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1RP - 204

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TRIDENT ENVIRONMENTAL

February 27, 2015

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Mr. Jim Griswold
New Mexico Energy, Minerals, & Natural Resources
Oil Conservation Division, Environmental Bureau
1220 S. St. Francis Drive
Santa Fe, New Mexico 87505

RE: **2014 ANNUAL GROUNDWATER MONITORING REPORT**
**PRIDE ENERGY COMPANY**
**SOUTH FOUR LAKES TANK BATTERY (1RP-0204)**
**T12S, R34E, SECTION 2, UNIT LETTER G**
**LEA COUNTY, NEW MEXICO**

Mr. Griswold:

As agent for Pride Energy Company, Trident Environmental submits the attached *2014 Annual Groundwater Monitoring Report* for the South Four Lakes Tank Battery Site (1RP-204) located approximately 10 miles west of Tatum in Lea County, New Mexico. This *2012 Annual Groundwater Monitoring Report* documents the annual sampling event performed by Trident on July 2-3, 2014, and site remediation activities conducted between May 6, 2008 and December 11, 2014. This report also contains historical groundwater elevation and analytical data for the onsite monitoring wells that was obtained from the OCD Online database. The monitoring and sampling program was conducted in accordance with the monitoring plan specified by Mr. William C. Olson of the New Mexico Oil Conservation Division (NMOCD) in his letter dated July 14, 1997.

Thank you for your attention concerning this annual summary of groundwater monitoring activities. If you have any questions, please contact me at (432) 638-8740 or Matt Pride at (918) 524-9200.

Sincerely,

Gilbert J. Van Deventer, REM, PG
Trident Environmental – Project Manager

cc: Matt Pride (Pride Energy Co.)
Tomas Oberding (NMOCD – District 1)

***February 27, 2015***

# *2014 ANNUAL GROUNDWATER MONITORING REPORT*

## SOUTH FOUR LAKES TANK BATTERY SITE (1RP-204)

## T12S, R34E, SECTION 2, UNIT LETTER G
## LEA COUNTY, NEW MEXICO


Prepared for:

**Pride Energy Company**

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## 1.0 Executive Summary

Trident Environmental (Trident) was retained by Pride Energy Company (Pride) to perform the annual groundwater monitoring at the South Four Lakes Tank Battery which is located approximately 10 miles west of Tatum, New Mexico. The legal description of the site is described as being in township 12 south, range 34 east, section 2, unit letter G, in Lea County, New Mexico. This 2014 Annual Groundwater Monitoring Report documents the annual sampling event performed by Trident at the South Four Lakes Tank Battery on July 2-3, 2014. This report also contains historical groundwater elevation and analytical data for all monitoring wells on site. The monitoring and sampling program was conducted in accordance with the monitoring plan specified by Mr. William C. Olson of the New Mexico Oil Conservation Division (NMOCD) in his letter dated July 14, 1997 (Appendix A).

Based on the sampling and monitoring data to date, the following conclusions relevant to groundwater conditions at the South Four Lakes Tank Battery are evident:

- Benzene concentrations in monitoring wells MW-5, MW-7, MW-9, MW-10, MW-14, MW-15, and MW-16 were below the New Mexico Water Quality Control Commission (WQCC) standard of 0.010 mg/L.
- The benzene levels in monitoring wells MW-13 (1.89 mg/L) and RW-1d (0.904 mg/L) exceeded the WQCC standard. Toluene, ethylbenzene, and xylene concentrations in all sampled wells were below the WQCC standards with the exception of the 0.75 mg/L standard for xylenes in MW-15 (1.141 mg/L).
- Light non-aqueous phased liquids (LNAPL) are present in the groundwater and have the characteristics of a light crude oil or natural gas liquid (condensate). The LNAPL thicknesses have been reduced significantly over the last 6 years due to operation of the windmill recovery system and passive recovery activities in affected wells. LNAPL is localized between RW-2 and MW-6. As of December 11, 2014, measurable LNAPL was only present in RW-2s (0.14 ft), MW-6 (0.03 ft) and MW-12 (0.14 ft).
- The windmill-driven LNAPL recovery system at RW-2s performed well since being put back into operation on July 20, 2008. The system operated in total fluids mode so it is not known how much LNAPL has been removed; however, approximately 612,595 gallons (14,586 barrels) of hydrocarbon-impacted groundwater has been removed, since July 2008.
- The windmill at RW-2s was severely damaged beyond repair from strong winds sometime between late November and early December in 2013. LNAPL recovery has since been accomplished using a passive bailer and hand-bailing technique.
- Approximately 100.8 gal of LNAPL has been removed from MW-1, MW-6, MW-7, MW-9, MW12, MW-13, RW-1s, and RW-2s since May 2008 by use of passive bailers, oil absorbent socks, hand bailing, and windmill recovery.
- Chloride concentrations in MW-13, MW-14, MW-16, and RW-1s exceed the WQCC standard of 250 mg/L.
- TDS concentrations in MW-9, MW-13, MW-14, MW-15, MW-16, and RW-1d exceed the WQCC standard of 1,000 mg/L.

- Although iron and manganese concentrations may periodically exceed WQCC standards in some monitoring wells, increased levels of these constituents indicate intrinsic bioremediation processes are active.

- Source control has been implemented with the removal of contaminated soils beneath the closed EXXON production pit (December 1995) and the ongoing LNAPL and groundwater recovery operations. Given these source control measures, contaminant loading to groundwater has diminished through time, and the groundwater plume has stabilized and shown indications of decreased concentrations and areal extent over time.

- There are no indications that the hydrocarbon plume in the groundwater has migrated beyond the boundaries of the facility and there are no potential receptors (water wells) within a half-mile of the site. Given local and regional groundwater use, the groundwater plume in its current extent poses no risk to human health or the environment.

Recommendations for the South Four Lakes Tank Battery are as follows:

- Continue the sampling and monitoring program on an annual basis in accordance with the July 14, 1997 NMOCD approval letter. Continued annual sampling is necessary to monitor plume stability and to evaluate the effectiveness of natural attenuation in limiting the downgradient migration of the plume. The next sampling event is scheduled during the second quarter of 2015.

- Continue LNAPL recovery, if present, in RW-1s, RW-2s, MW-1, MW-6, MW-7, MW-9, MW-12, and MW-13 using passive bailers or absorbent socks with monthly inspections. Obtain the annual groundwater samples from these wells if the LNAPL thickness is less than 0.01 feet.

- The above recommended LNAPL recovery effort will improve the effectiveness of biological attenuation of the dissolved hydrocarbon plume as observed with the continued uptake of electron acceptors, production of biological reaction by-products, and the reduction in BTEX concentrations and areal extent of the dissolved hydrocarbon plume.

## 2.0 Chronology of Events

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| November 13, 1987 | EXXON Company U. S. A. (Exxon) reported a crude oil spill to the NMOCD which resulted in a loss of 600 barrels from a ruptured line at the South Four Lakes Tank Battery. No record of corrective actions appear to be on file however, Exxon stated that the tank battery would be redesigned and that old buried piping would be replaced with new above-ground piping. |
| November 1990 | Phillips Petroleum Company (Phillips) acquired the South Four Lakes Unit from Exxon. As part of Phillips' due diligence effort during the acquisition, a Phase I and II environmental assessment was completed on the lease and associated facilities by Law Environmental, Inc. This assessment included the installation of four monitoring wells (MW-1 through MW-4). |
| September 1994 | As part of a second environmental due diligence effort for the sale of the Unit, monitoring wells MW-1 through MW-4 were sampled again by SECOR International Incorporated (SECOR). Upon detection of LNAPL in MW-I, Phillips initiated a source identification effort which included evaluation of production storage tank integrity, excavation of an adjacent Amoco crude oil pipeline, a comparative analysis (fingerprinting) of crude oil produced from the unit with the LNAPL discovered within MW-1, and a focused soil and groundwater assessment in the area of the closed EXXON production pit. |
| December 13-16, 1994 | SECOR supervised the installation of nine monitoring wells (MW-5 through MW-13). |
| January 17-18, 1995 | SECOR performed groundwater sampling of all wells at the site with the exception of MW-1, MW-6, RW-11, and MW-12 in which LNAPL was observed. |
| March 13, 1995 | SECOR submitted a *Soil and Groundwater Assessment* report in which they concluded that two historic hydrocarbon release mechanisms existed at the tank battery. The first and primary mechanism was a subsurface release to soil and ground-water from the closed production pit located north of the tank battery. The second mechanism was a relatively shallow subsurface release to soil from historic surface spills of crude oil and produced water. |
| May 15, 1995 | NMOCD requested submission of a soil and groundwater remediation work plan and additional delineation of the dissolved-phase hydrocarbons in groundwater at the site. |
| July 27, 1995 | Phillips submitted a *Remedial Action Plan for the South Four Lakes Unit* to the NMOCD. The plan proposed soil and groundwater remediation and delineation of dissolved-phase hydrocarbons at the site. |
| August 18, 1995 | The NMOCD gave Phillips conditional approval for the Remedial Action Plan. |

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| October 9-11, 1995 | SECOR conducted the installation and sampling of three monitoring wells (MW-14 through MW-16) to delineate the downgradient extent of the dissolved hydrocarbons in groundwater at the site. |
| November 27, 1995 | Ritter Environmental & Geotechnical Services (REGS) initiated closure of the former production pit under contract with Phillips. REGS excavated the former pit to a depth of approximately 23 ft below ground surface (bgs). The excavated soils were removed for treatment by solidification in three treatment cells. The solidified material (~1,835 $yd^3$) was allowed two to three weeks time to cure prior to covering the excavated production pit and treatment cells. Wells MW-8 and RW-11 had to be removed as they were in the footprint of the excavated area. |
| January 4-5, 1996 | SECOR supervised the installation of recovery wells RW-1s, RW-1d, RW-2s, and RW-2d for subsequent use to recover LNAPL. |
| January 15-16, 1996 | BASCOR Environmental, Inc. (BEI) supervised the installation of the windmill-driven pump system for LNAPL recovery and conducted a well performance test for recovery wells RW-2s and RW-2d. |
| January 31, 1996 | Phillips submitted the *Final Closure Report - Unlined Surface Impoundment Closure* report prepared by REGS (December 1995) to the NMOCD. |
| January 31, 1996 | Phillips submitted the *Supplemental Environmental Investigation – Downgradient Assessment* report prepared by SECOR (November 28, 1995) to the NMOCD. |
| January 31, 1996 | Phillips submitted the *Recovery Well Installation Report* prepared by SECOR (January 29, 1996) to the NMOCD. |
| January 31, 1996 | Phillips submitted the *Free Phase Hydrocarbon Recovery System Installation Report* prepared by BEI (January 30, 1996) to the NMOCD. |
| March 22, 1996 | NMOCD approved Phillips' actions to date and added conditions for a long-term groundwater monitoring plan. |
| May 6, 1997 | Phillips submitted the *Quantification of Natural Attenuation of Petroleum Hydrocarbons in Groundwater* report prepared by SECOR (April1997) to the NMOCD with a request that MW-2, MW-3, MW-4, and metals analysis for all monitoring wells be eliminated from future monitoring events. In addition, Phillips requested that groundwater monitoring for the on site wells be reduced to an annual frequency. |
| July 14, 1997 | NMOCD conditionally approved Phillips' May 6, 1997 request. |
| December 3-5, 1997 | CH2M Hill conducted the 1997 groundwater sampling event at the South Four Lakes Unit. |

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| October 1998 | Phillips sold South Four Lakes Unit to Pride Energy Company. |
| December 1, 1998 | After the sale of the South Four Lakes Unit to Pride, Phillips sent a disclosure letter that included reports of previous investigations at the site. In the letter Phillips stated they would finalize the 1998 annual monitoring report for submission to the NMOCD. |
| February 15, 2000 | NMOCD requested Phillips to submit required annual reports by March 17, 2000. |
| March 15, 2000 | Phillips submitted the 1997 annual monitoring report and requested NMOCD to acknowledge the submission as its final action for the site. |
| May 26, 2000 | NMOCD denied Phillips request for final action. Although Pride contractually accepted responsibility for site remediation, the NMOCD stated that contractual arrangement between Phillips and Pride does not relieve Phillips of liability or responsibility for remediation. |
| March 13, 2008 | Trident Environmental conducted the 2008 groundwater monitoring event at the South Four Lakes tank battery site on behalf of Pride. Trident also acquired site documentation from various reports available from the OCD Online database to incorporate into the forthcoming annual monitoring report. |
| May 6, 2008 | Trident supervised the inspection and trouble-shooting of the windmill-driven LNAPL recovery system at RW-2 which included removal of worn components. Passive bailers were installed in MW-6 and RW-1s to augment LNAPL recovery efforts. |
| May 28, 2008 | Trident supervised the repair of the windmill-driven LNAPL recovery system at RW-2 which included repair and replacement of downhole components. |
| June 30, 2008 | The discharge line was installed to direct LNAPL recovery from the windmill at RW-2s to the South Four Lakes tank battery. |
| July 24, 2008 | The pump rod on the windmill at RW-2s was repaired and the system put back into operating status for total fluids recovery. Also, hydrophobic bailers were placed in monitoring wells MW-1, MW-7, MW-12 and MW-13, for passive recovery of LNAPL. |
| August 12, 2009 | Hydrophobic bailer was installed in monitoring well MW-6. Wells showing steady decline in LNAPL thicknesses due to recovery system in operation. |
| September 17, 2009 | Oil absorbent sock was placed in monitoring well MW-9. The hydrophobic bailer in MW-7 was replaced with a hydrophobic sock, due to reduced LNAPL. |
| October 8, 2009 | The hydrophobic bailer in MW-13 was replaced with an oil absorbent sock, due to reduced LNAPL. |

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| December 23, 2009 | Lewis Windmill on site to re-install new sump in RW-2s; windmill set in product-only mode for winter operation. |
| January 15, 2009 | Adjusted sump; windmill set in product-only mode for winter operation. |
| February 27, 2009 | Lowered sump in windmill to pump total fluids. The hydrophobic bailer in MW-1 was replaced with an oil absorbent sock, due to reduced LNAPL. Wells showing steady decline in LNAPL thicknesses due to recovery system in operation. |
| April 28, 2009 | Re-attached loose bracket on windmill which was loose from pump on arrival (probably caused by high winds). Totalizer indicates windmill pumped at 1.7 gpm (average) over past month which is significantly higher than normal. |
| May 18-19, 2009 | Conducted annual groundwater monitoring event. Added monitoring wells MW-1, MW-7, MW-9, and MW-13 to sampled well list due to lack of LNAPL. |
| October 15 & 19, 2009 | Piñon Well Service on site to repair windmill (replaced leather cups, new coupling, and stabilizer tower) and put back in service. |
| October 21, 2009 | Replaced passive bailer in RW-1s with oil absorbent sock due to reduced LNAPL thickness. |
| December 10, 2009 | Turned windmill off to avoid winter freeze up problems. |
| February 25, 2010 | Re-activated windmill |
| April 1, 2010 | Windmill not operational (tophead plunge rod threads stripped) |
| April 28, 2010 | Repaired windmill (replaced tophead plunger rod) and installed new GPI totalizer meter. |
| May 25-26, 2010 | Completed annual groundwater sampling activities. |
| July 14, 2010 | Replaced passive bailer in MW-12 with oil absorbent sock due to reduced LNAPL thickness. |
| February 24, 2011 | Windmill out of service (stuffing box rod broken at threads). |
| March 17, 2011 | Windmill operational after replacing stuffing box rod. |
| May 17-18, 2011 | Completed annual groundwater sampling activities. |
| September 28, 2011 | Installed new GPI totalizer meter. |
| April 23, 2012 | Ray Hardy (Piñon Water Well Service) repaired windmill to operational status by replacing threaded rod and adding gearbox oil. |
| June 19-20, 2012 | Completed annual groundwater sampling activities. |

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| July 12, 2012 | Installed electronic EDD totalizer meter. |
| June 12-13, 2013 | Completed annual groundwater sampling activities. |
| December 10, 2013 | Windmill at RW-2s not operational due to severe wind damage. |
| April 14, 2014 | Two man crew removed windmill recovery components from RW-2s and replaced with a passive bailer to resume LNAPL recovery. |
| July 2-3, 2014 | Completed annual groundwater sampling activities. |

Although not itemized in the chronology of events listed above, operation and maintenance of the LNAPL recovery system was conducted every month since May 2008. These operations included the following:

- Repairs and replacements for the windmill system at RW-2s, when necessary
- Emptying and installation of hydrophobic bailers and oil absorbent socks
- Gauging wells to determine depth to groundwater and presence of LNAPL
- Disposal of recovered fluids into the SWD tank battery system
- Recording all information for tabulation and inclusion into the annual groundwater monitoring reports.

## 3.0 Site Description and Background Information

Pride Energy Company (Pride) owns and operates the South Four Lakes Unit located in Lea County, New Mexico, just north of U.S. Highway 380, approximately 10 miles northwest of the town of Tatum (Figure 1). The Unit is an oil and gas lease on State land containing several active producing wells, one saltwater disposal well, and associated production tank battery. The tank battery is situated on approximately 5 acres and is surrounded by relatively flat grazing lands. Regionally, topography gently slopes to the east-southeast and is sparsely vegetated. The nearest water well (L-3005) is located approximately 0.35 miles north and is currently out of service but has been used periodically as a rig supply well for oil and gas operations. An active windmill (L-0656) used for livestock watering is located approximately 0.4 miles east-northeast of the site. Figure 2 presents the facility layout, as well as the location of all site monitoring wells.

Pride acquired the Unit from Phillips Petroleum Company (Phillips) in October 1998. Phillips acquired the Unit from EXXON Company, U.S.A. in November 1990. EXXON (formerly Humble Oil Co.) had operated the unit since the 1950's. As part of Phillips' due diligence effort during the acquisition, Phase I and Phase II environmental assessments were completed on the lease and associated facilities. Eight soil borings were drilled for the purposes of soil screening and sampling. Four monitoring wells (MW-1 through MW-4) were installed in four of the eight soil borings. The four monitoring wells were sampled for benzene, toluene, ethylbenzene, and total xylenes (BTEX) in mid-October 1990. Low levels of dissolved toluene, ethylbenzene, and xylene were detected in the groundwater sample collected from MW-1, located adjacent to the northwest comer of an abandoned EXXON production pit. No other monitoring well contained detectable levels of BTEX or light non-aqueous phase liquids (LNAPL). Upon acquiring the lease from EXXON, Phillips dismantled the old EXXON tank battery and constructed a new tank battery in its place. As part of a second environmental due diligence effort for the sale of the Unit, the four monitoring wells were sampled again in September 1994. During this sampling event, approximately 2.5 feet of LNAPL was present in MW-1. No other monitoring well contained detectable levels of dissolved BTEX or measurable LNAPL. Upon detection of the LNAPL in MW-1, Phillips initiated a source identification effort that included four tasks:

1. A production storage tank integrity evaluation
2. Excavation of an adjacent Amoco crude oil pipeline
3. A comparative analysis (fingerprinting) of crude oil produced from the Unit with the LNAPL discovered in MW-1
4. A focused soil and groundwater assessment in the area of the abandoned EXXON production pit

Internal inspection of the two crude storage tanks indicated that the tanks had not leaked. Furthermore, excavation of the Amoco crude oil pipeline indicated that the Amoco pipeline had not leaked. The comparative analysis of the crude oil samples produced from the Unit with the LNAPL encountered at MW-1 indicated that the oils were essentially the same. One minor but expected difference between the produced crude oils and the LNAPL from MW-1 is that the MW-1 oil has experienced minor evaporation, water washing, and/or biodegradation as suggested by the loss of light-end petroleum hydrocarbons (C4-C8).

Based on the results of second due diligence effort, it was determined that LNAPLs in soils beneath the abandoned EXXON production pit were the source of the dissolved BTEX in groundwater and the LNAPL at MW-1.

SECOR performed soil and groundwater assessment activities in December 1994 which included the installation of nine monitoring wells (MW-5 through MW-13) as documented in the report titled "*Soil And Groundwater Assessment*", dated March 13, 1995. In October 1995, SECOR conducted the installation and sampling of three additional monitoring wells (MW-14 through MW-16) to delineate the downgradient extent of the dissolved hydrocarbons in groundwater at the site.

Soils beneath the abandoned EXXON production pit were excavated and solidified onsite by Ritter Environmental on behalf of Phillips in December 1995. Wells MW-8 and RW-11 had to be removed as they were in the footprint of the excavated area.

In January 1996, SECOR supervised the installation of two 4-inch diameter recovery well clusters, RW-1 and RW-2, in areas with thickest accumulations of LNAPL.

Construction of a total fluids removal system consisting of dual pumps installed in recovery well cluster RW-2s (shallow) and RW-2d (deep) was completed by Bascor Environmental in January 1996. A conventional 8-foot diameter windmill placed on a 27-foot high tower provided the energy necessary to operate the dual pump system. According to the *1997 Natural Attenuation of Petroleum Hydrocarbons Monitoring Report* (December 1997), the windmill "recovery system recovered 2,700 gallons [~64 barrels] of natural gas condensate and 190,000 to 200,000 gallons [~4600 barrels] of water" during 1997. In the 1997 report, Phillips demonstrated that biological attenuation of petroleum hydrocarbons is actively occurring, that the dissolved hydrocarbon plume has only migrated a few hundred feet beyond the LNAPL release, and the extent of the plume appears to be stable.

Figure 2 depicts the locations of the on site monitoring wells and recovery wells over a 2014 aerial photograph of the facility.

Pride resumed monitoring activities and authorized Trident Environmental to conduct the annual groundwater monitoring and sampling event on March 13, 2008. Between May 6, 2008 and July 24, 2008 the windmill fluids recovery system at RW-2s was repaired and put back into service, and passive bailers were placed in monitoring wells with LNAPL present. Passive bailers were eventually replaced with oil absorbent socks when significantly reduced thicknesses of LNAPL were achieved. Operation and maintenance of the groundwater recovery system has continued on a monthly basis with annual groundwater sampling events as updated herein.

## 4.0 Procedures

During the annual sampling event conducted by Trident on July 2-3, 2014, all on-site monitoring wells were gauged for depth to groundwater using a clean, decontaminated electronic water/oil interface probe. Groundwater samples were collected from monitoring wells with less than 0.01 ft of LNAPL (MW-5, MW-7, MW-9, MW-10, MW-13, MW-14, MW-15, MW-16, RW-1d, and RW-2d).

A minimum of three volumes was purged from the wells MW-5, MW-7, MW-9, MW-10, MW-13, and MW-14 by hand-bailing using a dedicated bailer prior to collecting groundwater samples. Wells MW-15, MW-16, RW-1d, and RW-2d were purged with a 12-volt submersible pump that was thoroughly decontaminated between sampling points. Groundwater samples for volatile organic compound (BTEX) analysis were collected using dedicated or new, clean, disposable bailers. Groundwater parameters, including pH, conductivity, temperature, and dissolved oxygen (DO) were measured at the completion of purging using a Milwaukee Model SM600 DO meter, and a Hanna Model 98130 pH, conductivity, and temperature meter. At the end of purging, ferrous iron ($Fe^{+2}$) was also measured in the field using a Hach DR890 spectrophotometer (Hach Method 8146).

Water samples for BTEX analysis using EPA Method 8021B were transferred into air-tight, septum-sealed, 40-ml glass VOA sample vials with zero head space. Water samples for analysis of sulfate ($SO_4$), total iron (Fe), and total manganese (Mn) were transferred into unpreserved plastic containers to assess the efficacy of intrinsic bioremedial activity currently taking place. Water samples were also collected for analysis of chloride, nitrate ($NO_3$), and total dissolved solids (TDS). Chain-of-custody (COC) forms documenting sample identification numbers, collection times, and delivery times to the laboratories were completed for each set of samples. The water samples were placed in an ice-filled cooler immediately after collection and delivered to Permian Basin Environmental Laboratories in Midland TX, on July 4, 2014, for analysis using EPA standard methods.

## 5.0 Groundwater Elevations, Hydraulic Gradient and Flow Direction

Based on the most recent gauging data collected by Trident on July 2, 2014, the groundwater conditions at the South Four Lakes Tank Battery are characterized below.

- The depth to the water table varies from approximately 23 to 27 feet below ground surface across the site.
- The hydraulic gradient is approximately 0.002 feet/foot.
- Direction of groundwater flow is to the southeast (~24° south of due east).
- The direction of groundwater flow and hydraulic gradient are consistent with previous gauging events and the prevailing regional gradient.
- Water table elevations have declined approximately 1.3 feet across the site since monitoring began in 1995.

A groundwater elevation map depicting the water table elevation and direction of groundwater flow using the gauging data obtained on July 2, 2014, is presented in Figure 3. Historical groundwater elevations and depth to water measurements are summarized on Table 1, and depicted graphically in Figure 4.

## 6.0 Groundwater Quality Conditions

### 6.1 Distribution of Dissolved-phase Hydrocarbons in Groundwater

A historical listing of BTEX concentrations obtained from the on site monitoring wells is summarized in Table 2. Hydrocarbon concentration maps depicting the BTEX concentrations for the July 2-3, 2014 sampling event is presented in Figure 5. The laboratory reports and COC documentation are included in Appendix B.

Based on the analytical results obtained from the July 2-3, 2014 sampling event, the distribution of dissolved-phase hydrocarbons at the South Four Lakes Tank Battery is described below.

- Benzene concentrations in monitoring wells MW-5, MW-7, MW-9, MW-10, MW-14, MW-15, and MW-16 were below the New Mexico Water Quality Control Commission (WQCC) standard of 0.010 mg/L.
- The benzene levels in monitoring wells MW-13 (1.89 mg/L) and RW-1d (0.904 mg/L) exceeded the WQCC standard.
- Toluene, ethylbenzene, and xylene concentrations in all sampled wells were below the WQCC standards with the exception of the 0.75 mg/L standard for xylenes in MW-15 (1.141 mg/L).
- The dissolved-phase hydrocarbons in groundwater are localized within the boundaries of the facility. The dissolved hydrocarbon plume in the groundwater has remained stable and shows no indications of further downgradient migration.

### 6.2 Distribution of Chloride and TDS in Groundwater

Historical chloride and TDS concentrations in groundwater are also listed in Table 2. Constituents with concentrations above the WQCC standards are highlighted in boldface type. Figure 6 is a map depicting the chloride and TDS concentration for the July 2-3, 2014 sampling event. The laboratory reports and COC documentation are included in Appendix B.

- Chloride concentrations in MW-13 (2,420 mg/L), MW-14 (290 mg/L), MW-16 (459 mg/L), and RW-1d (1,700 mg/L exceed the WQCC standard of 250 mg/L. The chloride concentrations in monitoring wells MW-5, MW-7, MW-9, MW-10, MW-15, and RW-1d were below the WQCC standard.
- TDS concentrations in MW-9 (1,260 mg/L), MW-13 (4,480 mg/L), MW-14 (1,220 mg/L), MW-15 (1,570 mg/L), MW-16 (1,480 mg/L), and RW-1d (1,820 mg/L) exceed the WQCC standard of 1,000 mg/L. TDS concentrations in monitoring well MW-5, MW-7, MW-10, and RW-2d were below the WQCC standard.

