNESS_MAP.MXD SASELAGE 9/1/2016

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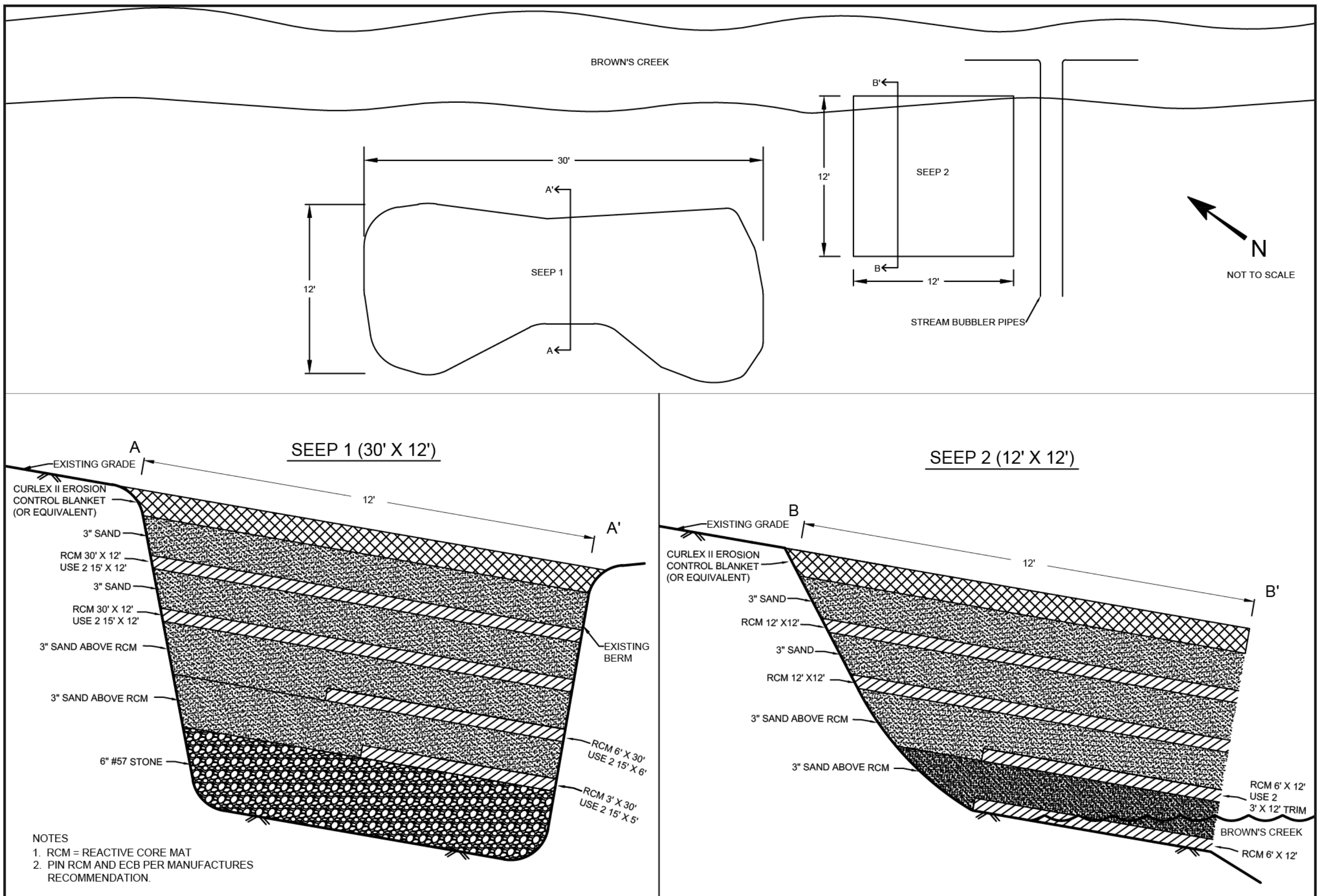

REV | DESCRIPTION OF REVISION | BY | DATE

KINDER MORGAN
SOUTH CAROLINA

AECOM
Tallahassee, Florida

SCALE | DRAWN BY: JM | CHECKED BY: BL | DATE: 01/2017

FIGURE 3
LEWIS DRIVE
SEEP REMEDIATION WITH REACTIVE CORE MAT
CONCEPTUAL DESIGN - NOT FOR CONSTRUCTION

PROJECT NUMBER
60517198
FIGURE NUMBER

Attachment 1

Cut Sheet for Reactive Core Mat

REACTIVE CORE MAT™
WITH GRANULAR ACTIVATED CARBON CORE (GAC)

DESCRIPTION
REACTIVE CORE MAT™ GAC is an aqueous permeable composite of geotextiles and activated carbon that reliably adsorbs organics from water.

APPLICATION
REACTIVE CORE MAT™ GAC is designed for use in the following applications:
- In situ subaqueous cap for contaminated sediments or post-dredge residual sediments
- Embankment seepage control
- Groundwater remediation

BENEFITS
- REACTIVE CORE MAT™ GAC provides a reactive material that treats contaminants which are carried by advective or diffusive flow.
- Reactive cap allows for thinner cap thickness than a traditional sand cap.
- Geotextiles provide stability and physical isolation of contaminants.

REACTIVE CORE MAT™ GAC is designed to provide a simple method of placing active materials into subaqueous sediment caps.

TESTING DATA

PHYSICAL PROPERTIES		
PROPERTY	**TEST METHOD**	**RESULT**
ACTIVATED CARBON[1]		
Iodine Number	AWWA B604 or ASTM D4607	Min. 750 mg/g
FINISHED RCM PRODUCT		
Activated Carbon Mass per Area	Modified ASTM D5993	0.4 lb/ft^2
Grab Strength[2]	ASTM D4632	90 lb. MARV
Permeability[3]	ASTM D 4491	1 x 10^{-3} cm/s min.

NOTES:
[1] Activated carbon properties performed prior to incorporation into the RCM
[2] All tensile testing in machine direction
[3] Permittivity at constant head of 2 inches and converted to hydraulic conductivity using Darcy's Law and RCM thickness per ASTM D5199 for geotextiles

PACKAGING
REACTIVE CORE MAT™ GAC is available in the following packaging option:
- 15' by 100' rolls, packaged on 4" PVC core tubes wrapped in polyethylene plastic

North America: 847.851.1800 | 800.527.9948 | www.CETCO.com

UPDATED: NOVEMBER 2013

TDS_RCM-GAC_AM_EN_201311_v1