## 7.0 Monitoring Natural Attenuation

The following biological parameters are being monitored to assess the efficacy of the biodegradation of the dissolved hydrocarbon (BTEX) plume:

- Electron Acceptors: dissolved oxygen (DO), nitrate ($NO_3$), sulfate ($SO_4$), and
- Biodegradation by-products: ferrous iron ($Fe^{+2}$), total iron (Fe), and total manganese (Mn).

Decreased levels of electron acceptors indicate uptake of these constituents in which biological processes are actively degrading dissolved hydrocarbons in groundwater. Thus, oxygen is consumed during aerobic respiration, nitrate is transformed to nitrite through denitrification, and sulfate decreases from the sulfate reduction process.

Increased levels of biodegradation byproducts (ferrous iron, total iron, and total manganese) are also indicators of naturally occurring biodegradation of the dissolved hydrocarbons. The uptake of hydronium ions associated with specific biodegradation processes mentioned above and/or the dissolution of soil minerals (iron and manganese) results from reaction with acids generated in hydrocarbon degradation. Insoluble forms of iron ($Fe^{+3}$) and manganese ($Mn^{+4}$) are then used as an electron acceptors producing highly soluble ferrous iron ($Fe^{+2}$) and manganese ($Mn^{+2}$). The historical summary of these parameters are listed in Table 3. The electron acceptor and biodegradation by-product data collected on July 2-3, 2014, are presented graphically in Figure 7.

One approach to analyzing the efficacy of biodegradation of dissolved hydrocarbons in groundwater is to compare the concentrations of various biological parameters based on their upgradient and downgradient location, to evaluate if any trends are evident. These trends are depicted graphically in Figure 8 in which the concentrations of benzene, electron acceptors, and biodegradation byproducts are plotted versus the distance from the source of hydrocarbons along the axis of the plume and extending from upgradient monitoring well MW-10 to downgradient monitoring well MW-16. With this analysis the following relationships in the electron acceptor and biodegradation by-product data are observed at the South Four Lakes Tank Battery site:

- Generally, DO values are lower downgradient and within the plume indicating that oxygen is being utilized as an electron acceptor (aerobic respiration).
- Nitrate and sulfate concentrations also exhibit decreasing tendencies in the downgradient direction (within the plume) as they are being utilized as electron acceptors indicating denitrification and sulfate reduction processes are occurring.
- Dissolved iron concentrations increase within the BTEX plume and downgradient indicating the insoluble ferric iron ($Fe^{+3}$) is being used as an electron acceptor producing highly soluble ferrous iron ($Fe^{+2}$).
- Manganese concentrations are higher within the plume indicating that manganese in solute form is a metabolic byproduct resulting from anaerobic biodegradation processes.
- Downgradient wells MW-14 and MW-16, which are outside the dissolved hydrocarbon plume, are perhaps the most obvious locations displaying the above relationships when compared to upgradient monitoring wells RW-2s, RW-1d, MW-13, and MW-15 within the dissolved hydrocarbon plume.

In another approach, using stoichiometric derivations, the mass of benzene degraded per unit mass of electron acceptor utilized and metabolic byproduct produced was calculated to determine the biodegradation capacity of these constituents relative to the highest and average benzene concentration observed on site. This comparison is summarized in Table 4.

The calculated biodegradation capacity of electron acceptors and metabolic byproducts (31.6 mg/L) exceeds the highest benzene concentration (1.43 mg/L) currently observed on site by a factor of 22 to 1. The biodegradation capacity of electron acceptors and metabolic byproducts further exceeds the average benzene concentration (0.35 mg/L) currently observed within the plume by a ratio of 90 to 1. This indicates that the necessary nutrients and by-products are present for the continued biodegradation of dissolved hydrocarbons.

The geochemical data for the site provides clear evidence of uptake of electron acceptors and production of biological reaction by-products, such that dissolved petroleum hydrocarbon biodegradation is occurring. Based on the analysis of electron acceptors and biodegradation by-products, it is concluded that biological processes continue to stabilize the hydrocarbon plume by actively reducing the BTEX constituents in both the downgradient dissolved plume and in the areas where LNAPL is present.

## 8.0 Free Product Recovery and LNAPL Thickness

Construction of a total fluids removal system consisting of dual pumps installed in recovery well cluster RW-2s (shallow) and RW-2d (deep) was completed by Bascor Environmental in January 1996. A conventional 8-foot diameter windmill placed on a 27-foot high tower provides the energy necessary to operate the dual pump system. According to the *1997 Natural Attenuation of Petroleum Hydrocarbons Monitoring Report* (December 1997), the windmill "recovery system recovered 2,700 gallons [~64 barrels] of natural gas condensate and 190,000 to 200,000 gallons [~4,600 barrels] of water" during 1997. A diagram of the windmill recovery system scanned from the *Free Phase Hydrocarbon Recovery System Installation Report* (January 30, 1996) prepared by BEI is shown in Figure 9. The system is also pictured on the cover of this report.

During the July 2-3, 2014 sampling event, monitoring well MW-1 (0.24 ft), MW-12 (0.26 ft), and RW-2s (0.20 ft) had the only measurable LNAPL thickness on site as listed in Table 1 and displayed in Figure 5. The steady declining trend in LNAPL thickness across the site, which is attributable to the product recovery efforts to date, is displayed in Figure 10. It should be recognized that measured thicknesses of LNAPL in wells exaggerates true thicknesses in the formation.

On May 6, 2008, and May 28, 2008, Trident supervised the inspection and trouble-shooting of the windmill-driven LNAPL recovery system at RW-2 which included removal of worn components. In late June 2008, the discharge line was installed to direct total fluids (LNAPL and recovered groundwater) from the windmill at RW-2s to the South Four Lakes tank battery. On July 24, 2008, the pump rod and wellhead seal on the windmill at RW-2s was repaired and the system put back into operating status with period repairs made thereafter. A totalizing meter records the cumulative volume of total fluids recovered by the windmill. With a 5 to 10 mile per hour wind the windmill pumps approximately 0.5 gallons per minute. According to the totalizer readings, the windmill has pumped approximately 612,572 gallons (14,585 barrels) of total fluids from RW-2s since July 24, 2008, at an average rate of 0.25 gal/min over the period of record. A higher volume of total fluids have been recovered compared to what has been recorded due to periods when the totalizer meter was not operational or intermittently clogged. In some cases due to totalizer malfunction total fluids were estimated at 0.25 gal/min over the period of record between maintenance visits. A new digital EDD totalizer meter was installed on July 12, 2012. The windmill was severely damaged beyond repair from strong winds sometime between late November and early December in 2013. LNAPL recovery has since been accomplished using a passive bailer and hand-bailing technique at RW-2s.

Passive bailers with hydrophobic filters were installed in MW-12 and RW-1s on May 6, 2008, to augment LNAPL recovery efforts. An oil-absorbent sock was installed in MW-9 due to minimal presence of LNAPL. On July 24, 2008, additional custom-made passive bailers were placed in monitoring wells MW-1, MW-6, MW-7, and MW-13. Due to subsequent declines in LNAPL thickness, the passive bailers in MW-1, MW-7, MW-13 and RW-1s, have since been replaced with oil-absorbent socks. Continued LNAPL recovery from MW-1, MW-7, MW-9, MW-13, and RW-1s was successful in reducing LNAPL thickness to 0.00 ft such that they could be included in the groundwater sampling program. Because of the minimized LNAPL thicknesses across the site, recoverable LNAPL has declined considerably as depicted in Figure 11.

A minimum of 100.2 gallons of LNAPL has been recovered since May 6, 2008 using a combination of the windmill pump system, passive bailers, oil absorbent socks, and hand bailing. The LNAPL from RW-2s is not separated from the total fluids; therefore LNAPL recovery in RW-2s cannot be measured and total LNAPL recovery volumes are underestimated. LNAPL thickness and product recovery volumes measurements are listed in Table 5 and Table 6, respectively. Operation and maintenance of the windmill recovery system, passive bailers, and oil absorbent socks continues on a monthly basis.

## 9.0 Conclusions

Based on the sampling and monitoring data to date, the following conclusions relevant to groundwater conditions at the South Four Lakes Tank Battery are evident:

- Benzene concentrations in monitoring wells MW-5, MW-7, MW-9, MW-10, MW-14, MW-15, and MW-16 were below the New Mexico Water Quality Control Commission (WQCC) standard of 0.010 mg/L. The benzene levels in monitoring wells MW-13 (1.89 mg/L) and RW-1d (0.904 mg/L) exceeded the WQCC standard. o Toluene, ethylbenzene, and xylene concentrations in all sampled wells were below the WQCC standards with the exception of the *0.75 mg/L standard for xylenes in MW-15 (1.141 mg/L).*
- Light non-aqueous phased liquids (LNAPL) are present in the groundwater and have the characteristics of a light crude oil or natural gas liquid (condensate). The LNAPL thicknesses have been reduced significantly over the last 6 years due to operation of the windmill recovery system and passive recovery activities in affected wells. LNAPL is localized between RW-2s and MW-6. As of December 11, 2014, measurable LNAPL was only present in: MW-1 (0.24 ft), MW-12 (0.26 ft), and RW-2s (0.20 ft).
- The windmill-driven LNAPL recovery system at RW-2s has been performing well since it was put back into operation on July 20, 2008. The system operates in total fluids mode so it is not known how much LNAPL has been removed; however, approximately 612,572 gallons (14,585 barrels) of hydrocarbon-impacted groundwater has been removed, since July 2008.
- Approximately 100.2 gal of LNAPL has been removed from MW-1, MW-6, MW-7, MW-9, MW12, MW-13, RW-1s, and RW-2s since May 2008 by use of passive bailers, oil absorbent socks, hand bailing, and windmill recovery.
- Chloride concentrations in MW-13 (2,420 mg/L), MW-14 (290 mg/L), MW-16 (459 mg/L), and RW-1d (1,700 mg/L exceed the WQCC standard of 250 mg/L. The chloride concentrations in the other sampled monitoring wells were below the WQCC standard.
- TDS concentrations in MW-9 (1,260 mg/L), MW-13 (4,480 mg/L), MW-14 (1,220 mg/L), MW-15 (1,570 mg/L), MW-16 (1,480 mg/L), and RW-1d (1,820 mg/L) exceed the WQCC standard of 1,000 mg/L. TDS concentrations in the other sampled monitoring wells were below the WQCC standard.
- Although iron and manganese concentrations exceed WQCC standards in some monitoring wells, increased levels of these constituents indicate intrinsic bioremediation processes are active.
- Source control has been implemented with the removal of contaminated soils beneath the closed EXXON production pit (December 1995) and the ongoing LNAPL and groundwater recovery operations. Given these source control measures, contaminant loading to groundwater has diminished through time, and the groundwater plume has stabilized and shown indications of decreased concentrations and areal extent over time.
- There are no indications that the hydrocarbon plume in the groundwater has migrated beyond the boundaries of the facility and there are no potential receptors (water wells) within a half-mile of the site. Given local and regional groundwater use, the groundwater plume in its current extent poses no risk to human health or the environment.
- Continued annual sampling is necessary to monitor plume stability and to evaluate the effectiveness of natural attenuation in limiting the downgradient migration of the plume.

## 10.0 Recommendations

The following corrective actions are recommended for South Four Lakes Tank Battery.

- Continue the sampling and monitoring program on an annual basis in accordance with the July 14, 1997 NMOCD approval letter. Continued annual sampling is necessary to monitor plume stability and to evaluate the effectiveness of natural attenuation in limiting the downgradient migration of the plume. The next sampling event is scheduled during the second quarter of 2015.

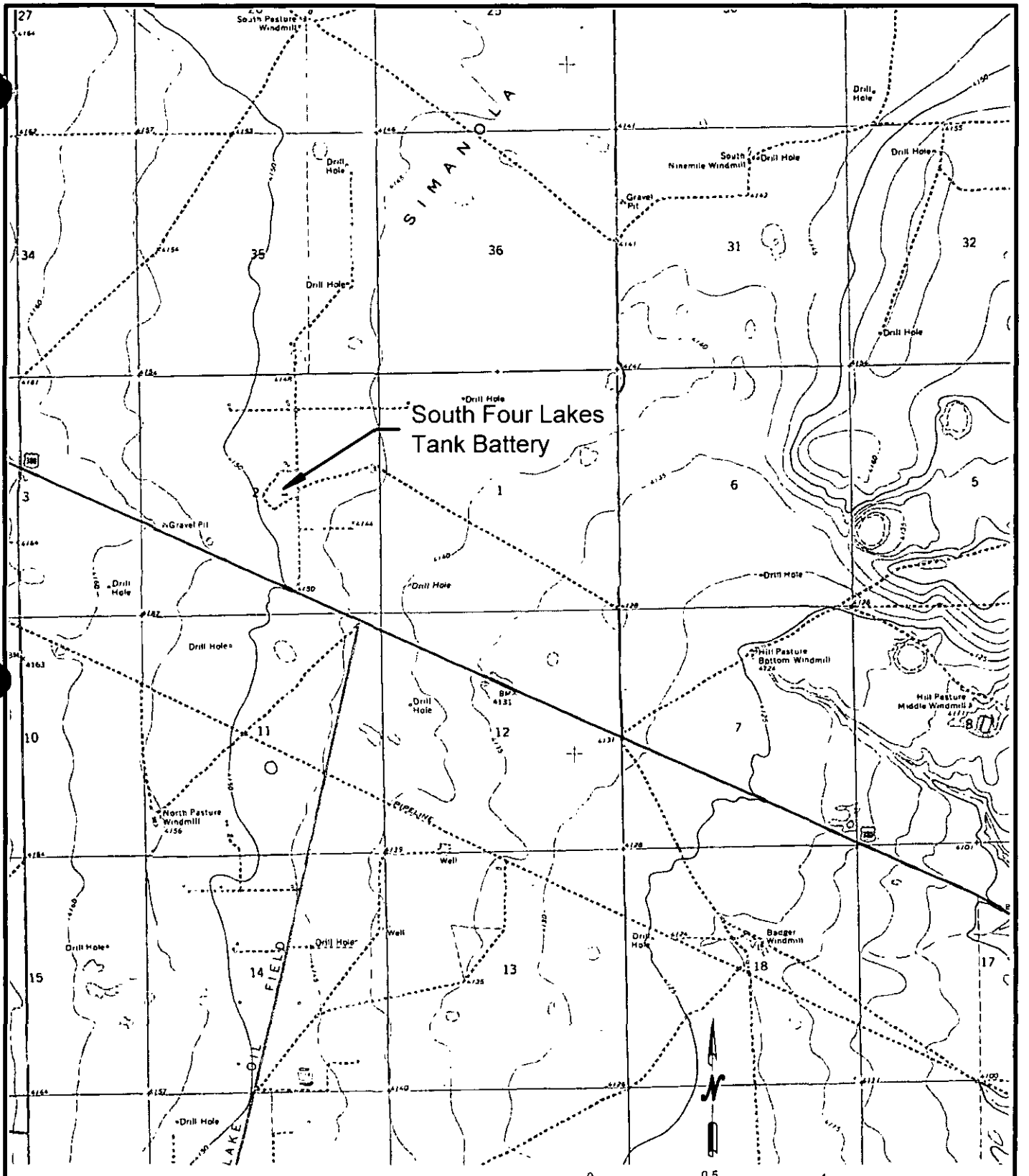
- Continue LNAPL recovery, if present, in RW-1s, RW-2s, MW-1, MW-6, MW-7, MW-9, MW-12, and MW-13, using passive bailers or absorbent socks with monthly inspections. Obtain groundwater samples from these wells if the LNAPL thickness is less than 0.01 feet.

- The above recommended LNAPL recovery effort will improve the effectiveness of biological attenuation of the dissolved hydrocarbon plume as observed with the continued uptake of electron acceptors, production of biological reaction by-products, and the reduction in BTEX concentrations and areal extent of the dissolved hydrocarbon plume.

## 11.0 Limitations

Trident has prepared this Annual Monitoring Report to the best of its ability. No other warranty, expressed or implied, is made or intended. Trident has examined and relied upon documents obtained from the OCD Online database (http://ocdimage.emnrd.state.nm.us/imaging/AEOrderFileView.aspx?appNo=pENV00001RP204) as referenced in the report and may have relied on oral statements made by certain individuals. Trident has not conducted an independent examination of the facts contained in referenced materials and statements. We have presumed the genuineness of the documents and that the information provided in documents or statements are true and accurate. Trident has prepared this report, in a professional manner, using the degree of skill and care expected of environmental consultants. Trident also notes that the facts and conditions referenced in this report may change over time and the conclusions and recommendations set forth herein are applicable only to the facts and conditions as described at the time of this report.

# FIGURES



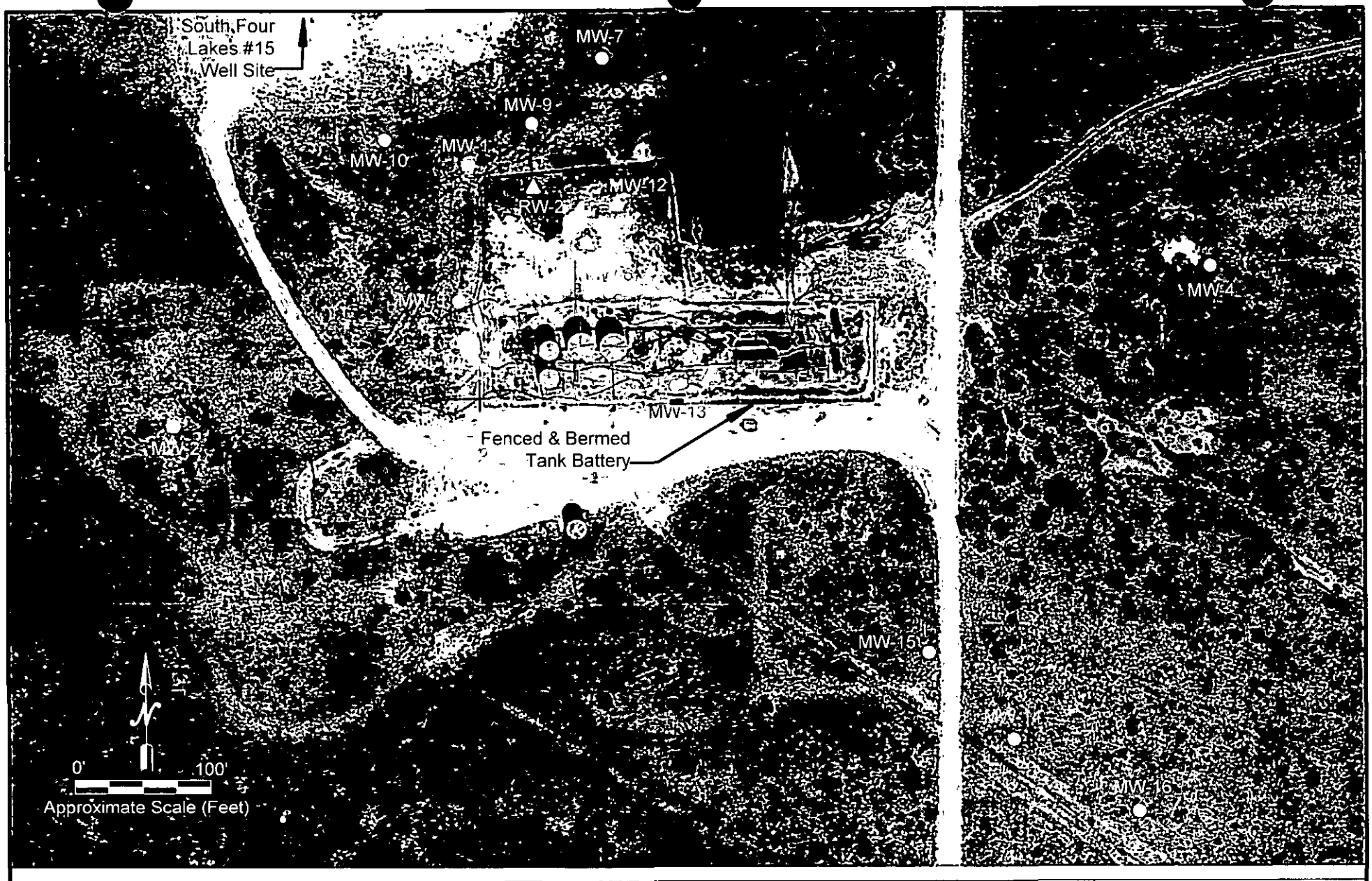

USGS Simanola Valley, NM 7.5" Quadrangle (1970)

TRIDENT ENVIRONMENTAL

**Pride Energy Company**

South Four Lakes Tank Battery (1R-204)
T12S - R34E - Section 2 (Lea County, New Mexico)

FIGURE 1
SITE TOPOGRAPHIC MAP



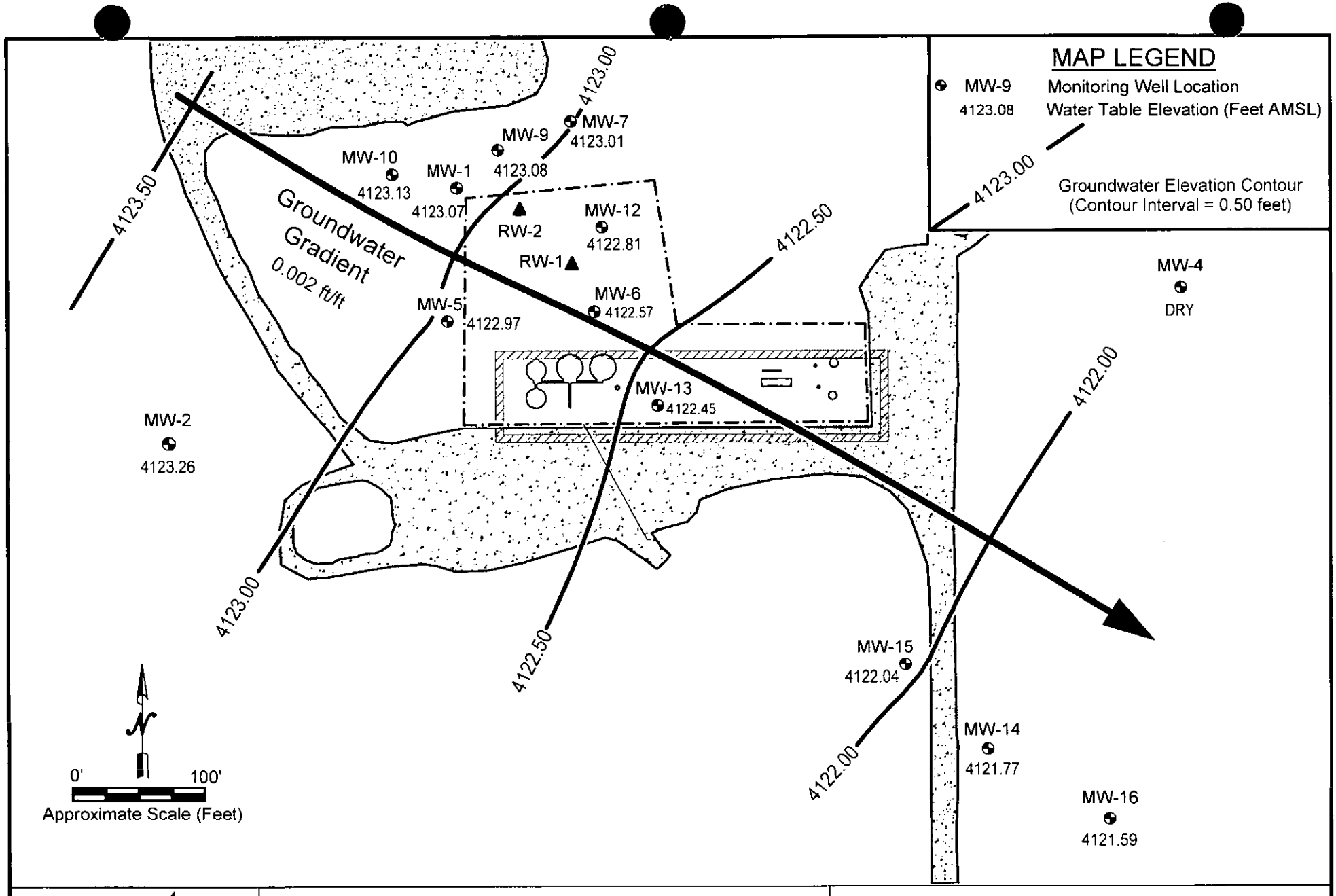

TRIDENT ENVIRONMENTAL

South Four Lakes Tank Battery (1R-204)

T12S - R34E - Section 2 (Lea County NM)

*Pride Energy Company*

FIGURE 2
2014 AERIAL PHOTO AND
MONITORING WELL LOCATION MAP




TRIDENT ENVIRONMENTAL

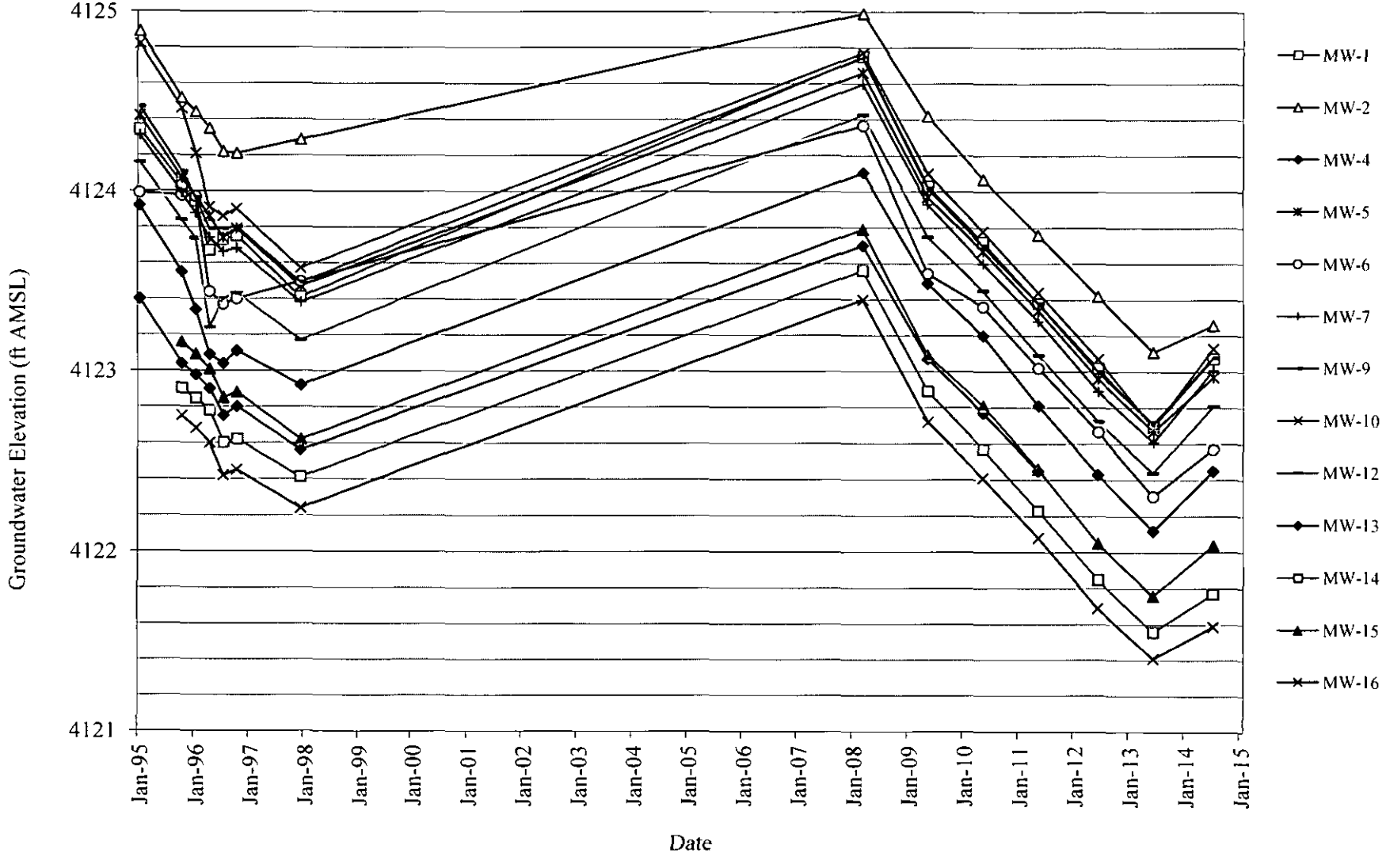
South Four Lakes Tank Battery (1R0204)

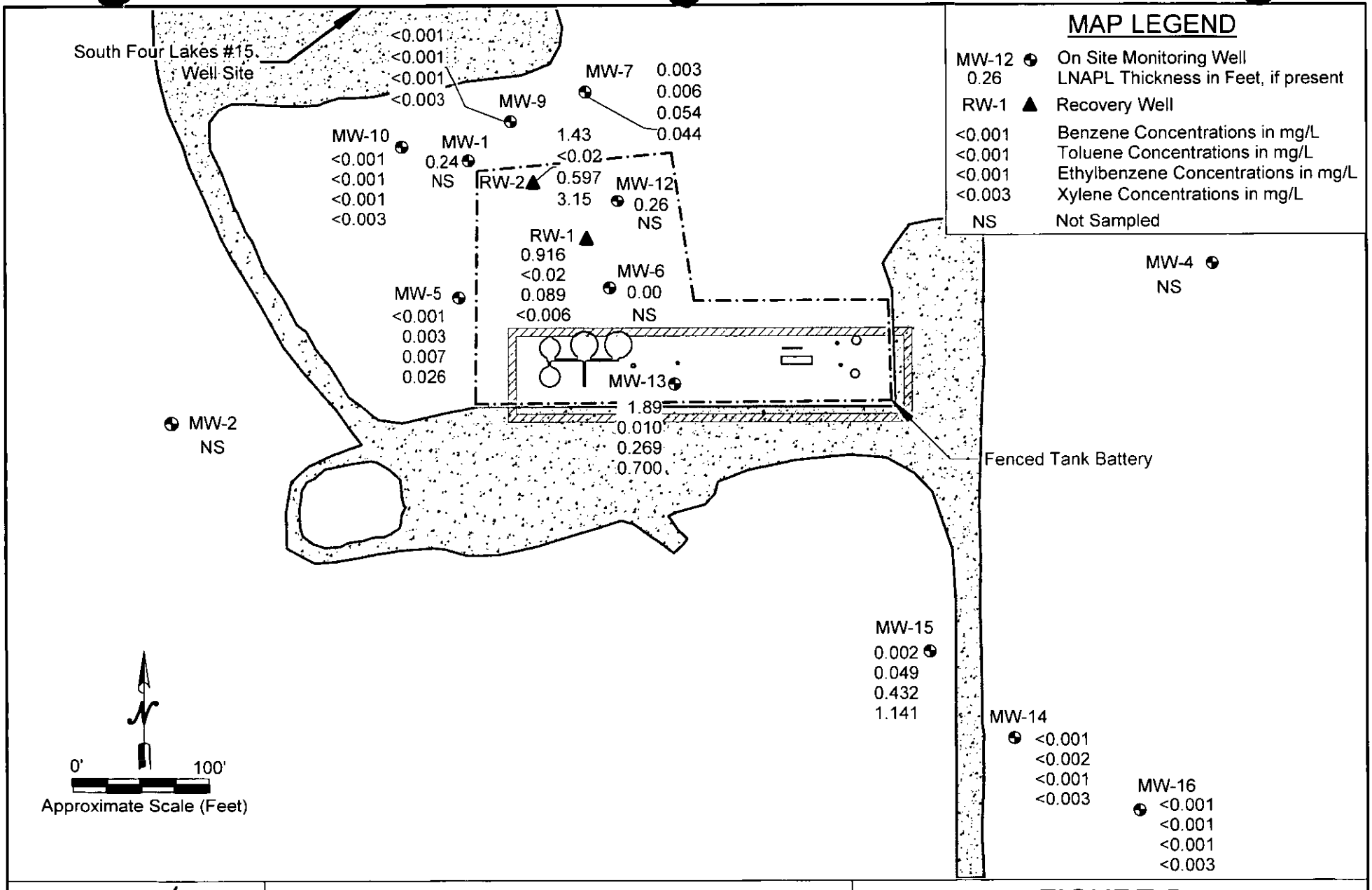
T12S - R34E - Section 2 (Lea County, NM)

*Pride Energy Company*

FIGURE 3
WATER TABLE ELEVATION MAP
July 12, 2014

**FIGURE 4**
**Groundwater Elevation Versus Time**





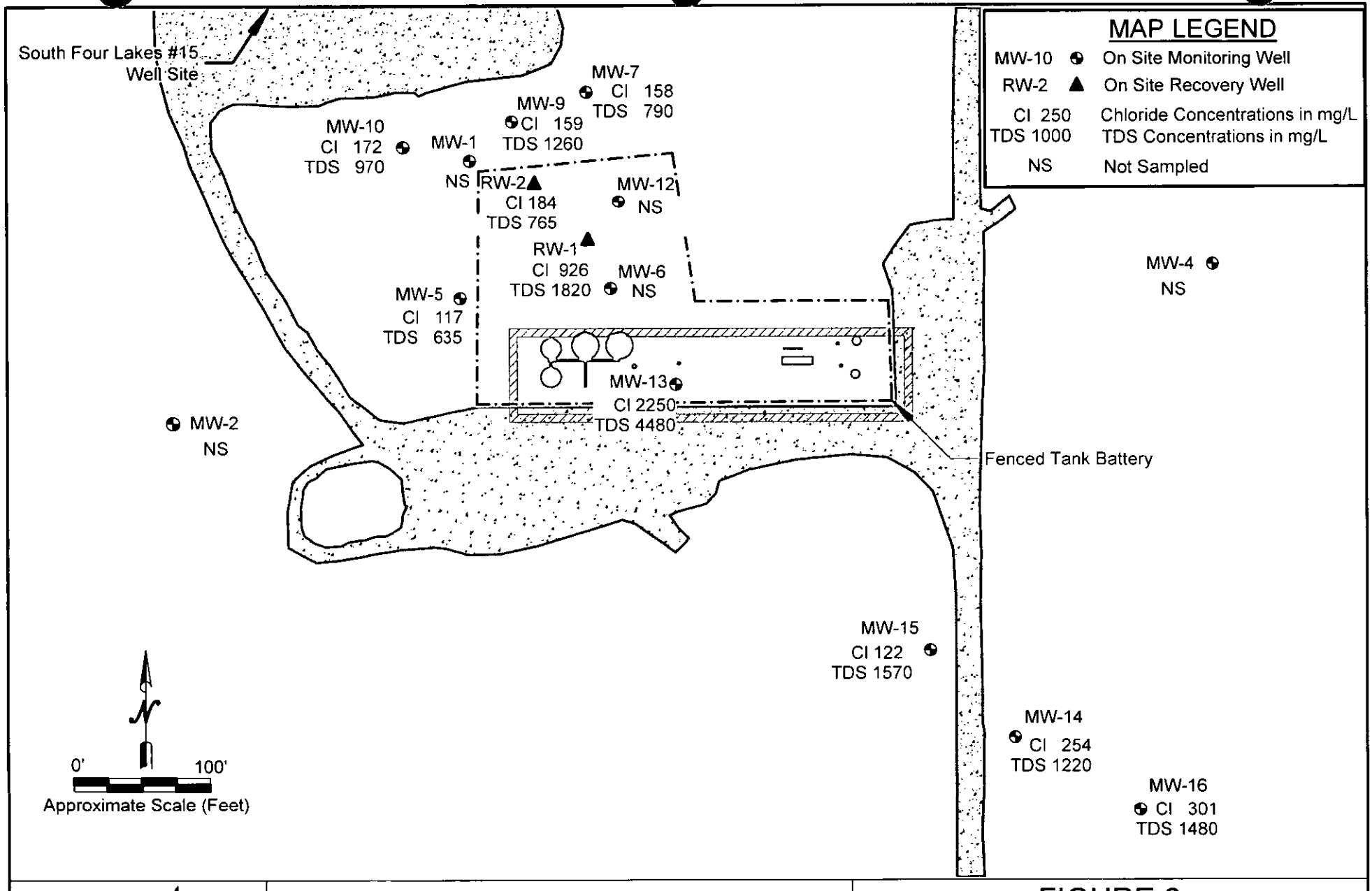

TRIDENT ENVIRONMENTAL

South Four Lakes Tank Battery (1R0204)

T12S - R34E - Section 2 (Lea County, NM)

*Pride Energy Company*

FIGURE 5
BTEX CONCENTRATION
AND LNAPL THICKNESS MAP
July 2-3, 2014



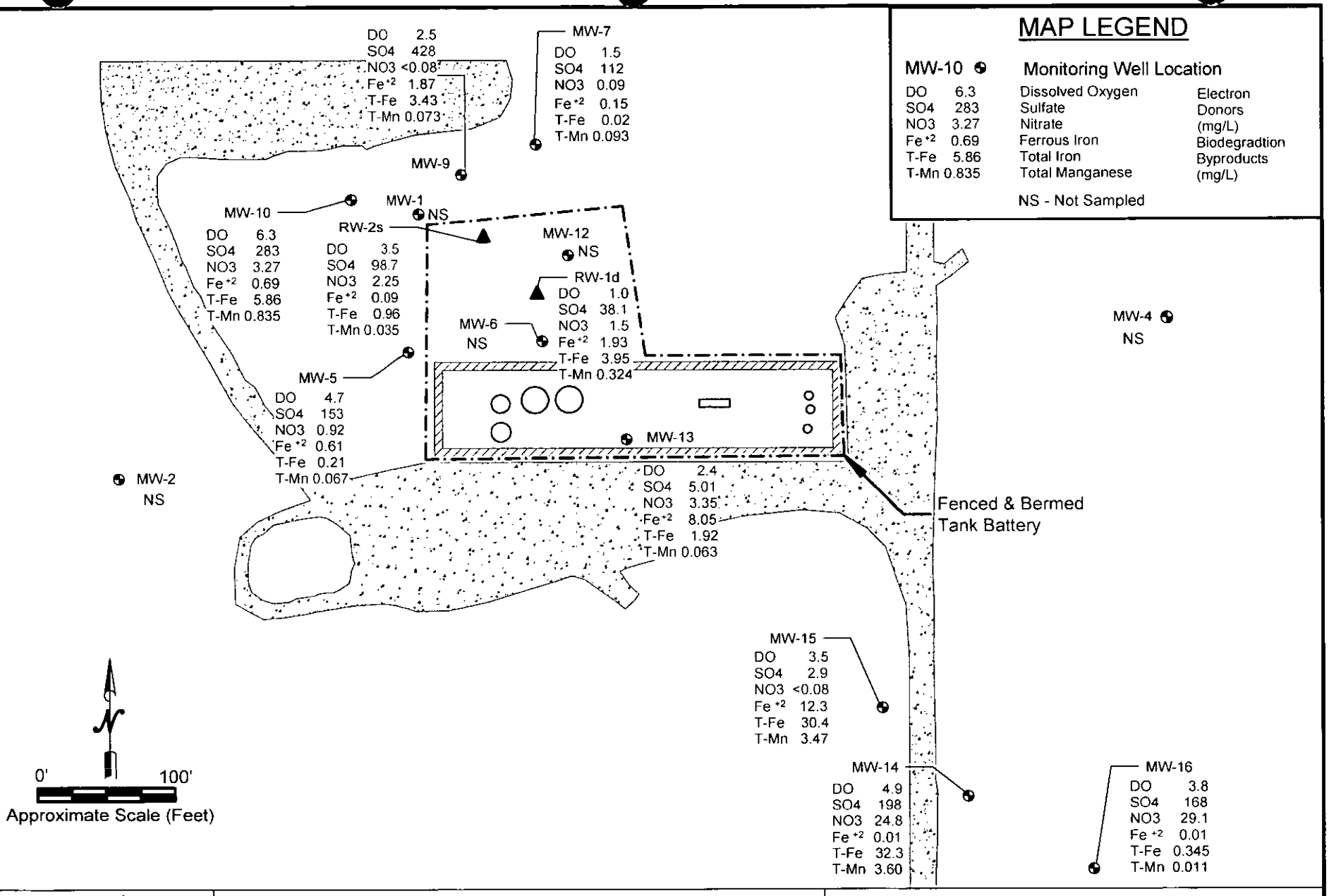

TRIDENT ENVIRONMENTAL

South Four Lakes Tank Battery (1R0204)

T12S - R34E - Section 2 (Lea County, NM)

*Pride Energy Company*

FIGURE 6
CHLORIDE AND TDS
CONCENTRATION MAP
July 2-3, 2014




TRIDENT ENVIRONMENTAL

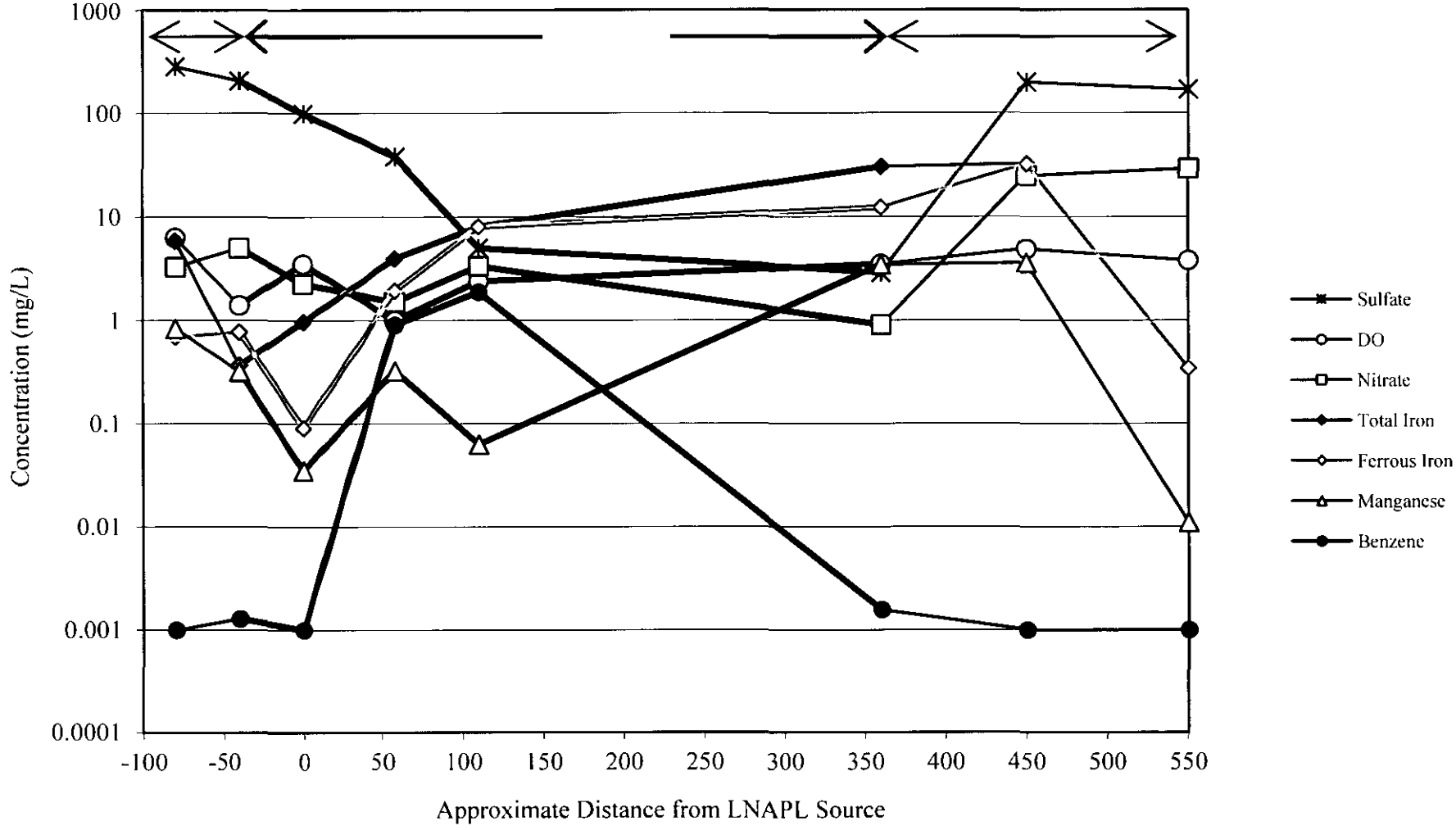
South Four Lakes Tank Battery (1R-204)

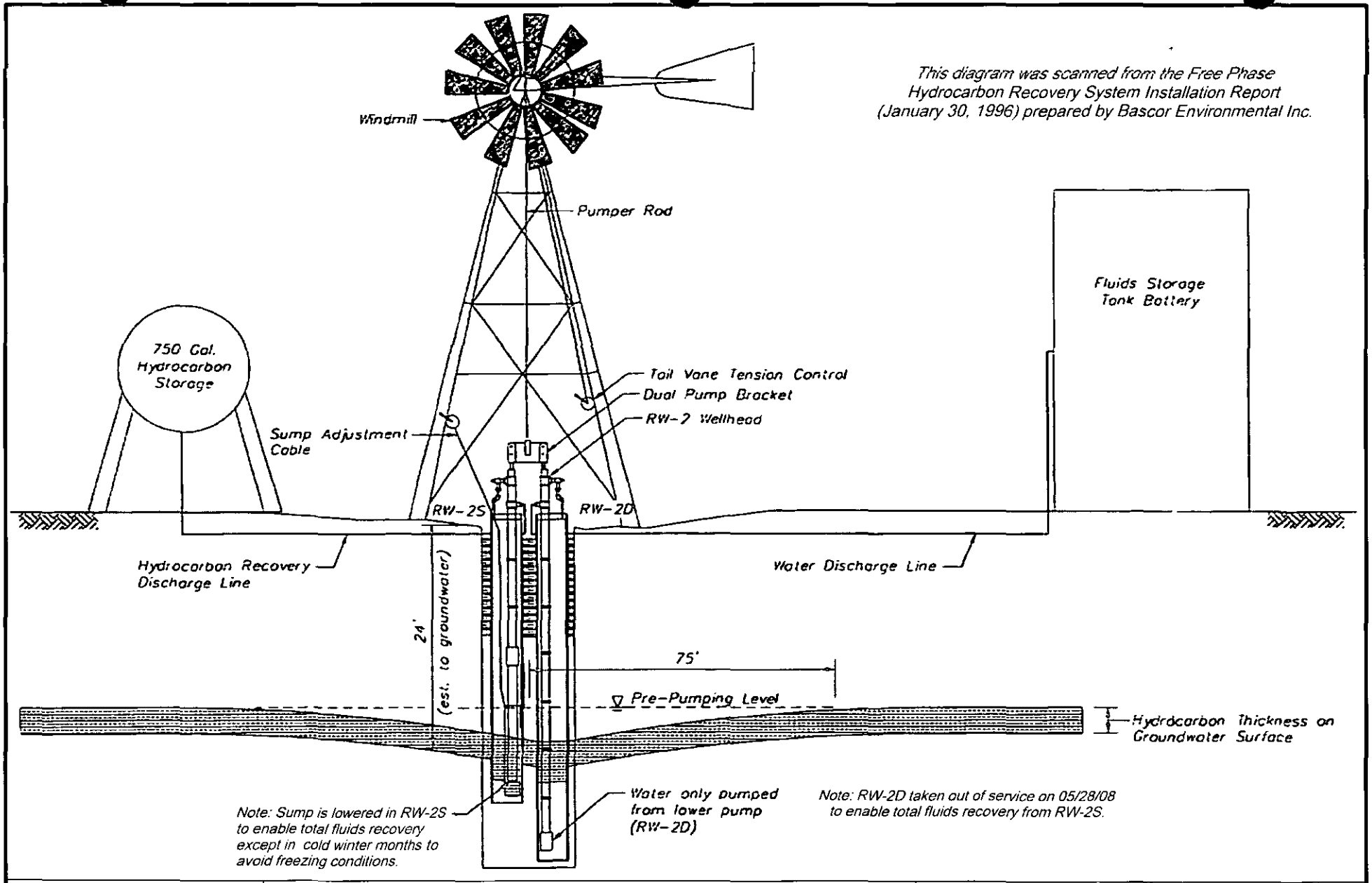
T12S - R34E - Section 2 (Lea County NM)

*Pride Energy Company*

FIGURE 7
BIODEGRADATION PARAMETERS
July 2-3, 2014

**FIGURE 8**
**Benzene and Biological Parameters Concentrations Versus Distance from Source Area**






TRIDENT ENVIRONMENTAL

South Four Lakes Tank Battery (1R0204)

T12S - R34E - Section 2 (Lea County, NM)

***Pride Energy Company***

FIGURE 9
WINDMILL RECOVERY SYSTEM DIAGRAM

***Figure 10***
**LNAPL Thickness Vs Time Graph**

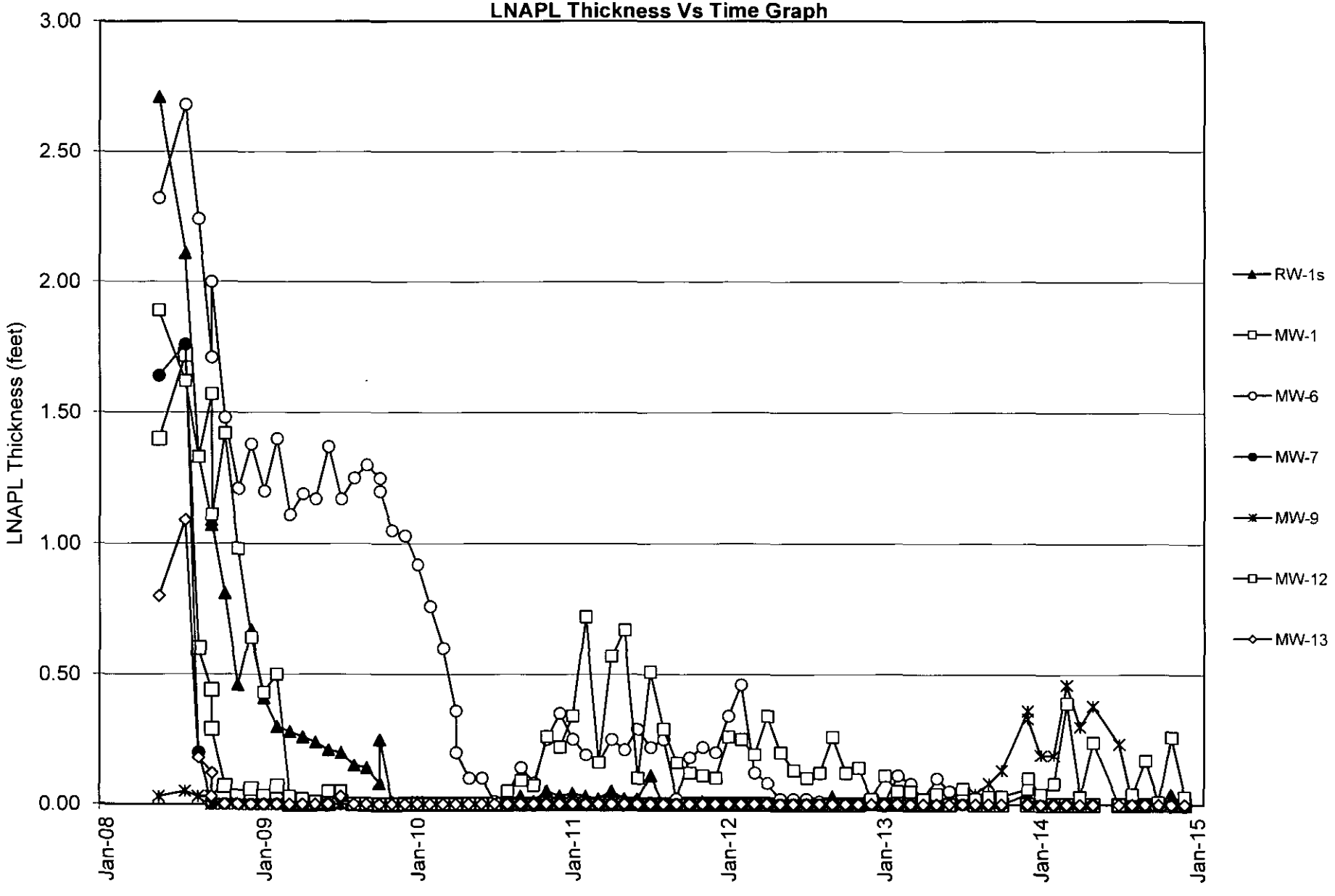
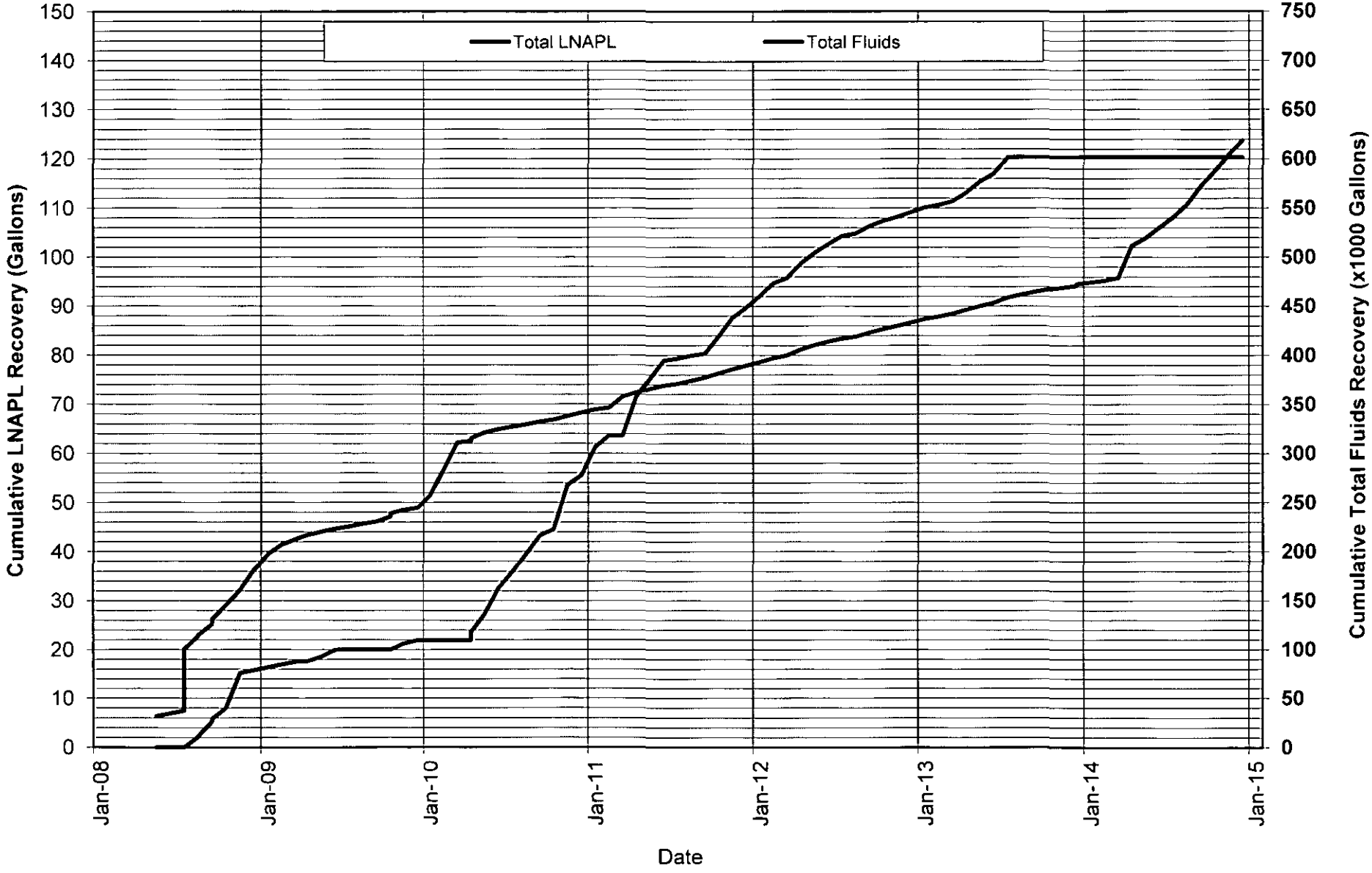


**Figure 11**
**Cumulative LNAPL and Total Fluids Recovery Vs Time Graph**



# TABLES

**Table 1**
**Summary of Groundwater Elevations**

| Monitoring Well | Sample Date | Top of Casing Elevation (feet) | Depth to Groundwater (feet BTOC) | LNAPL Thickness (feet) | Corrected Groundwater Elevation (feet AMSL) |
|---|---|---|---|---|---|
| MW-1 | 01/17/95 | 4149.13 | 26.37 | 1.96 | 4124.34 |
| | 10/10/95 | 4149.13 | NM | NM | 4124.04 |
| | 01/04/96 | 4149.13 | 27.40 | 2.74 | 4123.94 |
| | 04/16/96 | 4149.13 | 28.02 | 3.17 | 4123.67 |
| | 07/09/96 | 4149.13 | 27.96 | 3.17 | 4123.73 |
| | 10/15/96 | 4149.13 | 27.97 | 3.21 | 4123.75 |
| | 12/03/97 | 4149.13 | 27.98 | 2.80 | 4123.41 |
| | 03/13/08 | 4149.13 | 25.51 | 1.40 | 4124.75 |
| | 05/18/09 | 4149.13 | 25.10 | 0.00 | 4124.03 |
| | 05/26/10 | 4149.13 | 25.41 | 0.00 | 4123.72 |
| | 05/17/11 | 4149.13 | 25.75 | 0.00 | 4123.38 |
| | 06/19/12 | 4149.13 | 26.11 | 0.00 | 4123.02 |
| | 06/12/13 | 4149.13 | 26.43 | 0.00 | 4122.70 |
| | 07/02/14 | 4149.13 | 26.25 | 0.24 | 4123.07 |
| MW-2 | 01/04/95 | 4151.50 | 26.64 | 0.00 | 4124.86 |
| | 01/18/95 | 4151.50 | 26.61 | 0.00 | 4124.89 |
| | 10/10/95 | 4151.50 | 26.98 | 0.00 | 4124.52 |
| | 01/04/96 | 4151.50 | NM | NM | 4124.44 |
| | 04/16/96 | 4151.50 | 27.15 | 0.00 | 4124.35 |
| | 07/09/96 | 4151.50 | 27.28 | 0.00 | 4124.22 |
| | 10/15/96 | 4151.50 | 27.29 | 0.00 | 4124.21 |
| | 12/03/97 | 4151.50 | NM | NM | 4124.29 |
| | 03/13/08 | 4151.50 | 26.51 | 0.00 | 4124.99 |
| | 05/18/09 | 4151.50 | 27.08 | 0.00 | 4124.42 |
| | 05/26/10 | 4151.50 | 27.43 | 0.00 | 4124.07 |
| | 05/17/11 | 4151.50 | 27.74 | 0.00 | 4123.76 |
| | 06/19/12 | 4151.50 | 28.08 | 0.00 | 4123.42 |
| | 06/12/13 | 4151.50 | 28.39 | 0.00 | 4123.11 |
| | 07/02/14 | 4151.50 | 28.24 | 0.00 | 4123.26 |
| MW-4 | 01/18/95 | 4148.58 | 25.18 | 0.00 | 4123.40 |
| | 10/10/95 | 4148.58 | 25.54 | 0.00 | 4123.04 |
| | 01/04/96 | 4148.58 | NM | NM | 4122.98 |
| | 04/16/96 | 4148.58 | 25.68 | 0.00 | 4122.90 |
| | 07/09/96 | 4148.58 | 25.83 | 0.00 | 4122.75 |
| | 10/15/96 | 4148.58 | 25.78 | 0.00 | 4122.80 |
| | 12/03/97 | 4148.58 | 26.02 | 0.00 | 4122.56 |
| | 03/13/08 | 4148.58 | 24.88 | 0.00 | 4123.70 |
| | 05/18/09 | 4148.58 | 25.51 | 0.00 | 4123.07 |
| | 05/26/10 | 4148.58 | 25.81 | 0.00 | 4122.77 |
| | 05/17/11 | 4148.58 | 26.13 | 0.00 | 4122.45 |
| | 06/19/12 | 4148.58 | Dry | 0.00 | Dry |
| | 06/12/13 | 4148.58 | Dry | 0.00 | Dry |
| | 07/02/14 | 4148.58 | Dry | 0.00 | Dry |

**Table 1**
**Summary of Groundwater Elevations**

| Monitoring Well | Sample Date | Top of Casing Elevation (feet) | Depth to Groundwater (feet BTOC) | LNAPL Thickness (feet) | Corrected Groundwater Elevation (feet AMSL) |
|---|---|---|---|---|---|
| MW-5 | 01/18/95 | 4150.40 | 25.98 | 0.00 | 4124.42 |
| | 10/10/95 | 4150.40 | 26.33 | 0.00 | 4124.07 |
| | 01/04/96 | 4150.40 | NM | NM | 4123.97 |
| | 04/16/96 | 4150.40 | 26.54 | 0.00 | 4123.86 |
| | 07/09/96 | 4150.40 | 26.66 | 0.00 | 4123.74 |
| | 10/15/96 | 4150.40 | 26.61 | 0.00 | 4123.79 |
| | 12/03/97 | 4150.40 | 26.93 | 0.00 | 4123.47 |
| | 03/13/08 | 4150.40 | 25.74 | 0.00 | 4124.66 |
| | 05/18/09 | 4150.40 | 26.43 | 0.00 | 4123.97 |
| | 05/26/10 | 4150.40 | 26.73 | 0.00 | 4123.67 |
| | 05/17/11 | 4150.40 | 27.06 | 0.00 | 4123.34 |
| | 06/19/12 | 4150.40 | 27.44 | 0.00 | 4122.96 |
| | 06/12/13 | 4150.40 | 27.73 | 0.00 | 4122.67 |
| | 07/02/14 | 4150.40 | 27.43 | 0.00 | 4122.97 |
| MW-6 | 01/04/95 | 4149.90 | 28.88 | 3.68 | 4123.99 |
| | 10/10/95 | 4149.90 | NM | NM | 4123.98 |
| | 01/04/96 | 4149.90 | 29.53 | 4.46 | 4123.97 |
| | 04/16/96 | 4149.90 | 30.04 | 4.43 | 4123.44 |
| | 07/09/96 | 4149.90 | 30.04 | 4.52 | 4123.37 |
| | 10/15/96 | 4149.90 | 30.18 | 4.56 | 4123.40 |
| | 12/03/97 | 4149.90 | NM | NM | 4123.50 |
| | 03/13/08 | 4149.90 | 27.35 | 2.25 | 4124.37 |
| | 05/18/09 | 4149.90 | 27.30 | 1.17 | 4123.54 |
| | 05/26/10 | 4149.90 | 26.62 | 0.10 | 4123.36 |
| | 05/17/11 | 4149.90 | 27.05 | 0.21 | 4123.02 |
| | 06/19/12 | 4149.90 | 27.25 | 0.02 | 4122.67 |
| | 06/12/13 | 4149.90 | 27.63 | 0.05 | 4122.31 |
| | 07/02/14 | 4149.90 | 27.33 | 0.00 | 4122.57 |
| MW-7 | 01/18/95 | 4149.16 | 24.85 | 0.00 | 4124.31 |
| | 10/10/95 | 4149.16 | 25.17 | 0.00 | 4123.99 |
| | 01/04/96 | 4149.16 | NM | NM | 4123.88 |
| | 04/16/96 | 4149.16 | 25.42 | 0.00 | 4123.74 |
| | 07/09/96 | 4149.16 | 25.50 | 0.00 | 4123.66 |
| | 10/15/96 | 4149.16 | 25.48 | 0.00 | 4123.68 |
| | 12/03/97 | 4149.16 | 25.78 | 0.00 | 4123.38 |
| | 03/13/08 | 4149.16 | 25.87 | 1.62 | 4124.60 |
| | 05/18/09 | 4149.16 | 25.23 | 0.00 | 4123.93 |
| | 05/26/10 | 4149.16 | 25.56 | 0.00 | 4123.60 |
| | 05/17/11 | 4149.16 | 25.88 | 0.00 | 4123.28 |
| | 06/19/12 | 4149.16 | 26.27 | 0.00 | 4122.89 |
| | 06/12/13 | 4149.16 | 26.55 | 0.00 | 4122.61 |
| | 07/02/14 | 4149.16 | 26.15 | 0.00 | 4123.01 |
| MW-8 | 01/18/95 | 4148.81 | 24.66 | 0.00 | 4124.15 |
| | 10/10/95 | 4148.81 | 24.66 | 0.00 | 4124.15 |
| | Well removed to allow excavation and solidification of pit. | | | | |

**Table 1**
**Summary of Groundwater Elevations**

| Monitoring Well | Sample Date | Top of Casing Elevation (feet) | Depth to Groundwater (feet BTOC) | LNAPL Thickness (feet) | Corrected Groundwater Elevation (feet AMSL) |
|---|---|---|---|---|---|
| MW-9 | 01/18/95 | 4149.63 | 25.16 | 0.00 | 4124.47 |
| | 10/10/95 | 4149.63 | 25.52 | 0.00 | 4124.11 |
| | 01/04/96 | 4149.63 | NM | NM | 4123.96 |
| | 04/16/96 | 4149.63 | 25.84 | 0.00 | 4123.79 |
| | 07/09/96 | 4149.63 | 25.84 | 0.00 | 4123.79 |
| | 10/15/96 | 4149.63 | 25.83 | 0.00 | 4123.80 |
| | 12/03/97 | 4149.63 | 26.14 | 0.00 | 4123.49 |
| | 03/13/08 | 4149.63 | 24.91 | 0.03 | 4124.74 |
| | 05/18/09 | 4149.63 | 25.61 | 0.00 | 4124.02 |
| | 05/26/10 | 4149.63 | 25.93 | 0.00 | 4123.70 |
| | 05/17/11 | 4149.63 | 26.25 | 0.00 | 4123.38 |
| | 06/19/12 | 4149.63 | 26.63 | 0.00 | 4123.00 |
| | 06/12/13 | 4149.63 | 26.92 | 0.00 | 4122.71 |
| | 07/02/14 | 4149.63 | 26.55 | 0.00 | 4123.08 |
| MW-10 | 01/18/95 | 4149.98 | 25.16 | 0.00 | 4124.82 |
| | 10/10/95 | 4149.98 | 25.52 | 0.00 | 4124.46 |
| | 01/04/96 | 4149.98 | NM | NM | 4124.21 |
| | 04/16/96 | 4149.98 | 26.07 | 0.00 | 4123.91 |
| | 07/09/96 | 4149.98 | 26.12 | 0.00 | 4123.86 |
| | 10/15/96 | 4149.98 | 26.08 | 0.00 | 4123.90 |
| | 12/03/97 | 4149.98 | 26.41 | 0.00 | 4123.57 |
| | 03/13/08 | 4149.98 | 25.21 | 0.00 | 4124.77 |
| | 05/18/09 | 4149.98 | 25.88 | 0.00 | 4124.10 |
| | 05/26/10 | 4149.98 | 26.20 | 0.00 | 4123.78 |
| | 05/17/11 | 4149.98 | 26.54 | 0.00 | 4123.44 |
| | 06/19/12 | 4149.98 | 26.91 | 0.00 | 4123.07 |
| | 06/12/13 | 4149.98 | 27.29 | 0.00 | 4122.69 |
| | 07/02/14 | 4149.98 | 26.85 | 0.00 | 4123.13 |
| RW-11 | 01/04/95 | 4149.86 | 28.40 | 3.22 | 4124.06 |
| | 01/17/95 | 4149.86 | 28.76 | 3.69 | 4124.08 |
| | Well removed to allow excavation and solidification of pit. | | | | |
| MW-12 | 01/04/95 | 4149.15 | 25.30 | 0.35 | 4124.13 |
| | 01/17/95 | 4149.15 | 25.58 | 0.73 | 4124.16 |
| | 10/10/95 | 4149.15 | NM | NM | 4123.84 |
| | 01/04/96 | 4149.15 | 28.70 | 4.07 | 4123.74 |
| | 04/16/96 | 4149.15 | 29.98 | 5.04 | 4123.24 |
| | 07/09/96 | 4149.15 | 29.08 | 4.12 | 4123.40 |
| | 10/15/96 | 4149.15 | 28.94 | 3.99 | 4123.43 |
| | 12/03/97 | 4149.15 | 29.06 | 3.82 | 4123.17 |
| | 03/13/08 | 4149.15 | 26.20 | 1.83 | 4124.43 |
| | 05/18/09 | 4149.15 | 25.41 | 0.01 | 4123.75 |
| | 05/26/10 | 4149.15 | 25.70 | 0.00 | 4123.45 |
| | 05/17/11 | 4149.15 | 26.60 | 0.67 | 4123.09 |
| | 06/19/12 | 4149.15 | 26.53 | 0.13 | 4122.72 |
| | 06/12/13 | 4149.15 | 26.71 | 0.00 | 4122.44 |
| | 07/02/14 | 4149.15 | 26.55 | 0.26 | 4122.81 |

**Table 1**
**Summary of Groundwater Elevations**

| Monitoring Well | Sample Date | Top of Casing Elevation (feet) | Depth to Groundwater (feet BTOC) | LNAPL Thickness (feet) | Corrected Groundwater Elevation (feet AMSL) |
|---|---|---|---|---|---|
| MW-13 | 01/18/95 | 4150.31 | 26.39 | 0.00 | 4123.92 |
| | 10/10/95 | 4150.31 | 26.76 | 0.00 | 4123.55 |
| | 01/04/96 | 4150.31 | NM | NM | 4123.34 |
| | 04/16/96 | 4150.31 | 27.22 | 0.00 | 4123.09 |
| | 07/09/96 | 4150.31 | 27.27 | 0.00 | 4123.04 |
| | 10/15/96 | 4150.31 | 27.20 | 0.00 | 4123.11 |
| | 12/03/97 | 4150.31 | 27.39 | 0.00 | 4122.92 |
| | 03/13/08 | 4150.31 | 26.81 | 0.75 | 4124.11 |
| | 05/18/09 | 4150.31 | 26.82 | 0.00 | 4123.49 |
| | 05/26/10 | 4150.31 | 27.11 | 0.00 | 4123.20 |
| | 05/17/11 | 4150.31 | 27.50 | 0.00 | 4122.81 |
| | 06/19/12 | 4150.31 | 27.88 | 0.00 | 4122.43 |
| | 06/12/13 | 4150.31 | 28.19 | 0.00 | 4122.12 |
| | 07/02/14 | 4150.31 | 27.86 | 0.00 | 4122.45 |
| MW-14 | 10/11/95 | 4151.83 | 28.93 | 0.00 | 4122.90 |
| | 01/04/96 | 4151.83 | NM | NM | 4122.85 |
| | 04/16/96 | 4151.83 | 29.05 | 0.00 | 4122.78 |
| | 07/09/96 | 4151.83 | 29.23 | 0.00 | 4122.60 |
| | 10/15/96 | 4151.83 | 29.21 | 0.00 | 4122.62 |
| | 12/03/97 | 4151.83 | 29.42 | 0.00 | 4122.41 |
| | 03/13/08 | 4151.83 | 28.27 | 0.00 | 4123.56 |
| | 05/18/09 | 4151.83 | 28.94 | 0.00 | 4122.89 |
| | 05/26/10 | 4151.83 | 29.26 | 0.00 | 4122.57 |
| | 05/17/11 | 4151.83 | 29.60 | 0.00 | 4122.23 |
| | 06/19/12 | 4151.83 | 29.98 | 0.00 | 4121.85 |
| | 06/12/13 | 4151.83 | 30.27 | 0.00 | 4121.56 |
| | 07/02/14 | 4151.83 | 30.06 | 0.00 | 4121.77 |
| MW-15 | 10/11/95 | 4150.63 | 27.47 | 0.00 | 4123.16 |
| | 01/04/96 | 4150.63 | NM | NM | 4123.09 |
| | 04/16/96 | 4150.63 | 27.62 | 0.00 | 4123.01 |
| | 07/09/96 | 4150.63 | 27.78 | 0.00 | 4122.85 |
| | 10/15/96 | 4150.63 | 27.75 | 0.00 | 4122.88 |
| | 12/03/97 | 4150.63 | 28.01 | 0.00 | 4122.62 |
| | 03/13/08 | 4150.63 | 26.84 | 0.00 | 4123.79 |
| | 05/18/09 | 4150.63 | 27.54 | 0.00 | 4123.09 |
| | 05/26/10 | 4150.63 | 27.82 | 0.00 | 4122.81 |
| | 05/17/11 | 4150.63 | 28.17 | 0.00 | 4122.46 |
| | 06/19/12 | 4150.63 | 28.58 | 0.00 | 4122.05 |
| | 06/12/13 | 4150.63 | 28.87 | 0.00 | 4121.76 |
| | 07/02/14 | 4150.63 | 28.59 | 0.00 | 4122.04 |

**Table 1**

**Summary of Groundwater Elevations**

| Monitoring Well | Sample Date | Top of Casing Elevation (feet) | Depth to Groundwater (feet BTOC) | LNAPL Thickness (feet) | Corrected Groundwater Elevation (feet AMSL) |
|---|---|---|---|---|---|
| MW-16 | 10/11/95 | 4151.34 | 28.59 | 0.00 | 4122.75 |
| | 01/04/96 | 4151.34 | NM | NM | 4122.68 |
| | 04/16/96 | 4151.34 | 28.74 | 0.00 | 4122.60 |
| | 07/09/96 | 4151.34 | 28.92 | 0.00 | 4122.42 |
| | 10/15/96 | 4151.34 | 28.89 | 0.00 | 4122.45 |
| | 12/03/97 | 4151.34 | 29.10 | 0.00 | 4122.24 |
| | 03/13/08 | 4151.34 | 27.94 | 0.00 | 4123.40 |
| | 05/18/09 | 4151.34 | 28.62 | 0.00 | 4122.72 |
| | 05/26/10 | 4151.34 | 28.93 | 0.00 | 4122.41 |
| | 05/17/11 | 4151.34 | 29.26 | 0.00 | 4122.08 |
| | 06/19/12 | 4151.34 | 29.65 | 0.00 | 4121.69 |
| | 06/12/13 | 4151.34 | 29.93 | 0.00 | 4121.41 |
| | 07/02/14 | 4151.34 | 29.75 | 0.00 | 4121.59 |
| RW-1s | 01/04/96 | NM | DNA | 0.15 | DNA |
| | 04/16/96 | NM | DNA | 3.58 | DNA |
| | 07/09/96 | NM | DNA | 4.72 | DNA |
| | 10/15/96 | NM | DNA | 4.67 | DNA |
| | 12/03/97 | NM | DNA | 4.26 | DNA |
| | 03/13/08 | NM | DNA | 2.71 | DNA |
| | 05/18/09 | NM | DNA | 0.24 | DNA |
| | 05/26/10 | NM | 24.99 | 0.00 | DNA |
| | 05/17/11 | NM | 25.37 | 0.02 | DNA |
| | 06/19/12 | NM | 25.71 | 0.00 | DNA |
| | 06/12/13 | NM | 26.13 | 0.00 | DNA |
| | 07/02/14 | NM | 25.92 | 0.00 | DNA |
| RW-2s | 01/04/96 | NM | DNA | 3.50 | DNA |
| | 03/13/08 | NM | NM | 1.77 | DNA |
| | 05/18/09 | NM | 24.97 | 0.24 | DNA |
| | 05/26/10 | NM | 25.15 | 0.00 | DNA |
| | 05/17/11 | NM | NM | NM | DNA |
| | 06/19/12 | NM | NM | NM | DNA |
| | 06/12/13 | NM | NM | NM | DNA |
| | 07/02/14 | NM | 26.08 | 0.20 | DNA |

NM = Not Measured: DNA - Data Not Available

AMSL - Above Mean Sea Level: BTOC - Below Top of Casing, LNAPL - Light Non-Aqueous Phased Liquids

Gauging data, laboratory results, and elevations for MW-1 through MW-16 obtained from previously published reports submitted by Phillips Petrleum Co.

**Table 2**

**Summary of Regulated Constituent Concentrations**

| Monitoring Well | Sample Date | LNAPL Thickness (feet) | Benzene (mg/L) | Toluene (mg/L) | Ethylbenzene (mg/L) | Xylenes (mg/L) | Chloride (mg/L) | TDS (mg/L) |
|---|---|---|---|---|---|---|---|---|
| MW-1 | Oct-90 | 0.00 | <0.010 | 0.039 | 0.100 | 0.390 | NA | NA |
| | 01/04/96 | 2.74 | **0.260** | 0.730 | 0.450 | **2.72** | 120 | 680 |
| | 04/16/96 | 3.17 | **0.051** | 0.270 | 0.340 | **2.19** | 150 | 750 |
| | 07/09/96 | 3.17 | NA | NA | NA | NA | 160 | 800 |
| | 10/15/96 | 3.21 | NA | NA | NA | NA | 170 | **1,300** |
| | 12/03/97 | 2.80 | NA | NA | NA | NA | 100 | 650 |
| | 05/19/09 | 0.00 | **0.01** | 0.009 | 0.156 | 0.209 | 168 | 792 |
| | 05/26/10 | 0.00 | 0.002 | 0.004 | 0.036 | 0.045 | 144 | 594 |
| | 05/17/11 | 0.00 | <0.005 | <0.01 | 0.153 | 0.105 | **316** | **1,000** |
| | 06/19/12 | 0.00 | 0.005 | 0.012 | 0.170 | 0.023 | 177 | 570 |
| | 06/13/13 | 0.00 | 0.001 | 0.004 | 0.076 | 0.089 | 117 | 635 |
| | 07/03/14 | 0.24 | NS | NS | NS | NS | NS | NS |
| MW-2 | Oct-90 | 0.00 | <0.001 | <0.001 | <0.001 | <0.001 | NA | NA |
| | 01/04/95 | 0.00 | NS | NS | NS | NS | NS | NS |
| | 01/18/95 | 0.00 | <0.001 | <0.001 | <0.001 | <0.001 | 109 | 760 |
| | 10/10/95 | 0.00 | NS | NS | NS | NS | NS | NS |
| | 01/04/96 | NM | <0.001 | <0.001 | <0.001 | <0.001 | 80 | 680 |
| | 04/16/96 | 0.00 | <0.001 | <0.001 | <0.001 | <0.001 | 80 | 700 |
| | 07/09/96 | 0.00 | <0.001 | <0.001 | <0.001 | <0.001 | 84 | 680 |
| | 10/15/96 | 0.00 | <0.001 | <0.001 | <0.001 | <0.001 | 79 | 680 |
| | 12/03/97 | NM | NMOCD approved request to discontinue annual sampling. | | | | | |
| | 03/13/08 | 0.00 | <0.001 | <0.002 | <0.001 | <0.003 | 116 | **1,020** |
| MW-4 | Oct-90 | 0.00 | <0.001 | <0.001 | <0.001 | <0.001 | NA | NA |
| | 01/18/95 | 0.00 | <0.001 | <0.001 | <0.001 | <0.001 | **790** | **1,880** |
| | 10/10/95 | 0.00 | NS | NS | NS | NS | NS | NS |
| | 01/04/96 | NM | <0.001 | <0.001 | <0.001 | <0.001 | **460** | **1,300** |
| | 04/16/96 | 0.00 | <0.001 | <0.001 | <0.001 | 0.001 | **450** | **1,300** |
| | 07/09/96 | 0.00 | <0.001 | <0.001 | <0.001 | <0.001 | **460** | **1,200** |
| | 10/15/96 | 0.00 | <0.001 | <0.001 | <0.001 | <0.001 | **460** | **1,200** |
| | 12/03/97 | 0.00 | NMOCD approved request to discontinue annual sampling. | | | | | |
| | 03/13/08 | 0.00 | <0.001 | <0.002 | <0.001 | <0.003 | 243 | 868 |
| MW-5 | 01/18/95 | 0.00 | <0.001 | <0.001 | <0.001 | <0.001 | 49 | 497 |
| | 10/10/95 | 0.00 | NS | NS | NS | NS | NS | NS |
| | 01/04/96 | NM | <0.001 | <0.001 | <0.001 | <0.001 | 41 | 500 |
| | 04/16/96 | 0.00 | <0.001 | <0.001 | <0.001 | <0.001 | 40 | 490 |
| | 07/09/96 | 0.00 | <0.001 | <0.001 | <0.001 | <0.001 | 38 | 470 |
| | 10/15/96 | 0.00 | <0.001 | <0.001 | <0.001 | <0.001 | 36 | 500 |
| | 12/03/97 | 0.00 | <0.001 | <0.001 | <0.001 | <0.001 | 37 | 450 |
| | 03/13/08 | 0.00 | 0.003 | 0.021 | 0.081 | 0.466 | 173 | 724 |
| | 05/18/09 | 0.00 | 0.002 | 0.007 | 0.025 | 0.065 | **364** | **1,100** |
| | 05/25/10 | 0.00 | **0.448** | <0.04 | 0.121 | **0.776** | **372** | **1,180** |
| | 05/17/11 | 0.00 | <0.005 | <0.01 | <0.005 | <0.01 | **547** | **1,170** |
| | 06/19/12 | 0.00 | 0.003 | 0.010 | 0.027 | 0.030 | **389** | **1,220** |
| | 06/13/13 | 0.00 | <0.001 | 0.001 | 0.002 | 0.003 | **372** | **1,220** |
| | 07/03/14 | 0.00 | <0.001 | 0.003 | 0.007 | 0.026 | 117 | **635** |

**Table 2**

**Summary of Regulated Constituent Concentrations**

| Monitoring Well | Sample Date | LNAPL Thickness (feet) | Benzene (mg/L) | Toluene (mg/L) | Ethylbenzene (mg/L) | Xylenes (mg/L) | Chloride (mg/L) | TDS (mg/L) |
|---|---|---|---|---|---|---|---|---|
| MW-6 | 01/04/95 | 3.68 | NS | NS | NS | NS | NS | NS |
| | 10/10/95 | NM | NS | NS | NS | NS | NS | NS |
| | 01/04/96 | 4.08 | **9.10** | **11.0** | **0.93** | **5.30** | **1,400** | **3,700** |
| | 04/16/96 | 4.43 | **13.0** | **19.0** | **5.00** | **24.5** | **1,200** | **2,600** |
| | 07/09/96 | 4.52 | NA | NA | NA | NA | **1,100** | **2,500** |
| | 10/15/96 | 4.56 | NA | NA | NA | NA | **890** | **2,500** |
| | 12/03/97 | NM | NA | NA | NA | NA | **720** | **1,700** |
| | 03/13/08 | 2.25 | NS | NS | NS | NS | NS | NS |
| | 05/18/09 | 1.17 | NS | NS | NS | NS | NS | NS |
| | 05/25/10 | 0.10 | NS | NS | NS | NS | NS | NS |
| | 05/17/11 | 0.21 | NS | NS | NS | NS | NS | NS |
| | 06/19/12 | 0.02 | NS | NS | NS | NS | NS | NS |
| | 06/13/13 | 0.05 | NS | NS | NS | NS | NS | NS |
| | 07/03/14 | 0.00 | NS | NS | NS | NS | NS | NS |
| MW-7 | 01/18/95 | 0.00 | **0.013** | <0.001 | 0.026 | <0.001 | **255** | **1,190** |
| | 10/10/95 | 0.00 | NS | NS | NS | NS | NS | NS |
| | 01/04/96 | NM | 0.006 | <0.001 | 0.013 | <0.001 | 210 | 900 |
| | 04/16/96 | 0.00 | 0.004 | <0.001 | 0.011 | <0.001 | 180 | 920 |
| | 07/09/96 | 0.00 | 0.003 | <0.001 | 0.010 | <0.001 | 110 | 730 |
| | 10/15/96 | 0.00 | 0.005 | <0.001 | 0.015 | <0.001 | 120 | 720 |
| | 12/03/97 | 0.00 | 0.002 | <0.001 | <0.001 | <0.001 | 69 | 620 |
| | 03/13/08 | 1.62 | NS | NS | NS | NS | NS | NS |
| | 05/19/09 | 0.00 | 0.005 | 0.015 | 0.065 | 0.137 | **332** | **1,330** |
| | 05/25/10 | 0.00 | **0.022** | 0.112 | 0.050 | 0.083 | **362** | **1,240** |
| | 05/17/11 | 0.00 | <0.005 | <0.01 | 0.008 | <0.01 | 189 | 952 |
| | 06/19/12 | 0.00 | 0.003 | 0.006 | 0.032 | 0.004 | **332** | **1,510** |
| | 06/13/13 | 0.00 | <0.001 | 0.001 | 0.002 | 0.002 | 192 | 830 |
| | 07/03/14 | 0.00 | 0.003 | 0.006 | 0.054 | 0.044 | 158 | 790 |
| MW-8 | 01/18/95 | 0.00 | **0.740** | <0.001 | 0.100 | 0.330 | **563** | **1,460** |
| | 10/10/95 | 0.00 | NS | NS | NS | NS | NS | NS |
| | Nov-95 | Well removed to allow excavation and solidification of pit. | | | | | | |
| MW-9 | 01/18/95 | 0.00 | <0.001 | <0.001 | <0.001 | <0.001 | 58 | 636 |
| | 10/10/95 | 0.00 | <0.001 | <0.001 | <0.001 | <0.001 | NA | NA |
| | 01/04/96 | NM | <0.001 | <0.001 | <0.001 | <0.001 | 54 | 620 |
| | 04/16/96 | 0.00 | <0.001 | <0.001 | <0.001 | <0.001 | 58 | 630 |
| | 07/09/96 | DNA | <0.001 | <0.001 | <0.001 | <0.001 | 57 | 640 |
| | 10/15/96 | DNA | <0.001 | <0.001 | <0.001 | <0.001 | 58 | 620 |
| | 12/03/97 | 0.00 | <0.001 | <0.001 | <0.001 | <0.001 | 54 | 630 |
| | 03/13/08 | 0.03 | NS | NS | NS | NS | NS | NS |
| | 05/19/09 | 0.00 | <0.001 | 0.005 | 0.015 | 0.089 | 76 | 628 |
| | 05/25/10 | 0.00 | <0.001 | <0.002 | 0.005 | 0.014 | 149 | 630 |
| | 05/17/11 | 0.00 | <0.005 | <0.01 | 0.002 | 0.008 | 134 | 666 |
| | 06/19/12 | 0.00 | <0.001 | <0.001 | <0.001 | <0.003 | **412** | **1,220** |
| | 06/13/13 | 0.00 | <0.001 | 0.001 | <0.001 | <0.003 | **329** | **1,360** |
| | 07/03/14 | 0.00 | <0.001 | <0.001 | <0.001 | <0.003 | 159 | **1,260** |

**Table 2**

**Summary of Regulated Constituent Concentrations**

| Monitoring Well | Sample Date | LNAPL Thickness (feet) | Benzene (mg/L) | Toluene (mg/L) | Ethylbenzene (mg/L) | Xylenes (mg/L) | Chloride (mg/L) | TDS (mg/L) |
|---|---|---|---|---|---|---|---|---|
| MW-10 | 01/18/95 | 0.00 | <0.001 | <0.001 | <0.001 | <0.001 | **359** | **1,190** |
| | 10/10/95 | 0.00 | NS | NS | NS | NS | NS | NS |
| | 01/04/96 | NM | <0.001 | <0.001 | <0.001 | <0.001 | **290** | **1,100** |
| | 04/16/96 | 0.00 | <0.001 | <0.001 | <0.001 | <0.001 | **260** | 970 |
| | 07/09/96 | DNA | <0.001 | <0.001 | <0.001 | <0.001 | **260** | **1,000** |
| | 10/15/96 | DNA | <0.001 | <0.001 | <0.001 | <0.001 | **260** | **1,000** |
| | 12/03/97 | 0.00 | <0.001 | <0.001 | <0.001 | <0.001 | 140 | 720 |
| | 03/13/08 | 0.00 | <0.001 | <0.002 | <0.001 | <0.003 | **377** | **1,362** |
| | 05/18/09 | 0.00 | <0.001 | <0.001 | <0.001 | <0.003 | **320** | **1,100** |
| | 05/25/10 | 0.00 | <0.001 | <0.002 | <0.001 | <0.002 | **287** | 870 |
| | 05/17/11 | 0.00 | <0.005 | <0.01 | <0.005 | <0.01 | **471** | **1,510** |
| | 06/19/12 | 0.00 | <0.001 | <0.001 | <0.001 | <0.003 | **312** | **1,240** |
| | 06/13/13 | 0.00 | <0.001 | <0.001 | <0.001 | 0.006 | 213 | **1,120** |
| | 07/03/14 | 0.00 | <0.001 | <0.001 | <0.001 | <0.003 | 172 | 970 |
| RW-11 | 01/04/95 | 3.22 | NS | NS | NS | NS | NS | NS |
| | 01/17/95 | 3.69 | NS | NS | NS | NS | NS | NS |
| | Nov-95 | Well removed to allow excavation and solidification of pit. | | | | | | |
| MW-12 | 01/04/95 | 0.35 | NS | NS | NS | NS | NS | NS |
| | 01/17/95 | 0.73 | NS | NS | NS | NS | NS | NS |
| | 10/10/95 | NM | NS | NS | NS | NS | NS | NS |
| | 01/04/96 | 4.07 | ***7.20*** | ***6.10*** | ***1.50*** | ***7.40*** | ***1,700*** | ***3,600*** |
| | 04/16/96 | 5.04 | **11.0** | **11.0** | **1.10** | **6.50** | **2,100** | **4,300** |
| | 07/09/96 | 4.12 | NA | NA | NA | NA | **1,900** | **4,200** |
| | 10/15/96 | 3.99 | NA | NA | NA | NA | **2,000** | **4,300** |
| | 12/03/97 | 3.82 | NA | NA | NA | NA | **810** | **1,400** |
| | 03/13/08 | 1.83 | NS | NS | NS | NS | NS | NS |
| | 05/18/09 | 0.01 | NS | NS | NS | NS | NS | NS |
| | 05/26/10 | 0.00 | **1.10** | <0.04 | 0.257 | 0.349 | **394** | **1,120** |
| | 05/17/11 | 0.67 | NS | NS | NS | NS | NS | NS |
| | 06/19/12 | 0.13 | NS | NS | NS | NS | NS | NS |
| | 06/13/13 | 0.00 | NS | NS | NS | NS | NS | NS |
| | 07/03/14 | 0.26 | NS | NS | NS | NS | NS | NS |
| MW-13 | 01/18/95 | 0.00 | **2.2** | <0.001 | 0.36 | **1.60** | **647** | **1,640** |
| | 01/04/96 | NM | **2.4** | 0.022 | 0.330 | **1.59** | **560** | **1,500** |
| | 04/16/96 | 0.00 | **2.4** | 0.014 | 0.370 | **1.70** | **540** | **1,500** |
| | 07/09/96 | 0.00 | **2.2** | 0.034 | 0.430 | **1.82** | **560** | **1,500** |
| | 10/15/96 | 0.00 | **2.1** | 0.097 | 0.350 | **1.71** | **530** | **1,400** |
| | 12/03/97 | 0.00 | **0.92** | 0.140 | 0.160 | 0.570 | **560** | **1,500** |
| | 05/19/09 | 0.00 | **1.00** | 0.015 | 0.414 | **1.60** | **1,600** | **3,860** |
| | 05/26/10 | 0.00 | **0.247** | <0.01 | 0.125 | 0.400 | **1,329** | **2,720** |
| | 05/18/11 | 0.00 | **0.133** | 0.003 | 0.086 | 0.223 | **1,710** | **3,120** |
| | 06/19/12 | 0.00 | **0.403** | <0.05 | 0.160 | 0.242 | **2,420** | **4,450** |
| | 06/13/13 | 0.00 | **0.819** | 0.020 | 0.205 | 0.497 | **2,310** | **5,720** |
| | 07/03/14 | 0.00 | **1.890** | 0.010 | 0.269 | 0.700 | **2,250** | **4,480** |

**Table 2**

**Summary of Regulated Constituent Concentrations**

| Monitoring Well | Sample Date | LNAPL Thickness (feet) | Benzene (mg/L) | Toluene (mg/L) | Ethylbenzene (mg/L) | Xylenes (mg/L) | Chloride (mg/L) | TDS (mg/L) |
|---|---|---|---|---|---|---|---|---|
| MW-14 | 10/11/95 | 0.00 | <0.005 | <0.005 | <0.005 | <0.005 | NA | NA |
| | 01/04/96 | NM | <0.001 | <0.001 | <0.001 | <0.001 | 87 | 900 |
| | 04/16/96 | 0.00 | <0.001 | <0.001 | <0.001 | <0.001 | 100 | 920 |
| | 07/09/96 | 0.00 | <0.001 | <0.001 | <0.001 | <0.001 | 110 | **1,000** |
| | 10/15/96 | 0.00 | <0.001 | <0.001 | <0.001 | <0.001 | 120 | 930 |
| | 12/03/97 | 0.00 | <0.001 | <0.001 | <0.001 | <0.001 | 130 | 900 |
| | 03/13/08 | 0.00 | <0.001 | <0.002 | <0.001 | <0.003 | **361** | **1,170** |
| | 05/18/09 | 0.00 | <0.001 | <0.001 | <0.001 | <0.003 | **304** | **1,250** |
| | 05/25/10 | 0.00 | 0.002 | 0.002 | 0.001 | 0.003 | **319** | **1,280** |
| | 05/17/11 | 0.00 | 0.002 | <0.002 | <0.001 | 0.002 | **299** | **1,420** |
| | 06/19/12 | 0.00 | <0.001 | <0.001 | <0.001 | <0.003 | **290** | **1,370** |
| | 06/13/13 | 0.00 | <0.001 | <0.001 | 0.001 | <0.003 | **302** | **1,380** |
| | 07/03/14 | 0.00 | <0.001 | <0.002 | <0.001 | <0.003 | **254** | **1,220** |
| MW-15 | 10/11/95 | 0.00 | **0.087** | **1.10** | **0.770** | **2.07** | NA | NA |
| | 01/04/96 | NM | **0.096** | **0.870** | **0.880** | **2.40** | **430** | **1,200** |
| | 04/16/96 | 0.00 | **0.052** | 0.550 | 0.690 | **1.92** | **410** | **1,200** |
| | 07/09/96 | 0.00 | **0.035** | 0.610 | **0.850** | **2.15** | **510** | **1,400** |
| | 10/15/96 | 0.00 | <0.001 | 0.420 | 0.610 | **1.63** | **580** | **1,400** |
| | 12/03/97 | 0.00 | **0.091** | **1.10** | **0.860** | **2.26** | **490** | **1,400** |
| | 03/13/08 | 0.00 | **0.020** | 0.036 | 0.301 | **0.752** | **1,360** | **3,140** |
| | 05/18/09 | 0.00 | **0.019** | 0.033 | 0.364 | 0.747 | **960** | **2,250** |
| | 05/25/10 | 0.00 | 0.008 | 0.044 | 0.406 | **0.993** | **1,064** | **2,090** |
| | 05/17/11 | 0.00 | 0.005 | 0.019 | 0.322 | **0.757** | **1,010** | **1,840** |
| | 06/19/12 | 0.00 | 0.006 | 0.030 | 0.205 | 0.542 | **770** | **1,960** |
| | 06/13/13 | 0.00 | 0.008 | 0.030 | 0.398 | **0.887** | **1,040** | **1,950** |
| | 07/03/14 | 0.00 | 0.002 | 0.049 | 0.432 | **1.141** | 122 | **1,570** |
| MW-16 | 10/11/95 | 0.00 | <0.005 | <0.005 | <0.005 | <0.005 | NA | NA |
| | 01/04/96 | NM | <0.001 | <0.001 | <0.001 | <0.001 | 66 | 900 |
| | 04/16/96 | 0.00 | <0.001 | <0.001 | <0.001 | <0.001 | 68 | 910 |
| | 07/09/96 | 0.00 | <0.001 | <0.001 | <0.001 | <0.001 | 93 | 910 |
| | 10/15/96 | 0.00 | <0.001 | <0.001 | <0.001 | <0.001 | 73 | 870 |
| | 12/03/97 | 0.00 | <0.001 | <0.001 | <0.001 | <0.001 | 66 | 850 |
| | 03/13/08 | 0.00 | <0.001 | <0.002 | 0.002 | 0.006 | **293** | **1,400** |
| | 05/18/09 | 0.00 | <0.001 | <0.001 | <0.001 | <0.003 | **336** | **1,270** |
| | 05/25/10 | 0.00 | <0.001 | <0.002 | <0.001 | 0.003 | **404** | **1,290** |
| | 05/17/11 | 0.00 | <0.005 | <0.01 | <0.005 | <0.01 | **410** | **1,350** |
| | 06/19/12 | 0.00 | <0.001 | <0.001 | <0.001 | <0.003 | **799** | **1,700** |
| | 06/13/13 | 0.00 | <0.001 | <0.001 | <0.001 | <0.003 | **459** | **1,750** |
| | 07/03/14 | 0.00 | <0.001 | <0.001 | <0.001 | <0.003 | **301** | **1,480** |

**Table 2**

**Summary of Regulated Constituent Concentrations**

| Monitoring Well | Sample Date | LNAPL Thickness (feet) | Benzene (mg/L) | Toluene (mg/L) | Ethylbenzene (mg/L) | Xylenes (mg/L) | Chloride (mg/L) | TDS (mg/L) |
|---|---|---|---|---|---|---|---|---|
| RW-1s | 05/26/10 | 0.00 | <0.001 | <0.002 | <0.001 | <0.002 | **1,436** | **2,760** |
| RW-1d | 05/18/11 | 0.00 | **3.09** | 0.003 | 0.084 | 0.006 | **2,010** | **3,240** |
| | 06/19/12 | 0.00 | **0.916** | <0.02 | 0.089 | <0.06 | **1,700** | **2,430** |
| | 06/13/13 | 0.00 | **0.872** | 0.007 | 0.441 | **2.58** | **1,700** | **2,430** |
| | 07/03/14 | 0.00 | **0.904** | <0.002 | 0.094 | <0.003 | **926** | **1,820** |
| RW-2s | 05/18/09 | 0.00 | 0.814 | 0.107 | 0.345 | **2.56** | **720** | **1,800** |
| | 05/26/10 | NM | **1.03** | <1.00 | **1.32** | **5.74** | **718** | **1,470** |
| | 05/18/11 | NM | **1.22** | 0.270 | 0.526 | **3.05** | **452** | **2,510** |
| | 06/19/12 | NM | **1.43** | <0.02 | 0.597 | **3.15** | **348** | 710 |
| | 06/13/13 | NM | 1.98 | 0.031 | 0.492 | **3.36** | **323** | **1,120** |
| | 07/03/14 | NM | NS | NS | NS | NS | NS | NS |
| RW-2d | 07/03/14 | 0.00 | <0.001 | <0.002 | <0.001 | <0.003 | 184 | 765 |
| WQCC Standards | | | 0.01 | 0.62 | 0.62 | 0.75 | 250 | 1,000 |

DNA = Data Not Available, NA = Not Analyzed, NM = Not Measured, NS = Not Sampled

Total Dissolved Soilds (TDS), chloride, sulfate, and BTEX concentrations listed in milligrams per liter (mg/L)

Values in boldface type indicate concentrations exceed New Mexico Water Quality Commission (WQCC) standards.

**Table 3**

**Summary of Monitoring Natural Attenuation Parameters**

| Monitoring Well | Sample Date | Well Position | Electron Acceptors | | | Biodegradation Byproducts | | |
|---|---|---|---|---|---|---|---|---|
| | | | Dissolved Oxygen (mg/L) | Sulfate (mg/L) | Nitrate (mg/L) | Ferrous Iron (mg/L) | Total Iron (mg/L) | Total Manganese (mg/L) |
| MW-1 | 01/04/96 | In Plume | 1.50 | 120 | 1.00 | NA | 0.14 | 0.400 |
| | 04/16/96 | In Plume | 2.50 | 160 | 1.60 | NA | 0.08 | 0.320 |
| | 07/09/96 | In Plume | 1.19 | 160 | 1.60 | NA | 0.07 | 0.360 |
| | 10/15/96 | In Plume | <0.10 | 130 | 1.00 | NA | 0.06 | 0.350 |
| | 12/03/97 | In Plume | NA | 120 | 0.67 | NA | 0.10 | 0.490 |
| | 05/19/09 | In Plume | 0.3 | 110 | <0.1 | 0.79 | 1.34 | 0.431 |
| | 05/26/10 | Upgradient | 1.5 | 97.7 | 0.9 | 0.16 | 4.04 | 0.680 |
| | 05/17/11 | Upgradient | 1.0 | 66.2 | 1.0 | 1.97 | 3.74 | 0.694 |
| | 06/20/12 | Upgradient | 2.2 | 112 | 1.88 | 0.14 | 0.90 | 0.310 |
| | 06/13/13 | Upgradient | 1.4 | 206 | 5.00 | 0.77 | 0.37 | 0.320 |
| | 07/03/15 | In Plume | NS | NS | NS | NS | NS | NS |
| MW-2 | 01/18/95 | Crossgradient | NA | 145 | NA | NA | 2.0 | 0.380 |
| | 01/04/96 | Crossgradient | 1.60 | 120 | 16.0 | NA | <0.001 | 0.290 |
| | 04/16/96 | Crossgradient | 3.44 | 120 | 17.0 | NA | 0.04 | 0.320 |
| | 07/09/96 | Crossgradient | 3.44 | 120 | 17.0 | NA | 0.03 | 0.320 |
| | 10/15/96 | Crossgradient | 1.83 | 130 | 16.0 | NA | <0.001 | 0.280 |
| | 03/13/08 | Crossgradient | 3.6 | 151 | 0.87 | 0.07 | <0.20 | 0.602 |
| | 05/18/09 | Crossgradient | 2.1 | 205 | 24.4 | 0.75 | 0.17 | 0.040 |
| MW-4 | 01/18/95 | Crossgradient | NA | 121 | NA | NA | 2.20 | 0.090 |
| | 01/04/96 | Crossgradient | 2.65 | 78 | <0.05 | NA | 0.52 | 0.070 |
| | 04/16/96 | Crossgradient | 2.00 | 60 | <0.05 | NA | 1.00 | 0.120 |
| | 07/09/96 | Crossgradient | 1.90 | 43 | 0.06 | NA | 1.60 | 0.160 |
| | 10/15/96 | Crossgradient | NA | 36 | 0.06 | NA | 0.97 | 0.170 |
| | 03/13/08 | Crossgradient | 2.80 | 49.7 | 0.43 | 0.97 | 2.98 | 0.305 |
| | 05/18/09 | Crossgradient | 0.50 | 110 | <0.10 | 1.69 | 9.94 | 0.228 |
| MW-5 | 01/18/95 | Crossgradient | NA | 109 | NA | NA | 13.2 | 0.051 |
| | 01/04/96 | Crossgradient | 5.27 | 110 | 1.30 | NA | <0.025 | <0.01 |
| | 04/16/96 | Crossgradient | 5.38 | 110 | 1.20 | NA | <0.025 | <0.01 |
| | 07/09/96 | Crossgradient | NA | 100 | 0.91 | NA | <0.025 | <0.01 |
| | 10/15/96 | Crossgradient | 6.51 | 110 | 1.10 | NA | <0.025 | <0.01 |
| | 12/03/97 | Crossgradient | NA | 88 | 0.96 | NA | 0.028 | <0.01 |
| | 03/13/08 | Crossgradient | 4.8 | 75.2 | 1.11 | 0.29 | 4.73 | 0.266 |
| | 05/18/09 | Crossgradient | 3.8 | 92.4 | <0.1 | 1.41 | 2.43 | 0.075 |
| | 05/25/10 | Crossgradient / In Plume | 5.3 | 211 | 1.3 | 1.73 | 8.35 | 0.220 |
| | 05/17/11 | Crossgradient | 4.7 | 215 | 3.2 | 3.21 | 12.7 | 0.197 |
| | 06/20/12 | Crossgradient | 5.4 | 271 | 8.86 | 1.33 | 0.45 | 0.160 |
| | 06/12/13 | Crossgradient | 4.2 | 206 | 5.00 | 1.00 | 2.80 | 0.200 |
| | 07/03/14 | Crossgradient | 4.7 | 153 | 1.67 | 0.61 | 0.005 | 0.027 |

**Table 3**

**Summary of Monitoring Natural Attenuation Parameters**

| Monitoring Well | Sample Date | Well Position | Electron Acceptors | | | Biodegradation Byproducts | | |
|---|---|---|---|---|---|---|---|---|
| | | | Dissolved Oxygen (mg/L) | Sulfate (mg/L) | Nitrate (mg/L) | Ferrous Iron (mg/L) | Total Iron (mg/L) | Total Manganese (mg/L) |
| MW-6 | 01/04/96 | In Plume | 1.98 | 46 | NA | NA | 3.20 | 1.10 |
| | 04/16/96 | In Plume | <0.10 | 56 | 0.73 | NA | 2.20 | 1.00 |
| | 07/09/96 | In Plume | 1.67 | 40 | 0.48 | NA | 1.90 | 0.850 |
| | 10/15/96 | In Plume | <0.10 | 43 | 0.29 | NA | 1.40 | 0.720 |
| | 12/03/97 | In Plume | NA | 21 | <0.05 | NA | <0.025 | 0.790 |
| MW-7 | 01/18/95 | In Plume | NA | 222 | NA | NA | 15.6 | 0.180 |
| | 01/04/96 | Upgradient | 2.06 | 170 | <0.05 | NA | 0.67 | 0.100 |
| | 04/16/96 | Upgradient | 2.82 | 170 | <0.05 | NA | 0.77 | 0.110 |
| | 07/09/96 | Upgradient | 3.37 | 170 | <0.05 | NA | 0.46 | 0.080 |
| | 10/15/96 | Upgradient | 0.76 | 180 | <0.05 | NA | 0.40 | 0.070 |
| | 12/03/97 | Upgradient | 2.08 | 140 | <0.05 | NA | 0.34 | 0.078 |
| | 03/13/08 | In Plume | NS | NS | NS | NS | NS | NS |
| | 05/19/09 | Upgradient | 0.3 | 283 | <0.1 | 0.53 | 0.91 | 0.171 |
| | 05/25/10 | In Plume | 2.7 | 185 | <0.1 | 2.50 | 14.0 | 0.530 |
| | 05/17/11 | Upgradient | 1.2 | 86.6 | 0.9 | 1.37 | 3.26 | 0.137 |
| | 06/20/12 | Upgradient | 1.6 | 215 | NA | 1.07 | 0.37 | 0.099 |
| | 06/12/13 | Upgradient | 1.1 | 191 | 0.92 | 2.08 | 0.21 | 0.067 |
| | 07/03/14 | Upgradient | 1.5 | 112 | 0.09 | 0.15 | 0.02 | 0.093 |
| MW-9 | 01/18/95 | Upgradient | NA | 192 | NA | NA | 17.6 | 0.020 |
| | 01/04/96 | Upgradient | 5.98 | 180 | 0.59 | NA | <0.025 | <0.01 |
| | 04/16/96 | Upgradient | 7.03 | 190 | 0.56 | NA | 0.04 | <0.01 |
| | 07/09/96 | Upgradient | 6.30 | 180 | 0.65 | NA | <0.025 | <0.01 |
| | 10/15/96 | Upgradient | 6.30 | 190 | 0.70 | NA | <0.025 | <0.01 |
| | 12/03/97 | Upgradient | NA | 200 | 0.61 | NA | <0.025 | <0.01 |
| | 03/13/08 | In Plume | NS | NS | NS | NS | NS | NS |
| | 05/19/09 | Upgradient | 0.7 | 150 | <0.1 | 0.39 | 0.72 | 0.230 |
| | 05/25/10 | Upgradient | 2.3 | 165 | <0.1 | 0.81 | 0.80 | 0.600 |
| | 05/17/11 | Upgradient | 3.0 | 184 | 0.3 | 0.01 | 0.53 | 0.366 |
| | 06/20/12 | Upgradient | 2.8 | 125 | 3.14 | 0.22 | 0.31 | 0.310 |
| | 06/12/13 | Upgradient | 1.8 | 237 | 0.78 | 1.23 | 0.09 | 0.140 |
| | 07/03/14 | Upgradient | 2.5 | 428 | <0.08 | 1.87 | 3.43 | 0.073 |

**Table 3**

**Summary of Monitoring Natural Attenuation Parameters**

| Monitoring Well | Sample Date | Well Position | Electron Acceptors | | | Biodegradation Byproducts | | |
|---|---|---|---|---|---|---|---|---|
| | | | Dissolved Oxygen (mg/L) | Sulfate (mg/L) | Nitrate (mg/L) | Ferrous Iron (mg/L) | Total Iron (mg/L) | Total Manganese (mg/L) |
| MW-10 | 01/18/95 | Upgradient | NA | 176 | NA | NA | 19.9 | 0.093 |
| | 01/04/96 | Upgradient | 4.80 | 160 | 4.80 | NA | <0.025 | <0.01 |
| | 04/16/96 | Upgradient | 4.57 | 160 | 4.10 | NA | <0.025 | <0.01 |
| | 07/09/96 | Upgradient | 4.58 | 170 | 3.70 | NA | <0.025 | <0.01 |
| | 10/15/96 | Upgradient | 4.10 | 180 | 3.90 | NA | <0.025 | 0.020 |
| | 12/03/97 | Upgradient | 3.83 | 150 | 2.00 | NA | <0.025 | <0.01 |
| | 03/13/08 | Upgradient | 6.5 | 154 | 2.80 | 0.01 | 0.58 | 0.067 |
| | 05/18/09 | Upgradient | 7.8 | 197 | 2.10 | 1.49 | 7.81 | 0.109 |
| | 05/25/10 | Upgradient | 7.2 | 138 | 0.7 | 0.15 | 0.70 | <0.1 |
| | 05/17/11 | Upgradient | 4.7 | 200 | 4.0 | 2.49 | 22.4 | 0.278 |
| | 06/20/12 | Upgradient | 5.8 | 332 | 8.46 | 1.50 | 0.13 | 0.008 |
| | 06/12/13 | Upgradient | 5.0 | 291 | 3.44 | 0.69 | <1.7 | <0.17 |
| | 07/03/14 | Upgradient | 6.3 | 283 | 3.27 | 2.00 | 5.86 | 0.835 |
| MW-12 | 01/04/96 | In Plume | 0.81 | 0.86 | <0.05 | NA | 2.80 | 0.850 |
| | 04/16/96 | In Plume | 1.32 | <0.025 | <0.05 | NA | 5.60 | 1.60 |
| | 07/09/96 | In Plume | 1.35 | <0.025 | <0.05 | NA | 5.20 | 1.30 |
| | 10/15/96 | In Plume | <0.10 | 0.37 | <0.05 | NA | 0.04 | 1.30 |
| | 12/03/97 | In Plume | NA | 4.30 | <0.05 | NA | 0.27 | 0.620 |
| | 05/25/10 | In Plume | 1.4 | 64.1 | 1.90 | 2.02 | 6.64 | 0.850 |
| MW-13 | 01/18/95 | Downgradient / In Plume | NA | 20.20 | NA | NA | 38.2 | 0.640 |
| | 01/04/96 | Downgradient / In Plume | 1.66 | 4.50 | 0.07 | NA | 4.30 | 1.90 |
| | 04/16/96 | Downgradient / In Plume | 1.19 | 2.30 | <0.05 | NA | 4.00 | 1.90 |
| | 07/09/96 | Downgradient / In Plume | 1.49 | 2.70 | <0.05 | NA | 4.00 | 1.90 |
| | 10/15/96 | Downgradient / In Plume | 0.85 | 2.80 | <0.05 | NA | 4.40 | 2.10 |
| | 12/03/97 | Downgradient / In Plume | 2.22 | 11.0 | <0.05 | NA | 4.30 | 2.20 |
| | 03/13/08 | Downgradient / In Plume | NS | NS | NS | NS | NS | NS |
| | 05/19/09 | Downgradient / In Plume | 2.4 | <10 | 0.420 | 12.5 | 29.9 | 4.62 |
| | 05/26/10 | Downgradient / In Plume | 1.7 | <25 | <0.1 | 8.8 | 26.6 | 30.5 |
| | 05/17/11 | Downgradient / In Plume | 1.5 | 59.9 | 0.400 | 6.36 | 28.0 | 2.44 |
| | 06/20/12 | Downgradient / In Plume | 2.6 | 60.0 | 5.45 | 4.74 | 29.0 | 3.30 |
| | 06/12/13 | Downgradient / In Plume | 2.1 | 17.2 | 0.705 | 19.3 | 13.0 | 4.00 |
| | 07/03/14 | Downgradient / In Plume | 2.4 | 5.01 | 3.35 | 8.05 | 1.92 | 0.063 |

**Table 3**

**Summary of Monitoring Natural Attenuation Parameters**

| Monitoring Well | Sample Date | Well Position | Electron Acceptors | | | Biodegradation Byproducts | | |
|---|---|---|---|---|---|---|---|---|
| | | | Dissolved Oxygen (mg/L) | Sulfate (mg/L) | Nitrate (mg/L) | Ferrous Iron (mg/L) | Total Iron (mg/L) | Total Manganese (mg/L) |
| MW-14 | 01/04/96 | Downgradient | 5.7 | 230 | 0.38 | NA | 0.03 | 0.010 |
| | 04/16/96 | Downgradient | NA | 230 | 0.47 | NA | 0.05 | 0.010 |
| | 07/09/96 | Downgradient | 3.68 | 220 | 0.37 | NA | 0.03 | 0.010 |
| | 10/15/96 | Downgradient | 2.96 | 250 | 0.60 | NA | <0.025 | <0.01 |
| | 12/03/97 | Downgradient | NA | 170 | 0.79 | NA | <0.025 | <0.01 |
| | 03/13/08 | Downgradient | 4.7 | 154 | 8.41 | 0.01 | 0.45 | <0.05 |
| | 05/18/09 | Downgradient | 5.3 | 225 | 14.8 | 2.16 | 1.19 | 0.023 |
| | 05/25/10 | Downgradient | 4.4 | 28.2 | 5.5 | 2.99 | <0.3 | <0.1 |
| | 05/17/11 | Downgradient | 4.9 | 259 | 16.2 | 0.39 | 1.43 | 0.038 |
| | 06/19/12 | Downgradient | 5.1 | 243 | 41.9 | 0.00 | 0.10 | 0.009 |
| | 06/12/13 | Downgradient | 3.5 | 254 | 27.8 | 0.00 | <1.7 | <0.017 |
| | 07/03/14 | Downgradient | 4.9 | 198 | 24.8 | 0.01 | 32.3 | 3.60 |
| MW-15 | 01/04/96 | Downgradient / In Plume | 1.30 | 27 | <0.05 | NA | 1.70 | 0.660 |
| | 04/16/96 | Downgradient / In Plume | 2.17 | 42 | <0.05 | NA | 1.60 | 0.660 |
| | 07/09/96 | Downgradient / In Plume | 2.08 | 55 | <0.05 | NA | 1.80 | 0.750 |
| | 10/15/96 | Downgradient / In Plume | 1.05 | 46 | <0.05 | NA | 2.40 | 0.980 |
| | 12/03/97 | Downgradient / In Plume | 1.19 | 4.8 | <0.05 | NA | 3.30 | 0.870 |
| | 03/13/08 | Downgradient / In Plume | 2.6 | <10 | <0.20 | 1.03 | 15.0 | 2.12 |
| | 05/18/09 | Downgradient / In Plume | 1.1 | <10 | <0.1 | 3.86 | 17.5 | 1.68 |
| | 05/25/10 | Downgradient / In Plume | 2.0 | 36.8 | <0.1 | 3.50 | 16.5 | 2.38 |
| | 05/17/11 | Downgradient / In Plume | 1.5 | 37.4 | 0.5 | 2.96 | 16.2 | 1.99 |
| | 06/19/12 | Downgradient / In Plume | 4.0 | 11.4 | 2.85 | 6.18 | 18.0 | 2.80 |
| | 06/12/13 | Downgradient / In Plume | 2.3 | 12.7 | 0.91 | 12.3 | 4.00 | 2.60 |
| | 07/03/14 | Downgradient / In Plume | 3.5 | 2.9 | <0.08 | 12.3 | 30.4 | 3.47 |
| MW-16 | 01/04/96 | Downgradient | 4.90 | 280 | 1.00 | NA | <0.025 | <0.01 |
| | 04/16/96 | Downgradient | 4.75 | 260 | 0.92 | NA | 0.03 | <0.01 |
| | 07/09/96 | Downgradient | 3.03 | 230 | 0.86 | NA | 0.04 | <0.01 |
| | 10/15/96 | Downgradient | 3.56 | 260 | 0.81 | NA | <0.025 | <0.01 |
| | 12/03/97 | Downgradient | 2.83 | 190 | 0.66 | NA | <0.025 | <0.01 |
| | 03/13/08 | Downgradient | 3.2 | 140 | 3.69 | 0.01 | <0.20 | <0.05 |
| | 05/18/09 | Downgradient | 1.7 | 168 | 2.61 | 1.96 | 4.71 | 0.042 |
| | 05/25/10 | Downgradient | 1.7 | 172 | 3.2 | 3.06 | <0.3 | <0.1 |
| | 05/17/11 | Downgradient | 2.6 | 201 | 5.2 | 0.00 | 1.91 | <0.033 |
| | 06/19/12 | Downgradient | 2.4 | 195 | 14.8 | 0.00 | 0.09 | 0.007 |
| | 06/12/13 | Downgradient | 3.5 | 26.4 | 4.14 | 0.00 | <1.7 | <0.017 |
| | 07/03/14 | Downgradient | 3.8 | 168 | 29.1 | 0.01 | 0.345 | 0.011 |

**Table 3**

**Summary of Monitoring Natural Attenuation Parameters**

| Monitoring Well | Sample Date | Well Position | Electron Acceptors | | | Biodegradation Byproducts | | |
|---|---|---|---|---|---|---|---|---|
| | | | Dissolved Oxygen (mg/L) | Sulfate (mg/L) | Nitrate (mg/L) | Ferrous Iron (mg/L) | Total Iron (mg/L) | Total Manganese (mg/L) |
| RW-1s | 05/26/10 | In Plume | 1.2 | <25 | <0.1 | 3.04 | 26.0 | 0.660 |
| RW-1d | 05/17/11 | In Plume | 0.8 | 38.0 | 6.55 | 7.36 | 14.5 | 0.486 |
| | 06/20/12 | In Plume | 1.6 | 13.4 | 5.35 | 4.20 | 9.7 | 0.410 |
| | 06/13/13 | In Plume | 1.3 | 55.8 | 0.795 | 3.80 | <1.7 | 0.220 |
| | 07/03/14 | In Plume | 1.0 | 38.1 | <0.08 | 1.93 | 3.95 | 0.324 |
| RW-2s | 05/18/09 | In Plume | 6.2 | 61.4 | <0.1 | 6.18 | 10.4 | 0.957 |
| | 05/26/10 | In Plume | 6.2 | 55.2 | 2.4 | 4.94 | 13.5 | 0.780 |
| | 05/17/11 | In Plume | 1.1 | 96.9 | 3.25 | 6.60 | 7.79 | 0.435 |
| | 06/20/12 | In Plume | 2.1 | 96.3 | 2.12 | 2.68 | 6.00 | 0.380 |
| | 06/13/13 | In Plume | 2.3 | 60.2 | 0.68 | 3.80 | 3.70 | 0.420 |
| RW-2d | 07/03/14 | In Plume | 3.5 | 98.7 | 2.25 | 0.09 | 0.96 | 0.035 |
| | | WQCC Standards: | | 600 | 10 | --- | 1.0 | 0.2 |

NA - Not Analyzed.
Hanna Model 98130 instrument used in field to obtain pH, conductivity, and temperature measurements.
Milwaukee Model SM300 used in field for dissolved oxygen readings
Hach Model DR 890 Spectrophotometer used for field measurement of ferrous iron (Method 8146).

**Table 4**
**Expressed Assimilative Capacity**

| Electron Acceptor/ Byproduct | Terminal Electron Accepting Process (in order of preferred utilization) | Trend in Analyte Concentration During Biodegradation | Mass of benzene Degraded per unit mass of Electron Acceptor Utilized/Produced | Average Concentrations of Electron Acceptors/ Byproducts (mg/L) | Biodegradation Capacity of Electron Acceptors/Byproducts (mg/L) |
|---|---|---|---|---|---|
| $O_2/CO_2$ | Aerobic Respiration | Decreases | 0.325 | 3.35 | 1.09 |
| $SO_4/H_2S$ | Sulfanogenesis | Decreases | 0.22 | 125 | 27.2 |
| $NO_3/NO_2,N_2,NH_3$ | Denitrification | Decreases | 0.21 | 8.77 | 1.84 |
| $Fe^{3+}/Fe^{+2}$ | Iron Reduction | Increases | 0.046 | 10.3 | 0.47 |
| $Mn^{4+}/Mn^{2+}$ | Manganese Reduction | Increases | 0.14 | 7.06 | 0.99 |
| | | | | Total Biodegradation Capacity | 31.6 |
| | | | | Highest benzene concentration currently observed within plume | 1.43 |
| | | | | Average benzene concentration currently observed within plume | 0.35 |

Degradation capacity based on values provided by "*Technical Protocol for Implementing Intrinsic Remediation With Long-Term Monitoring of Natural Attenuation of Fuel-Contamination Dissolved in Groundwater*" (Weidemeier et. al. 1995)
The stoichiometry presented above does not take into account microbial cell mass production (Conservative assumption).

| Redox * | Respiration | e⁻ Acceptor | By-Products |
|---|---|---|---|
| + 200 mv | Aerobic | $O_2$ | $CO_2$ |
| | Denitrification | $NO_3^{2-}$ | $NO_2^-$, $N_2$, $NH_3$ |
| | Manganese Reduction | $Mn^{4+}$ | $Mn^{2+}$ |
| | Iron Reduction | $Fe^{3+}$ | $Fe^{2+}$ |
| | Sulfanogenesis | $SO_4^{2-}$ | $H_2S$ |
| - 400 mv | Methanogenesis | $CO_2$ | $CH_4$ |

* The redox values are for guideline purposes only. These values can vary by 2 to 3 times based on other factors.

As displayed in Table 4 above, the calculated biodegradation capacity of electron acceptors and metabolic byproducts (31.6 mg/L) exceeds the *highest* benzene concentration (1.43 mg/L) currently observed on site by a factor of 22 to 1. The biodegradation capacity of electron acceptors and metabolic byproducts further exceeds the *average* benzene concentration (0.35 mg/L) currently observed within the plume by a ratio of 90 to 1. This indicates that the necessary nutrients and by-products are present for the continued biodegradation of dissolved hydrocarbons.

**Table 5**

***Light Non-Aqueous Phase Liquids Thickness***

| Date | LNAPL Thickness (feet) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | RW-1s | RW-2s | MW-1 | MW-6 | MW-7 | MW-9 | MW-12 | MW-13 |
| 5/7/2008 | 2.71 | 1.77 | 1.40 | 2.32 | 1.64 | 0.03 | 1.89 | 0.80 |
| 7/23/2008 | 2.11 | NM | 1.72 | 2.68 | 1.76 | 0.05 | 1.62 | 1.09 |
| 7/24/2008 | 1.35 | NM | 0.27 | 0.39 | 0.45 | 0.00 | 0.54 | 0.03 |
| 8/12/2008 | 1.33 | NM | 0.60 | 2.24 | 0.20 | 0.03 | 1.33 | 0.18 |
| 8/13/2008 | 1.32 | NM | 0.54 | 1.65 | 0.17 | 0.00 | 1.37 | 0.18 |
| 9/9/2008 | 1.07 | NM | 0.44 | 1.71 | 0.00 | 0.03 | 1.57 | 0.12 |
| 9/17/2008 | 1.09 | NM | 0.29 | 2.00 | 0.01 | 0.00 | 1.11 | 0.03 |
| 10/8/2008 | 0.81 | NM | 0.07 | 1.48 | 0.00 | 0.00 | 1.42 | 0.00 |
| 11/20/2008 | 0.46 | 0.00 | 0.03 | 1.21 | 0.00 | 0.00 | 0.98 | 0.00 |
| 12/23/2008 | 0.67 | 1.47 | 0.06 | 1.38 | 0.00 | 0.00 | 0.64 | 0.00 |
| 12/23/2008 | 0.35 | 1.47 | 0.06 | 0.14 | 0.00 | 0.00 | 0.64 | 0.00 |
| 1/15/2009 | 0.41 | NM | 0.03 | 1.20 | 0.00 | 0.00 | 0.43 | 0.00 |
| 2/27/2009 | 0.30 | NM | 0.07 | 1.40 | 0.00 | 0.00 | 0.50 | 0.00 |
| 3/26/2009 | 0.28 | NM | 0.00 | 1.11 | 0.00 | 0.00 | 0.03 | 0.00 |
| *4/28/2009* | *0.26* | *NM* | *0.00* | *1.19* | *0.00* | *0.00* | *0.02* | *0.00* |
| 5/18/2009 | 0.24 | NM | 0.00 | 1.17 | 0.00 | 0.00 | 0.01 | 0.00 |
| 6/17/2009 | 0.21 | NM | 0.00 | 1.37 | 0.00 | 0.00 | 0.05 | 0.00 |
| 7/16/2009 | 0.20 | NM | 0.01 | 1.17 | 0.00 | 0.00 | 0.05 | 0.03 |
| 8/26/2009 | 0.15 | NM | 0.00 | 1.25 | 0.00 | 0.00 | 0.00 | 0.00 |
| 9/15/2009 | 0.14 | NM | 0.00 | 1.30 | 0.00 | 0.00 | 0.00 | 0.00 |
| 10/15/2009 | 0.08 | 1.44 | 0.00 | 1.25 | 0.00 | 0.00 | 0.00 | 0.00 |
| 10/21/2009 | 0.25 | NM | 0.00 | 1.20 | 0.00 | 0.00 | 0.00 | 0.00 |
| 11/12/2009 | 0.01 | NM | 0.00 | 1.05 | 0.00 | 0.00 | 0.00 | 0.00 |
| 12/10/2009 | 0.00 | NM | 0.00 | 1.03 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1/13/2010 | 0.00 | NM | 0.00 | 0.92 | 0.00 | 0.01 | 0.00 | 0.00 |
| 2/25/2010 | 0.00 | NM | 0.00 | 0.76 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3/23/2010 | 0.00 | NM | 0.00 | 0.60 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4/1/2010 | 0.00 | NM | 0.00 | 0.36 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4/28/2010 | 0.00 | NM | 0.00 | 0.20 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5/25/2010 | 0.00 | NM | 0.00 | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6/16/2010 | 0.00 | NM | 0.00 | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7/14/2010 | 0.00 | NM | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| 8/24/2010 | 0.01 | NM | 0.00 | 0.04 | 0.00 | 0.00 | 0.05 | 0.00 |
| 9/22/2010 | 0.03 | NM | 0.00 | 0.14 | 0.00 | 0.00 | 0.09 | 0.00 |
| 10/6/2010 | 0.01 | NM | 0.00 | 0.08 | 0.00 | 0.00 | 0.07 | 0.00 |
| 11/30/2010 | 0.05 | NM | 0.00 | 0.25 | 0.00 | 0.00 | 0.26 | 0.00 |
| 12/13/2010 | 0.03 | NM | 0.00 | 0.35 | 0.00 | 0.00 | 0.22 | 0.00 |
| 1/19/2011 | 0.04 | NM | 0.00 | 0.25 | 0.00 | 0.00 | 0.34 | 0.00 |
| 2/24/2011 | 0.03 | NM | 0.00 | 0.19 | 0.00 | 0.00 | 0.72 | 0.00 |
| 3/17/2011 | 0.02 | NM | 0.00 | 0.16 | 0.00 | 0.00 | 0.16 | 0.00 |
| 4/26/2011 | 0.05 | NM | 0.00 | 0.25 | 0.00 | 0.00 | 0.57 | 0.00 |
| 5/17/2011 | 0.02 | NM | 0.00 | 0.21 | 0.00 | 0.00 | 0.67 | 0.00 |
| 6/29/2011 | 0.02 | NM | 0.00 | 0.29 | 0.00 | 0.00 | 0.10 | 0.00 |

**Table 5**

**Light Non-Aqueous Phase Liquids Thickness**

| Date | *LNAPL Thickness (feet)* | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | RW-1s | RW-2s | MW-1 | MW-6 | MW-7 | MW-9 | MW-12 | MW-13 |
| 7/14/2011 | 0.11 | NM | 0.00 | 0.22 | 0.00 | 0.00 | 0.51 | 0.00 |
| 8/23/2011 | 0.00 | NM | 0.00 | 0.25 | 0.00 | 0.00 | 0.29 | 0.00 |
| 9/28/2011 | 0.01 | NM | 0.00 | 0.02 | 0.00 | 0.00 | 0.16 | 0.00 |
| 10/25/2011 | 0.00 | NM | 0.00 | 0.18 | 0.00 | 0.00 | 0.12 | 0.00 |
| 11/22/2011 | 0.01 | NM | 0.00 | 0.22 | 0.00 | 0.00 | 0.11 | 0.00 |
| 12/13/2011 | 0.00 | NM | 0.00 | 0.20 | 0.00 | 0.00 | 0.10 | 0.00 |
| 1/24/2012 | 0.00 | NM | 0.00 | 0.34 | 0.00 | 0.00 | 0.26 | 0.00 |
| 2/29/2012 | 0.00 | NM | 0.00 | 0.46 | 0.00 | 0.00 | 0.25 | 0.00 |
| 3/15/2012 | 0.00 | NM | 0.00 | 0.12 | 0.00 | 0.00 | 0.19 | 0.00 |
| 4/25/2012 | 0.00 | NM | 0.00 | 0.08 | 0.00 | 0.00 | 0.34 | 0.00 |
| 5/25/2012 | 0.00 | NM | 0.00 | 0.02 | 0.00 | 0.00 | 0.20 | 0.00 |
| 6/19/2012 | 0.00 | NM | 0.00 | 0.02 | 0.00 | 0.00 | 0.13 | 0.00 |
| 07/12/12 | 0.00 | NM | 0.00 | 0.02 | 0.00 | 0.00 | 0.10 | 0.00 |
| 08/02/12 | 0.00 | NM | 0.00 | 0.01 | 0.00 | 0.00 | 0.12 | 0.00 |
| 09/26/12 | 0.03 | NM | 0.00 | 0.00 | 0.00 | 0.00 | 0.26 | 0.00 |
| 10/29/12 | 0.00 | NM | 0.00 | 0.00 | 0.00 | 0.00 | 0.12 | 0.00 |
| 11/29/12 | 0.00 | NM | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 |
| 12/27/12 | 0.00 | NM | 0.01 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| 01/30/13 | 0.00 | NM | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 |
| 02/20/13 | 0.00 | NM | 0.00 | 0.11 | 0.00 | 0.00 | 0.05 | 0.00 |
| 03/18/13 | 0.00 | NM | 0.00 | 0.08 | 0.00 | 0.00 | 0.05 | 0.00 |
| 04/23/13 | 0.00 | NM | 0.00 | 0.02 | 0.00 | 0.00 | 0.02 | 0.00 |
| 05/28/13 | 0.00 | NM | 0.00 | 0.10 | 0.00 | 0.00 | 0.04 | 0.00 |
| 06/13/13 | 0.00 | NM | 0.00 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 |
| 07/25/13 | 0.01 | NM | 0.04 | 0.03 | 0.00 | 0.00 | 0.06 | 0.00 |
| 08/29/13 | 0.03 | NM | 0.04 | 0.02 | 0.00 | 0.00 | 0.07 | 0.00 |
| 09/23/13 | 0.02 | NM | 0.08 | 0.03 | 0.00 | 0.00 | 0.07 | 0.00 |
| 10/25/13 | 0.00 | NM | 0.13 | 0.03 | 0.00 | 0.00 | 0.08 | 0.01 |
| 12/06/13 | 0.04 | NM | 0.36 | 0.06 | 0.00 | 0.00 | 0.06 | 0.01 |
| 12/30/13 | 0.03 | NM | 0.33 | 0.10 | 0.00 | 0.00 | 0.16 | 0.00 |
| 01/17/14 | 0.00 | NM | 0.19 | 0.04 | 0.00 | 0.00 | 0.27 | 0.00 |
| 02/04/14 | 0.00 | NM | 0.19 | 0.08 | 0.00 | 0.00 | 0.08 | 0.00 |
| 03/24/14 | 0.00 | NM | 0.46 | 0.39 | 0.00 | 0.00 | 0.13 | 0.22 |
| 04/14/14 | 0.00 | 2.26 | 0.30 | 0.03 | 0.00 | 0.00 | 0.03 | 0.11 |
| 05/15/14 | 0.00 | 1.96 | 0.38 | 0.24 | 0.00 | 0.00 | 0.04 | 0.00 |
| 07/02/14 | 0.00 | 0.20 | 0.23 | 0.00 | 0.00 | 0.00 | 0.26 | 0.00 |
| 08/06/14 | 0.02 | 1.80 | 0.00 | 0.04 | 0.00 | 0.00 | 0.56 | 0.00 |
| 09/26/14 | 0.00 | 0.21 | 0.00 | 0.17 | 0.00 | 0.00 | 0.35 | 0.00 |
| 10/13/14 | 0.00 | 0.14 | 0.00 | 0.01 | 0.00 | 0.00 | 0.39 | 0.00 |
| 11/21/14 | 0.04 | 0.14 | 0.00 | 0.26 | 0.00 | 0.00 | 0.32 | 0.06 |
| 12/11/14 | 0.00 | 0.14 | 0.00 | 0.03 | 0.00 | 0.00 | 0.14 | 0.00 |

Thickness measurements in recovery well RW-2s cannot be made while windmill is in operation and is assumed ~0.00 ft.

**Table 6**

**Total Fluids and Light Non-Aqueous Phase Liquids Recovery Volumes**

| Date | Total Fluids and LNAPL Recovered (gallons) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | RW-1s | RW-2s | MW-1 | MW-6 | MW-7 | MW-9 | MW-12 | MW-13 |
| 5/7/2008 | 1.34 | 5 | 0 | 0 | 0 | 0 | 0.03 | 0 |
| 7/23/2008 | 1.00 | 0 | 0 | 0 | 0 | 0 | 0 | 0.10 |
| 7/24/2008 | 3.00 | 5 | 1 | 1 | 1 | 0.10 | 1 | 0.50 |
| 8/12/2008 | 0.80 | *10,421* | 0.50 | 0.50 | 0.50 | 0 | 0.30 | 0.03 |
| 8/13/2008 | 0.10 | *432* | 0.01 | 0.01 | 0.02 | 0.01 | 0.00 | 0.03 |
| 9/9/2008 | 0.90 | *15,331* | 0.40 | 0.30 | 0.15 | 0.00 | 0.50 | 0.05 |
| 9/17/2008 | 0.05 | *2,649* | 0.14 | 0.38 | 0.01 | 0.02 | 0.34 | 0.05 |
| 10/8/2008 | 1.04 | *10,853* | 0.15 | 0.90 | 0.05 | 0.00 | 0.64 | 0.05 |
| 11/20/2008 | 0.95 | *36,452* | 0.27 | 0.85 | 0.01 | 0.01 | 1.04 | 0.02 |
| 12/23/2008 | 0.78 | *2,852* | 0.08 | 1.10 | 0.00 | 0.00 | 0.42 | 0.00 |
| 1/15/2009 | 0.30 | *2,852* | 0.02 | 0.47 | 0.00 | 0.00 | 0.40 | 0.00 |
| 2/27/2009 | 0.48 | *2,851* | 0.10 | 0.46 | 0.00 | 0.00 | 0.41 | 0.00 |
| 3/26/2009 | 0.23 | *2,836* | 0.06 | 0.44 | 0.00 | 0.00 | 0.39 | 0.00 |
| 4/28/2009 | 0.23 | *829* | 0.06 | 0.39 | 0.00 | 0.00 | 0.25 | 0.00 |
| 5/18/2009 | 0.23 | *4,687* | 0.00 | 0.38 | 0.00 | 0.00 | 0.05 | 0.00 |
| 6/17/2009 | 0.17 | *6,859* | 0.00 | 0.36 | 0.00 | 0.00 | 0.05 | 0.00 |
| 7/16/2009 | 0.12 | 0.0 | 0.00 | 0.25 | 0.00 | 0.00 | 0.05 | 0.00 |
| 8/26/2009 | 0.20 | 0.0 | 0.01 | 0.34 | 0.00 | 0.00 | 0.04 | 0.00 |
| 9/15/2009 | 0.12 | 0.0 | 0.00 | 0.24 | 0.00 | 0.00 | 0.02 | 0.00 |
| 10/15/2009 | 0.12 | 0.0 | 0.01 | 0.50 | 0.00 | 0.00 | 0.01 | 0.00 |
| 10/21/2009 | 0.20 | 0.5 | 0.00 | 0.38 | 0.00 | 0.00 | 0.00 | 0.00 |
| 11/12/2009 | 0.21 | *5,904* | 0.02 | 0.44 | 0.00 | 0.00 | 0.02 | 0.00 |
| 12/10/2009 | 0.01 | *3,874* | 0.01 | 0.44 | 0.00 | 0.00 | 0.01 | 0.00 |
| 1/13/2010 | 0.01 | 2.0 | 0.01 | 0.31 | 0.00 | 0.00 | 0.01 | 0.00 |
| 2/25/2010 | 0.03 | 5.0 | 0.01 | 0.37 | 0.00 | 0.00 | 0.04 | 0.00 |
| 3/23/2010 | 0.06 | 5.0 | 0.01 | 0.33 | 0.00 | 0.00 | 0.03 | 0.00 |
| 4/1/2010 | 0.03 | 0.0 | 0.00 | 0.29 | 0.00 | 0.00 | 0.04 | 0.00 |
| 4/28/2010 | 0.02 | *9,720* | 0.00 | 0.27 | 0.00 | 0.00 | 0.02 | 0.00 |
| 5/25/2010 | 0.01 | *34,850* | 0.00 | 0.25 | 0.00 | 0.00 | 0.01 | 0.00 |
| 6/16/2010 | 0.01 | *18,060* | 0.00 | 0.06 | 0.00 | 0.00 | 0.01 | 0.00 |
| 7/14/2010 | 0.01 | *16,450* | 0.00 | 0.07 | 0.00 | 0.00 | 0.02 | 0.00 |
| 8/24/2010 | 0.03 | *18,980* | 0.00 | 0.10 | 0.00 | 0.00 | 0.02 | 0.00 |
| 9/22/2010 | 0.04 | *18,330* | 0.00 | 0.04 | 0.00 | 0.00 | 0.03 | 0.00 |
| 10/6/2010 | 0.03 | *6,600* | 0.00 | 0.04 | 0.00 | 0.00 | 0.02 | 0.00 |
| 11/30/2010 | 0.05 | *44,928* | 0.01 | 0.04 | 0.00 | 0.00 | 0.05 | 0.00 |
| 12/13/2010 | 0.04 | *9,690* | 0.00 | 0.06 | 0.00 | 0.00 | 0.06 | 0.00 |
| 1/19/2011 | 0.02 | *28,482* | 0.01 | 0.05 | 0.00 | 0.00 | 0.05 | 0.00 |
| 2/24/2011 | 0.04 | *11,900* | 0.00 | 0.06 | 0.00 | 0.00 | 0.01 | 0.00 |
| 3/17/2011 | 0.04 | *130* | 0.00 | 0.06 | 0.00 | 0.00 | 0.21 | 0.00 |
| 4/26/2011 | 0.03 | *39,670* | 0.00 | 0.06 | 0.00 | 0.00 | 0.07 | 0.00 |
| 5/17/2011 | 0.02 | *18,310* | 0.00 | 0.06 | 0.00 | 0.00 | 0.07 | 0.00 |
| 6/29/2011 | 0.06 | *18,530* | 0.00 | 0.08 | 0.00 | 0.00 | 0.25 | 0.00 |
| 7/14/2011 | 0.11 | *2,060* | 0.00 | 0.07 | 0.00 | 0.00 | 0.06 | 0.00 |
| 8/23/2011 | 0.13 | *3,040* | 0.00 | 0.07 | 0.00 | 0.00 | 0.36 | 0.00 |
| 9/28/2011 | 0.05 | *2,058* | 0.00 | 0.24 | 0.00 | 0.00 | 0.35 | 0.00 |
| 10/25/2011 | 0.07 | *17,486* | 0.00 | 0.03 | 0.00 | 0.00 | 0.29 | 0.00 |

**Table 6**

**Total Fluids and Light Non-Aqueous Phase Liquids Recovery Volumes**

| Date | Total Fluids and LNAPL Recovered (gallons) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | RW-1s | RW-2s | MW-1 | MW-6 | MW-7 | MW-9 | MW-12 | MW-13 |
| 11/22/2011 | 0.03 | *18,779* | 0.00 | 0.06 | 0.00 | 0.00 | 0.28 | 0.00 |
| 12/13/2011 | 0.07 | *10,388* | 0.00 | 0.07 | 0.00 | 0.00 | 0.23 | 0.00 |
| 1/24/2012 | 0.10 | *11,988* | 0.00 | 0.08 | 0.00 | 0.00 | 0.38 | 0.00 |
| 2/29/2012 | 0.07 | *12,960* | 0.00 | 0.08 | 0.00 | 0.00 | 0.38 | 0.00 |
| 3/15/2012 | 0.02 | *5,400* | 0.00 | 0.13 | 0.00 | 0.00 | 0.16 | 0.00 |
| 4/25/2012 | 0.17 | *14,760* | 0.00 | 0.40 | 0.00 | 0.00 | 0.38 | 0.00 |
| 5/25/2012 | 0.07 | *10,800* | 0.00 | 0.21 | 0.00 | 0.00 | 0.37 | 0.00 |
| 6/19/2012 | 0.04 | *9,000* | 0.00 | 0.13 | 0.00 | 0.00 | 0.27 | 0.00 |
| 07/12/12 | 0.06 | *8,280* | 0.00 | 0.10 | 0.00 | 0.00 | 0.23 | 0.00 |
| 08/02/12 | 0.03 | *2,588* | 0.00 | 0.11 | 0.00 | 0.00 | 0.17 | 0.00 |
| 09/26/12 | 0.11 | *7,477* | 0.00 | 0.25 | 0.00 | 0.00 | 0.39 | 0.00 |
| 10/29/12 | 0.08 | *5,361* | 0.00 | 0.16 | 0.00 | 0.00 | 0.36 | 0.00 |
| 11/29/12 | 0.08 | *3,982* | 0.00 | 0.14 | 0.00 | 0.00 | 0.33 | 0.00 |
| 12/27/12 | 0.06 | *4,771* | 0.01 | 0.14 | 0.00 | 0.00 | 0.35 | 0.00 |
| 01/30/13 | 0.13 | *4,771* | 0.01 | 0.16 | 0.00 | 0.00 | 0.34 | 0.01 |
| 02/20/13 | 0.05 | *2,566* | 0.01 | 0.07 | 0.00 | 0.00 | 0.26 | 0.01 |
| 03/18/13 | 0.07 | *3,649* | 0.02 | 0.12 | 0.00 | 0.00 | 0.26 | 0.01 |
| 04/23/13 | 0.05 | *8,660* | 0.03 | 0.19 | 0.00 | 0.00 | 0.35 | 0.01 |
| 05/28/13 | 0.04 | *11,425* | 0.05 | 0.15 | 0.00 | 0.00 | 0.28 | 0.02 |
| 06/13/13 | 0.09 | *8,020* | 0.02 | 0.08 | 0.00 | 0.00 | 0.14 | 0.00 |
| 07/25/13 | 0.06 | *16,891* | 0.05 | 0.35 | 0.00 | 0.00 | 0.30 | 0.02 |
| 08/29/13 | 0.14 | *283* | 0.05 | 0.17 | 0.00 | 0.00 | 0.22 | 0.03 |
| 09/23/13 | 0.13 | *466* | 0.05 | 0.15 | 0.00 | 0.00 | 0.20 | 0.02 |
| 10/25/13 | 0.12 | *263* | 0.05 | 0.13 | 0.00 | 0.00 | 0.21 | 0.01 |
| 12/06/13 | 0.13 | *67* | 0.04 | 0.19 | 0.00 | 0.00 | 0.34 | 0.02 |
| 12/30/13 | 0.13 | *0* | 0.05 | 0.07 | 0.00 | 0.00 | 0.13 | 0.00 |
| 01/17/14 | 0.06 | *0 ** * | 0.06 | 0.09 | 0.00 | 0.00 | 0.12 | 0.01 |
| 02/04/14 | 0.00 | *0 ** * | 0.06 | 0.07 | 0.00 | 0.00 | 0.18 | 0.00 |
| 03/24/14 | 0.08 | *0 ** * | 0.07 | 0.06 | 0.00 | 0.00 | 0.35 | 0.01 |
| 04/14/14 | 0.06 | 6 | 0.08 | 0.22 | 0.00 | 0.00 | 0.18 | 0.02 |
| 05/15/14 | 0.15 | 1.04 | 0.08 | 0.06 | 0.00 | 0.00 | 0.20 | 0.05 |
| 07/02/14 | 0.00 | 3.81 | 0.11 | 0.21 | 0.00 | 0.00 | 0.12 | 0.01 |
| 08/06/14 | 0.27 | 2.09 | 0.00 | 0.18 | 0.00 | 0.00 | 0.02 | 0.00 |
| 09/26/14 | 0.24 | 2.82 | 0.00 | 0.29 | 0.00 | 0.00 | 0.40 | 0.00 |
| 10/13/14 | 0.16 | 2.45 | 0.03 | 0.13 | 0.00 | 0.00 | 0.15 | 0.05 |
| 11/21/14 | 0.12 | 2.89 | 0.00 | 0.08 | 0.00 | 0.00 | 0.40 | 0.06 |
| 12/11/14 | 0.12 | 2.04 | 0.00 | 0.19 | 0.00 | 0.00 | 0.36 | 0.00 |
| Well Totals | 16.8 | *612,595* | 3.8 | 18.5 | 1.7 | 0.1 | 17.5 | 1.1 |
| **Total Gallons of LNAPL Recovered in all Wells Since May 6, 2008:** | | | | | | | | **100.2** |
| **Total Gallons of Fluids Recovered in RW-2s Since July 24, 2008:** | | | | | | | | ***612,595*** |

** Volumes in blue text reflect gallons of total fluids (mostly water with some LNAPL) recovered from RW-2s. LNAPL is not separated from total fluids, therefore LNAPL recovery in RW-2s cannot be measured.*

*Total fluids volume estimated at average of 0.25 gpm during certain periods when totalizer meter malfunctioned.*

*** Windmill system was not operational due to high wind damage as discovered in January 2014. Since April 2014 LNAPL recovery has been accomplished using a passive bailer and hand bailing during monthly site visits.*

# APPENDIX A

## NMOCD Correspondence

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION
2040 S. PACHECO
SANTA FE, NEW MEXICO 87505
(505) 827-7131

July 14, 1997

CERTIFIED MAIL
RETURN RECEIPT NO. P-410-431-193

Mr. Sam E. Christy
Phillips Petroleum Company
4001 Penbrook
Odessa, Texas 79762

RE: GROUND WATER REMEDIATION AND MONITORING
SOUTH FOUR LAKES UNIT

Dear Mr. Christy:

The New Mexico Oil Conservation Division has reviewed Phillips Petroleum Company's (Phillips) May 6, 1997 "SOUTH FOUR LAKES UNIT QUANTIFICATION OF NATURAL ATTENUATION & FUTURE GROUNDWATER MONITORING PROGRAM". This document contains the results of Phillips's recent ground water remediation and monitoring activities. The document also contains recommendations to plug and abandon 3 site monitoring wells and modify the long term ground water monitoring plan.

Phillips's proposals as contained in the above referenced document are approved with the following conditions:

1. In addition to the proposed sampling parameters, Phillips will continue to sample and analyze ground water from all monitor wells for concentrations of iron and manganese using EPA approved methods and quality assurance/quality control (QA/QC).

2. Annual remediation and monitoring reports will be submitted to the OCD by July 1 of each year. The annual reports will contain:

   a. A description of the monitoring and remediation activities which occurred during the year including conclusions and recommendations.

   b. Summary tables listing past and present laboratory analytic results of all water quality sampling for each monitoring point and plots of concentration vs. time for contaminants of concern from each monitoring point. Copies of the most recent years laboratory, data sheets and associated QA/QC data will also be submitted.

c. A water table elevation map using the water table elevation of the ground water in all monitor wells.

d. Plots of water table elevation vs. time for each ground water monitoring point.

e. A product thickness map based on the thickness of free phase product on ground water in all refinery monitor wells.

f. The volume of product and water recovered in the remediation system during each year and the total recovered to date.

3. All wastes generated will be disposed of at an OCD approved facility or in an OCD approved manner.

4. Phillips will notify the OCD at least one week in advance of all scheduled activities such that the OCD has the opportunity to witness the events and/or split samples.

5. All documents will be submitted to the OCD Santa Fe Office with copies provided to the OCD Hobbs District Office.

Please be advised that OCD approval does not relieve Phillips of liability should the remediation and monitoring program fail to adequately monitor or remediate contamination related to Phillips's operations. In addition, OCD approval does not relieve Phillips of responsibility for compliance with any other federal, state, or local laws and/or regulations.

If you have any questions, please call me at (505) 827-7154.

Sincerely,

William C. Olson
Hydrogeologist
Environmental Bureau

xc: Chris Williams, OCD Hobbs District Supervisor
Wayne Price, OCD Hobbs Office
David Deardorff, New Mexico State Land Office

# APPENDIX B

Laboratory Analytical Reports

And

Chain of Custody Documentation

**PERMIAN BASIN**
**ENVIRONMENTAL LAB, LP**
**10014 SCR 1213**
**Midland, TX 79706**

# Analytical Report

**Prepared for:**

Matt Pride
Pride Energy Company
P.O. BOX 701950
Tulsa, OK 74170-1950

Project: Pride Energy Company
Project Number: South Four Lakes Tank Battery
Location: T12S-R34E, Sectio 2 Unit Letter G

Lab Order Number: 4G07001

NELAP/TCEQ # T104704156-13-3

Report Date: 08/08/14

Pride Energy Company
P.O. BOX 701950
Tulsa OK, 74170-1950

Project: Pride Energy Company
Project Number: South Four Lakes Tank Battery
Project Manager: Matt Pride

Fax: (918) 524-9292

## ANALYTICAL REPORT FOR SAMPLES

| Sample ID | Laboratory ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| MW-5 | 4G07001-01 | Water | 07/03/14 13:30 | 07-04-2014 13:30 |
| MW-7 | 4G07001-02 | Water | 07/03/14 12:00 | 07-04-2014 13:30 |
| MW-9 | 4G07001-03 | Water | 07/03/14 11:00 | 07-04-2014 13:30 |
| MW-10 | 4G07001-04 | Water | 07/03/14 10:00 | 07-04-2014 13:30 |
| MW-13 | 4G07001-05 | Water | 07/03/14 13:00 | 07-04-2014 13:30 |
| MW-14 | 4G07001-06 | Water | 07/02/14 15:50 | 07-04-2014 13:30 |
| MW-15 | 4G07001-07 | Water | 07/02/14 17:00 | 07-04-2014 13:30 |
| MW-16 | 4G07001-08 | Water | 07/02/14 15:10 | 07-04-2014 13:30 |
| RW-1d | 4G07001-09 | Water | 07/03/14 14:10 | 07-04-2014 13:30 |
| RW-2d | 4G07001-10 | Water | 07/03/14 15:00 | 07-04-2014 13:30 |

Please note, PBEL is currently in the process for receiving NELAC Certification on Fe and Mn. New Mexico does not require NELAC certification at this time for groundwater sampling.

Pride Energy Company
P.O. BOX 701950
Tulsa OK, 74170-1950

Project: Pride Energy Company
Project Number: South Four Lakes Tank Battery
Project Manager: Matt Pride

Fax: (918) 524-9292

## MW-5

**4G07001-01 (Water)**

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Permian Basin Environmental Lab, L.P.** | | | | | | | | | |
| **Organics by GC** | | | | | | | | | |
| Benzene | ND | 0.00100 | mg/L | 1 | P4G1006 | 07/07/14 | 07/08/14 | EPA 8021B | |
| **Toluene** | **0.00289** | 0.00100 | mg/L | 1 | P4G1006 | 07/07/14 | 07/08/14 | EPA 8021B | |
| **Ethylbenzene** | **0.00724** | 0.00100 | mg/L | 1 | P4G1006 | 07/07/14 | 07/08/14 | EPA 8021B | |
| **Xylene (p/m)** | **0.0199** | 0.00200 | mg/L | 1 | P4G1006 | 07/07/14 | 07/08/14 | EPA 8021B | |
| **Xylene (o)** | **0.00611** | 0.00100 | mg/L | 1 | P4G1006 | 07/07/14 | 07/08/14 | EPA 8021B | |
| *Surrogate: 4-Bromofluorobenzene* | | *94.8 %* | *80-120* | | *P4G1006* | *07/07/14* | *07/08/14* | *EPA 8021B* | |
| *Surrogate: 1,4-Difluorobenzene* | | *77.4 %* | *80-120* | | *P4G1006* | *07/07/14* | *07/08/14* | *EPA 8021B* | *S-GC* |
| **General Chemistry Parameters by EPA / Standard Methods** | | | | | | | | | |
| **Chloride** | **117** | 2.50 | mg/L | 5 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| **Nitrate as N** | **1.67** | 0.0800 | mg/L | 1 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| **Total Dissolved Solids** | **635** | 20.0 | mg/L | 1 | P4G1509 | 07/08/14 | 07/15/14 | EPA 160.1 | |
| **Sulfate** | **153** | 5.00 | mg/L | 5 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| **Total Metals by EPA / Standard Methods** | | | | | | | | | |
| **I[redacted]** | **0.00500** | 0.0170 | mg/L | 1 | P4H0402 | 07/28/14 | 08/01/14 | EPA 6010B | QAL1, J |
| **M[redacted]anese** | **0.0270** | 0.00100 | mg/L | 1 | P4H0402 | 07/28/14 | 08/01/14 | EPA 6010B | QAL1 |

| | | |
|---|---|---|
| Pride Energy Company | Project: Pride Energy Company | Fax: (918) 524-9292 |
| P.O. BOX 701950 | Project Number: South Four Lakes Tank Battery | |
| Tulsa OK, 74170-1950 | Project Manager: Matt Pride | |

## MW-7

**4G07001-02 (Water)**

**Permian Basin Environmental Lab, L.P.**

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Organics by GC** | | | | | | | | | |
| **Benzene** | **0.00329** | 0.00100 | mg/L | 1 | P4G1006 | 07/07/14 | 07/08/14 | EPA 8021B | |
| **Toluene** | **0.00640** | 0.00100 | mg/L | 1 | P4G1006 | 07/07/14 | 07/08/14 | EPA 8021B | |
| **Ethylbenzene** | **0.0542** | 0.00100 | mg/L | 1 | P4G1006 | 07/07/14 | 07/08/14 | EPA 8021B | |
| **Xylene (p/m)** | **0.0287** | 0.00200 | mg/L | 1 | P4G1006 | 07/07/14 | 07/08/14 | EPA 8021B | |
| **Xylene (o)** | **0.0148** | 0.00100 | mg/L | 1 | P4G1006 | 07/07/14 | 07/08/14 | EPA 8021B | |
| *Surrogate: 4-Bromofluorobenzene* | | *83.2 %* | *80-120* | | *P4G1006* | *07/07/14* | *07/08/14* | *EPA 8021B* | |
| *Surrogate: 1,4-Difluorobenzene* | | *82.7 %* | *80-120* | | *P4G1006* | *07/07/14* | *07/08/14* | *EPA 8021B* | |
| **General Chemistry Parameters by EPA / Standard Methods** | | | | | | | | | |
| **Chloride** | **158** | 2.50 | mg/L | 5 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| **Nitrate as N** | **0.0870** | 0.0800 | mg/L | 1 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| **Total Dissolved Solids** | **790** | 20.0 | mg/L | 1 | P4G1509 | 07/08/14 | 07/15/14 | EPA 160.1 | |
| **Sulfate** | **112** | 5.00 | mg/L | 5 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| **Total Metals by EPA / Standard Methods** | | | | | | | | | |
| **Iron** | **0.0170** | 0.0170 | mg/L | 1 | P4H0402 | 07/28/14 | 08/01/14 | EPA 6010B | QAL1 |
| **Manganese** | **0.0930** | 0.00100 | mg/L | 1 | P4H0402 | 07/28/14 | 08/01/14 | EPA 6010B | QAL1 |

| | | |
|---|---|---|
| Pride Energy Company | Project: Pride Energy Company | Fax: (918) 524-9292 |
| P.O. BOX 701950 | Project Number: South Four Lakes Tank Battery | |
| Tulsa OK, 74170-1950 | Project Manager: Matt Pride | |

## MW-9

**4G07001-03 (Water)**

**Permian Basin Environmental Lab, L.P.**

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Organics by GC** | | | | | | | | | |
| Benzene | ND | 0.00100 | mg/L | 1 | P4G1006 | 07/07/14 | 07/08/14 | EPA 8021B | |
| Toluene | ND | 0.00100 | mg/L | 1 | P4G1006 | 07/07/14 | 07/08/14 | EPA 8021B | |
| Ethylbenzene | ND | 0.00100 | mg/L | 1 | P4G1006 | 07/07/14 | 07/08/14 | EPA 8021B | |
| Xylene (p/m) | ND | 0.00200 | mg/L | 1 | P4G1006 | 07/07/14 | 07/08/14 | EPA 8021B | |
| Xylene (o) | ND | 0.00100 | mg/L | 1 | P4G1006 | 07/07/14 | 07/08/14 | EPA 8021B | |
| *Surrogate: 4-Bromofluorobenzene* | | *106 %* | *80-120* | | *P4G1006* | *07/07/14* | *07/08/14* | *EPA 8021B* | |
| *Surrogate: 1,4-Difluorobenzene* | | *82.1 %* | *80-120* | | *P4G1006* | *07/07/14* | *07/08/14* | *EPA 8021B* | |
| **General Chemistry Parameters by EPA / Standard Methods** | | | | | | | | | |
| **Chloride** | **159** | 2.50 | mg/L | 5 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| Nitrate as N | ND | 0.0800 | mg/L | 1 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| **Total Dissolved Solids** | **1260** | 20.0 | mg/L | 1 | P4G1509 | 07/08/14 | 07/15/14 | EPA 160.1 | |
| **Sulfate** | **428** | 5.00 | mg/L | 5 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| **Total Metals by EPA / Standard Methods** | | | | | | | | | |
| **Iron** | **3.43** | 0.0170 | mg/L | 1 | P4H0402 | 07/28/14 | 08/01/14 | EPA 6010B | QAL1 |
| **Manganese** | **0.0730** | 0.00100 | mg/L | 1 | P4H0402 | 07/28/14 | 08/01/14 | EPA 6010B | QAL1 |

| | | |
|---|---|---|
| Pride Energy Company | Project: Pride Energy Company | Fax: (918) 524-9292 |
| P.O. BOX 701950 | Project Number: South Four Lakes Tank Battery | |
| Tulsa OK, 74170-1950 | Project Manager: Matt Pride | |

## MW-10

**4G07001-04 (Water)**

**Permian Basin Environmental Lab, L.P.**

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Organics by GC** | | | | | | | | | |
| Benzene | ND | 0.00100 | mg/L | 1 | P4G1006 | 07/07/14 | 07/08/14 | EPA 8021B | |
| Toluene | ND | 0.00100 | mg/L | 1 | P4G1006 | 07/07/14 | 07/08/14 | EPA 8021B | |
| Ethylbenzene | ND | 0.00100 | mg/L | 1 | P4G1006 | 07/07/14 | 07/08/14 | EPA 8021B | |
| Xylene (p/m) | ND | 0.00200 | mg/L | 1 | P4G1006 | 07/07/14 | 07/08/14 | EPA 8021B | |
| Xylene (o) | ND | 0.00100 | mg/L | 1 | P4G1006 | 07/07/14 | 07/08/14 | EPA 8021B | |
| *Surrogate: 4-Bromofluorobenzene* | | *107 %* | *80-120* | | *P4G1006* | *07/07/14* | *07/08/14* | *EPA 8021B* | |
| *Surrogate: 1,4-Difluorobenzene* | | *81.2 %* | *80-120* | | *P4G1006* | *07/07/14* | *07/08/14* | *EPA 8021B* | |
| **General Chemistry Parameters by EPA / Standard Methods** | | | | | | | | | |
| **Chloride** | **172** | 2.50 | mg/L | 5 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| **Nitrate as N** | **3.27** | 0.0800 | mg/L | 1 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| **Total Dissolved Solids** | **970** | 20.0 | mg/L | 1 | P4G1509 | 07/08/14 | 07/15/14 | EPA 160.1 | |
| **Sulfate** | **283** | 5.00 | mg/L | 5 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| **Total Metals by EPA / Standard Methods** | | | | | | | | | |
| **Iron** | **5.86** | 0.0170 | mg/L | 1 | P4H0402 | 07/28/14 | 08/01/14 | EPA 6010B | QAL1 |
| **Manganese** | **0.835** | 0.00100 | mg/L | 1 | P4H0402 | 07/28/14 | 08/01/14 | EPA 6010B | QAL1 |

| | | |
|---|---|---|
| Pride Energy Company | Project: Pride Energy Company | Fax: (918) 524-9292 |
| P.O. BOX 701950 | Project Number: South Four Lakes Tank Battery | |
| Tulsa OK, 74170-1950 | Project Manager: Matt Pride | |

## MW-13

**4G07001-05 (Water)**

**Permian Basin Environmental Lab, L.P.**

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Organics by GC** | | | | | | | | | |
| **Benzene** | **1.89** | 0.0200 | mg/kg wet | 20 | P4G1607 | 07/15/14 | 07/16/14 | EPA 8021B | |
| **Toluene** | **0.0103** | 0.00200 | mg/kg wet | 1 | P4G1607 | 07/15/14 | 07/16/14 | EPA 8021B | |
| **Ethylbenzene** | **0.269** | 0.0200 | mg/kg wet | 20 | P4G1607 | 07/15/14 | 07/16/14 | EPA 8021B | |
| **Xylene (p/m)** | **0.643** | 0.0400 | mg/kg wet | 20 | P4G1607 | 07/15/14 | 07/16/14 | EPA 8021B | |
| **Xylene (o)** | **0.0572** | 0.0200 | mg/kg wet | 20 | P4G1607 | 07/15/14 | 07/16/14 | EPA 8021B | |
| *Surrogate: 4-Bromofluorobenzene* | | *79.4 %* | *75-125* | | *P4G1607* | *07/15/14* | *07/16/14* | *EPA 8021B* | |
| *Surrogate: 1,4-Difluorobenzene* | | *99.8 %* | *75-125* | | *P4G1607* | *07/15/14* | *07/16/14* | *EPA 8021B* | |
| **General Chemistry Parameters by EPA / Standard Methods** | | | | | | | | | |
| **Chloride** | **2250** | 25.0 | mg/L | 50 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| **Nitrate as N** | **3.35** | 2.00 | mg/L | 25 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| **Total Dissolved Solids** | **4480** | 20.0 | mg/L | 1 | P4G1509 | 07/08/14 | 07/15/14 | EPA 160.1 | |
| **Sulfate** | **5.01** | 1.00 | mg/L | 1 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| **Total Metals by EPA / Standard Methods** | | | | | | | | | |
| **Iron** | **1.92** | 0.0170 | mg/L | 1 | P4H0402 | 07/28/14 | 08/01/14 | EPA 6010B | QAL1 |
| **Manganese** | **0.0630** | 0.00100 | mg/L | 1 | P4H0402 | 07/28/14 | 08/01/14 | EPA 6010B | QAL1 |

| | | |
|---|---|---|
| Pride Energy Company | Project: Pride Energy Company | Fax: (918) 524-9292 |
| P.O. BOX 701950 | Project Number: South Four Lakes Tank Battery | |
| Tulsa OK, 74170-1950 | Project Manager: Matt Pride | |

## MW-14

**4G07001-06 (Water)**

**Permian Basin Environmental Lab, L.P.**

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Organics by GC** | | | | | | | | | |
| Benzene | ND | 0.00100 | mg/kg wet | 1 | P4G1607 | 07/15/14 | 07/16/14 | EPA 8021B | |
| Toluene | ND | 0.00200 | mg/kg wet | 1 | P4G1607 | 07/15/14 | 07/16/14 | EPA 8021B | |
| Ethylbenzene | ND | 0.00100 | mg/kg wet | 1 | P4G1607 | 07/15/14 | 07/16/14 | EPA 8021B | |
| Xylene (p/m) | ND | 0.00200 | mg/kg wet | 1 | P4G1607 | 07/15/14 | 07/16/14 | EPA 8021B | |
| Xylene (o) | ND | 0.00100 | mg/kg wet | 1 | P4G1607 | 07/15/14 | 07/16/14 | EPA 8021B | |
| *Surrogate: 1,4-Difluorobenzene* | | *94.4 %* | *75-125* | | *P4G1607* | *07/15/14* | *07/16/14* | *EPA 8021B* | |
| *Surrogate: 4-Bromofluorobenzene* | | *86.0 %* | *75-125* | | *P4G1607* | *07/15/14* | *07/16/14* | *EPA 8021B* | |
| **General Chemistry Parameters by EPA / Standard Methods** | | | | | | | | | |
| **Chloride** | **254** | 5.00 | mg/L | 10 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| **Nitrate as N** | **24.8** | 0.400 | mg/L | 5 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| **Total Dissolved Solids** | **1220** | 20.0 | mg/L | 1 | P4G1509 | 07/08/14 | 07/15/14 | EPA 160.1 | |
| **Sulfate** | **198** | 10.0 | mg/L | 10 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| **Total Metals by EPA / Standard Methods** | | | | | | | | | |
| **Iron** | **32.3** | 0.0170 | mg/L | 1 | P4H0402 | 07/28/14 | 08/01/14 | EPA 6010B | QAL1 |
| **Manganese** | **3.60** | 0.00100 | mg/L | 1 | P4H0402 | 07/28/14 | 08/01/14 | EPA 6010B | QAL1 |

| | | |
|---|---|---|
| Pride Energy Company | Project: Pride Energy Company | Fax: (918) 524-9292 |
| P.O. BOX 701950 | Project Number: South Four Lakes Tank Battery | |
| Tulsa OK, 74170-1950 | Project Manager: Matt Pride | |

## MW-15

**4G07001-07 (Water)**

**Permian Basin Environmental Lab, L.P.**

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Organics by GC** | | | | | | | | | |
| **Benzene** | **0.00157** | 0.00100 | mg/kg wet | 1 | P4G1607 | 07/15/14 | 07/16/14 | EPA 8021B | |
| **Toluene** | **0.0486** | 0.00200 | mg/kg wet | 1 | P4G1607 | 07/15/14 | 07/16/14 | EPA 8021B | |
| **Ethylbenzene** | **0.432** | 0.0200 | mg/kg wet | 20 | P4G1607 | 07/15/14 | 07/16/14 | EPA 8021B | |
| **Xylene (p/m)** | **1.00** | 0.0400 | mg/kg wet | 20 | P4G1607 | 07/15/14 | 07/16/14 | EPA 8021B | |
| **Xylene (o)** | **0.141** | 0.0200 | mg/kg wet | 20 | P4G1607 | 07/15/14 | 07/16/14 | EPA 8021B | |
| *Surrogate: 1,4-Difluorobenzene* | | *89.8 %* | *75-125* | | *P4G1607* | *07/15/14* | *07/16/14* | *EPA 8021B* | |
| *Surrogate: 4-Bromofluorobenzene* | | *98.0 %* | *75-125* | | *P4G1607* | *07/15/14* | *07/16/14* | *EPA 8021B* | |
| **General Chemistry Parameters by EPA / Standard Methods** | | | | | | | | | |
| **Chloride** | **122** | 5.00 | mg/L | 10 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| Nitrate as N | ND | 0.0800 | mg/L | 1 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| **Total Dissolved Solids** | **1570** | 20.0 | mg/L | 1 | P4G1509 | 07/08/14 | 07/15/14 | EPA 160.1 | |
| **Sulfate** | **2.89** | 1.00 | mg/L | 1 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| **Total Metals by EPA / Standard Methods** | | | | | | | | | |
| **Iron** | **30.4** | 0.0170 | mg/L | 1 | P4H0402 | 07/28/14 | 08/01/14 | EPA 6010B | QAL1 |
| **Manganese** | **3.47** | 0.00100 | mg/L | 1 | P4H0402 | 07/28/14 | 08/01/14 | EPA 6010B | QAL1 |

| | | |
|---|---|---|
| Pride Energy Company | Project: Pride Energy Company | Fax: (918) 524-9292 |
| P.O. BOX 701950 | Project Number: South Four Lakes Tank Battery | |
| Tulsa OK, 74170-1950 | Project Manager: Matt Pride | |

## MW-16

**4G07001-08 (Water)**

**Permian Basin Environmental Lab, L.P.**

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Organics by GC** | | | | | | | | | |
| Benzene | ND | 0.00100 | mg/L | 1 | P4G1006 | 07/07/14 | 07/09/14 | EPA 8021B | |
| Toluene | ND | 0.00100 | mg/L | 1 | P4G1006 | 07/07/14 | 07/09/14 | EPA 8021B | |
| Ethylbenzene | ND | 0.00100 | mg/L | 1 | P4G1006 | 07/07/14 | 07/09/14 | EPA 8021B | |
| Xylene (p/m) | ND | 0.00200 | mg/L | 1 | P4G1006 | 07/07/14 | 07/09/14 | EPA 8021B | |
| Xylene (o) | ND | 0.00100 | mg/L | 1 | P4G1006 | 07/07/14 | 07/09/14 | EPA 8021B | |
| *Surrogate: 4-Bromofluorobenzene* | | *103 %* | *80-120* | | *P4G1006* | *07/07/14* | *07/09/14* | *EPA 8021B* | |
| *Surrogate: 1,4-Difluorobenzene* | | *79.4 %* | *80-120* | | *P4G1006* | *07/07/14* | *07/09/14* | *EPA 8021B* | *S-GC* |
| **General Chemistry Parameters by EPA / Standard Methods** | | | | | | | | | |
| **Chloride** | **301** | 5.00 | mg/L | 10 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| **Nitrate as N** | **29.1** | 0.0800 | mg/L | 1 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| **Total Dissolved Solids** | **1480** | 20.0 | mg/L | 1 | P4G1509 | 07/08/14 | 07/15/14 | EPA 160.1 | |
| **Sulfate** | **168** | 10.0 | mg/L | 10 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| **Total Metals by EPA / Standard Methods** | | | | | | | | | |
| **Iron** | **0.345** | 0.0170 | mg/L | 1 | P4H0402 | 07/28/14 | 08/01/14 | EPA 6010B | QAL1 |
| **Manganese** | **0.0110** | 0.00100 | mg/L | 1 | P4H0402 | 07/28/14 | 08/01/14 | EPA 6010B | QAL1 |

## RW-1d

**4G07001-09 (Water)**

**Permian Basin Environmental Lab, L.P.**

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Organics by GC** | | | | | | | | | |
| **Benzene** | **0.904** | 0.0200 | mg/kg wet | 20 | P4G1607 | 07/15/14 | 07/16/14 | EPA 8021B | |
| Toluene | ND | 0.00200 | mg/kg wet | 1 | P4G1607 | 07/15/14 | 07/16/14 | EPA 8021B | |
| **Ethylbenzene** | **0.0944** | 0.0200 | mg/kg wet | 20 | P4G1607 | 07/15/14 | 07/16/14 | EPA 8021B | |
| Xylene (p/m) | ND | 0.00200 | mg/kg wet | 1 | P4G1607 | 07/15/14 | 07/16/14 | EPA 8021B | |
| Xylene (o) | ND | 0.00100 | mg/kg wet | 1 | P4G1607 | 07/15/14 | 07/16/14 | EPA 8021B | |
| *Surrogate: 1,4-Difluorobenzene* | | *98.4 %* | *75-125* | | *P4G1607* | *07/15/14* | *07/16/14* | *EPA 8021B* | |
| *Surrogate: 4-Bromofluorobenzene* | | *83.5 %* | *75-125* | | *P4G1607* | *07/15/14* | *07/16/14* | *EPA 8021B* | |
| **General Chemistry Parameters by EPA / Standard Methods** | | | | | | | | | |
| **Chloride** | **926** | 10.0 | mg/L | 20 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| Nitrate as N | ND | 0.0800 | mg/L | 1 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| **Total Dissolved Solids** | **1820** | 20.0 | mg/L | 1 | P4G1509 | 07/08/14 | 07/15/14 | EPA 160.1 | |
| **Sulfate** | **38.1** | 20.0 | mg/L | 20 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| **Total Metals by EPA / Standard Methods** | | | | | | | | | |
| **Iron** | **3.95** | 0.0170 | mg/L | 1 | P4H0402 | 07/28/14 | 08/01/14 | EPA 6010B | QAL1 |
| **Manganese** | **0.324** | 0.00100 | mg/L | 1 | P4H0402 | 07/28/14 | 08/01/14 | EPA 6010B | QAL1 |

| | | |
|---|---|---|
| Pride Energy Company | Project: Pride Energy Company | Fax: (918) 524-9292 |
| P.O. BOX 701950 | Project Number: South Four Lakes Tank Battery | |
| Tulsa OK, 74170-1950 | Project Manager: Matt Pride | |

**RW-2d**

**4G07001-10 (Water)**

**Permian Basin Environmental Lab, L.P.**

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Organics by GC** | | | | | | | | | |
| Benzene | ND | 0.00100 | mg/kg wet | 1 | P4G1607 | 07/15/14 | 07/16/14 | EPA 8021B | |
| Toluene | ND | 0.00200 | mg/kg wet | 1 | P4G1607 | 07/15/14 | 07/16/14 | EPA 8021B | |
| Ethylbenzene | ND | 0.00100 | mg/kg wet | 1 | P4G1607 | 07/15/14 | 07/16/14 | EPA 8021B | |
| Xylene (p/m) | ND | 0.00200 | mg/kg wet | 1 | P4G1607 | 07/15/14 | 07/16/14 | EPA 8021B | |
| Xylene (o) | ND | 0.00100 | mg/kg wet | 1 | P4G1607 | 07/15/14 | 07/16/14 | EPA 8021B | |
| *Surrogate: 4-Bromofluorobenzene* | | *87.3 %* | *75-125* | | *P4G1607* | *07/15/14* | *07/16/14* | *EPA 8021B* | |
| *Surrogate: 1,4-Difluorobenzene* | | *100 %* | *75-125* | | *P4G1607* | *07/15/14* | *07/16/14* | *EPA 8021B* | |
| **General Chemistry Parameters by EPA / Standard Methods** | | | | | | | | | |
| **Chloride** | **184** | 5.00 | mg/L | 10 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| **Nitrate as N** | **2.25** | 0.0800 | mg/L | 1 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| **Total Dissolved Solids** | **765** | 20.0 | mg/L | 1 | P4G1509 | 07/08/14 | 07/15/14 | EPA 160.1 | |
| **Sulfate** | **98.7** | 10.0 | mg/L | 10 | P4G1506 | 07/09/14 | 07/15/14 | EPA 300.0 | |
| **Total Metals by EPA / Standard Methods** | | | | | | | | | |
| **Iron** | **0.960** | 0.0170 | mg/L | 1 | P4H0402 | 07/28/14 | 08/01/14 | EPA 6010B | QAL1 |
| **Manganese** | **0.0350** | 0.00100 | mg/L | 1 | P4H0402 | 07/28/14 | 08/01/14 | EPA 6010B | QAL1 |

## Organics by GC - Quality Control

## Permian Basin Environmental Lab, L.P.

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch P4G1006 - General Preparation (GC)** | | | | | | | | | | |
| **Blank (P4G1006-BLK1)** | | | | Prepared: 07/07/14 Analyzed: 07/08/14 | | | | | | |
| Benzene | ND | 0.00100 | mg/L | | | | | | | |
| Toluene | ND | 0.00100 | " | | | | | | | |
| Ethylbenzene | ND | 0.00100 | " | | | | | | | |
| Xylene (p/m) | ND | 0.00200 | " | | | | | | | |
| Xylene (o) | ND | 0.00100 | " | | | | | | | |
| *Surrogate: 4-Bromofluorobenzene* | *59.4* | | *ug/l* | *60.0* | | *99.0* | *80-120* | | | |
| *Surrogate: 1,4-Difluorobenzene* | *45.9* | | " | *60.0* | | *76.5* | *80-120* | | | *S-GC* |
| **LCS (P4G1006-BS1)** | | | | Prepared: 07/07/14 Analyzed: 07/08/14 | | | | | | |
| Benzene | 0.0840 | 0.00100 | mg/L | 0.100 | | 84.0 | 80-120 | | | |
| Toluene | 0.0912 | 0.00100 | " | 0.100 | | 91.2 | 80-120 | | | |
| Ethylbenzene | 0.0929 | 0.00100 | " | 0.100 | | 92.9 | 80-120 | | | |
| Xylene (p/m) | 0.202 | 0.00200 | " | 0.200 | | 101 | 80-120 | | | |
| Xylene (o) | 0.107 | 0.00100 | " | 0.100 | | 107 | 80-120 | | | |
| *Surrogate: 4-Bromofluorobenzene* | *81.1* | | *ug/l* | *60.0* | | *135* | *80-120* | | | *S-GC* |
| *Surrogate: 1,4-Difluorobenzene* | *54.4* | | " | *60.0* | | *90.7* | *80-120* | | | |
| **LCS Dup (P4G1006-BSD1)** | | | | Prepared: 07/07/14 Analyzed: 07/08/14 | | | | | | |
| [illegible] | 0.0875 | 0.00100 | mg/L | 0.100 | | 87.5 | 80-120 | 4.05 | 20 | |
| Toluene | 0.0916 | 0.00100 | " | 0.100 | | 91.6 | 80-120 | 0.438 | 20 | |
| Ethylbenzene | 0.0931 | 0.00100 | " | 0.100 | | 93.1 | 80-120 | 0.161 | 20 | |
| Xylene (p/m) | 0.199 | 0.00200 | " | 0.200 | | 99.6 | 80-120 | 1.27 | 20 | |
| Xylene (o) | 0.107 | 0.00100 | " | 0.100 | | 107 | 80-120 | 0.243 | 20 | |
| *Surrogate: 4-Bromofluorobenzene* | *77.1* | | *ug/l* | *60.0* | | *128* | *80-120* | | | *S-GC* |
| *Surrogate: 1,4-Difluorobenzene* | *52.1* | | " | *60.0* | | *86.9* | *80-120* | | | |
| **Duplicate (P4G1006-DUP1)** | **Source: 4G07021-02** | | | Prepared: 07/07/14 Analyzed: 07/09/14 | | | | | | |
| Benzene | ND | 0.00100 | mg/L | | ND | | | | 20 | |
| Toluene | ND | 0.00100 | " | | ND | | | | 20 | |
| Ethylbenzene | ND | 0.00100 | " | | ND | | | | 20 | |
| Xylene (p/m) | ND | 0.00200 | " | | ND | | | | 20 | |
| Xylene (o) | ND | 0.00100 | " | | ND | | | | 20 | |
| *Surrogate: 4-Bromofluorobenzene* | *67.9* | | *ug/l* | *60.0* | | *113* | *80-120* | | | |
| *Surrogate: 1,4-Difluorobenzene* | *46.5* | | " | *60.0* | | *77.4* | *80-120* | | | *S-GC* |

## Organics by GC - Quality Control

## Permian Basin Environmental Lab, L.P.

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch P4G1607 - General Preparation (GC)** | | | | | | | | | | |
| **Blank (P4G1607-BLK1)** | | | | Prepared & Analyzed: 07/15/14 | | | | | | |
| Benzene | ND | 0.00100 | mg/kg wet | | | | | | | |
| Toluene | ND | 0.00200 | " | | | | | | | |
| Ethylbenzene | ND | 0.00100 | " | | | | | | | |
| Xylene (p/m) | ND | 0.00200 | " | | | | | | | |
| Xylene (o) | ND | 0.00100 | " | | | | | | | |
| *Surrogate: 1,4-Difluorobenzene* | *56.6* | | *ug kg* | *60.0* | | *94.4* | *75-125* | | | |
| *Surrogate: 4-Bromofluorobenzene* | *50.7* | | " | *60.0* | | *84.6* | *75-125* | | | |
| **LCS (P4G1607-BS1)** | | | | Prepared & Analyzed: 07/15/14 | | | | | | |
| Benzene | 0.100 | 0.00100 | mg/kg wet | 0.100 | | 100 | 70-130 | | | |
| Toluene | 0.0952 | 0.00200 | " | 0.100 | | 95.2 | 70-130 | | | |
| Ethylbenzene | 0.0896 | 0.00100 | " | 0.100 | | 89.6 | 70-130 | | | |
| Xylene (p/m) | 0.190 | 0.00200 | " | 0.200 | | 95.1 | 70-130 | | | |
| Xylene (o) | 0.0949 | 0.00100 | " | 0.100 | | 94.9 | 70-130 | | | |
| *Surrogate: 4-Bromofluorobenzene* | *62.5* | | *ug kg* | *60.0* | | *104* | *75-125* | | | |
| *Surrogate: 1,4-Difluorobenzene* | *61.1* | | " | *60.0* | | *102* | *75-125* | | | |
| **Duplicate (P4G1607-DUP1)** | | **Source: 4G07001-10** | | Prepared: 07/15/14 Analyzed: 07/16/14 | | | | | | |
| Benzene | ND | 0.00100 | mg/kg wet | | ND | | | | 20 | |
| Toluene | ND | 0.00200 | " | | ND | | | | 20 | |
| Ethylbenzene | ND | 0.00100 | " | | ND | | | | 20 | |
| Xylene (p/m) | ND | 0.00200 | " | | ND | | | | 20 | |
| Xylene (o) | ND | 0.00100 | " | | ND | | | | 20 | |
| *Surrogate: 4-Bromofluorobenzene* | *47.1* | | *ug kg* | *60.0* | | *78.5* | *75-125* | | | |
| *Surrogate: 1,4-Difluorobenzene* | *57.8* | | " | *60.0* | | *96.3* | *75-125* | | | |

## General Chemistry Parameters by EPA / Standard Methods - Quality Control

## Permian Basin Environmental Lab, L.P.

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch P4G1506 - *** DEFAULT PREP *** ** | | | | | | | | | | |
| **Blank (P4G1506-BLK1)** | | | | Prepared & Analyzed: 07/15/14 | | | | | | |
| Chloride | ND | 0.500 | mg/L | | | | | | | |
| Nitrate as N | ND | 0.0800 | " | | | | | | | |
| Sulfate | ND | 1.00 | " | | | | | | | |
| **LCS (P4G1506-BS1)** | | | | Prepared & Analyzed: 07/15/14 | | | | | | |
| Chloride | 9.81 | 0.500 | mg/L | 10.0 | | 98.1 | 80-120 | | | |
| Sulfate | 9.82 | 1.00 | " | 10.0 | | 98.2 | 80-120 | | | |
| Nitrate as N | 2.16 | 0.0800 | " | 2.00 | | 108 | 80-120 | | | |
| **LCS Dup (P4G1506-BSD1)** | | | | Prepared & Analyzed: 07/15/14 | | | | | | |
| Chloride | 9.99 | 0.500 | mg/L | 10.0 | | 99.9 | 80-120 | 1.87 | 20 | |
| Sulfate | 10.0 | 1.00 | " | 10.0 | | 100 | 80-120 | 2.05 | 20 | |
| Nitrate as N | 2.22 | 0.0800 | " | 2.00 | | 111 | 80-120 | 2.88 | 20 | |
| **Matrix Spike (P4G1506-MS1)** | | **Source: 4G07001-01** | | Prepared & Analyzed: 07/15/14 | | | | | | |
| Nitrate as N | 3.76 | 0.0800 | mg/L | 11.0 | 1.67 | 19.0 | 80-120 | | | |
| Chloride | 171 | 2.50 | " | 55.0 | 117 | 98.6 | 80-120 | | | |
| Sulfate | 210 | 5.00 | " | 55.0 | 153 | 103 | 80-120 | | | |
| **P[redacted]P4G1509 - *** DEFAULT PREP *** ** | | | | | | | | | | |
| **Blank (P4G1509-BLK1)** | | | | Prepared & Analyzed: 07/15/14 | | | | | | |
| Total Dissolved Solids | ND | 20.0 | mg/L | | | | | | | |
| **Duplicate (P4G1509-DUP1)** | | **Source: 4G03014-01** | | Prepared & Analyzed: 07/15/14 | | | | | | |
| Total Dissolved Solids | 815 | 20.0 | mg/L | | 815 | | | 0.00 | 20 | |

## General Chemistry Parameters by EPA / Standard Methods - Quality Control

## Permian Basin Environmental Lab, L.P.

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch P4G1509 - *** DEFAULT PREP ***** | | | | | | | | | | |
| **Duplicate (P4G1509-DUP2)** | **Source: 4G07004-04** | | | Prepared & Analyzed: 07/15/14 | | | | | | |
| Total Dissolved Solids | 1660 | 20.0 | mg/L | | 1700 | | | 2.38 | 20 | |

Pride Energy Company
P.O. BOX 701950
Tulsa OK, 74170-1950

Project: Pride Energy Company
Project Number: South Four Lakes Tank Battery
Project Manager: Matt Pride

Fax: (918) 524-9292

## Total Metals by EPA / Standard Methods - Quality Control

## Permian Basin Environmental Lab, L.P.

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch P4H0402 - EPA 3005A** | | | | | | | | | | |
| **Blank (P4H0402-BLK1)** | | | | Prepared: 07/28/14 Analyzed: 08/01/14 | | | | | | |
| Manganese | ND | 0.00100 | mg/L | | | | | | | |
| Iron | ND | 0.0170 | " | | | | | | | |
| **LCS (P4H0402-BS1)** | | | | Prepared: 07/28/14 Analyzed: 08/01/14 | | | | | | |
| Iron | 0.940 | 0.0170 | mg/L | 1.00 | | 94.0 | 85-115 | | | |
| Manganese | 0.951 | 0.00100 | " | 1.00 | | 95.1 | 85-115 | | | |

## Notes and Definitions

| | |
|---|---|
| S-GC | Surrogate recovery outside of control limits. The data was accepted based on valid recovery of the remaining surrogate. |
| QAL1 | The Laboratory is not NELAC Certified for this analyte or analysis. |
| J | Detected but below the Reporting Limit; therefore, result is an estimated concentration (CLP J-Flag). |
| DET | Analyte DETECTED |
| ND | Analyte NOT DETECTED at or above the reporting limit |
| NR | Not Reported |
| dry | Sample results reported on a dry weight basis |
| RPD | Relative Percent Difference |
| LCS | Laboratory Control Spike |
| MS | Matrix Spike |
| Dup | Duplicate |

Report Approved By: _____ Date: 8/8/2014

Brent Barron, Laboratory Director/Technical Director

PBELAB
Permian Basin Environmental Lab, LP
10014 S. County Road 1213
Midland, Texas 79706
Phone: 432-661-4184

# CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

| | | | | | |
|---|---|---|---|---|---|
| **Company Name:** | Pride Energy Company | **Company Name:** | Trident Environmental | **Project Name:** | Pride Energy Company |
| **Direct Invoice To:** | Matt Pride | **Project Manager:** | Gil Van Deventer | **Project #:** | South Four Lakes Tank Battery |
| **Billing Address:** | P. O. Box 701950 | **Address:** | PO Box 12177 | **Project Location:** | T12S-R34E, Section 2, Unit Letter G |
| **City, State, Zip Code:** | Tulsa, OK 74170-1950 | **City, State, Zip Code:** | Odessa TX 79768-2177 | **COC #:** | V-126-0714 |
| **Telephone No:** | 918-524-9200 | **Telephone No:** | 432-638-8740 | | |
| **Fax No:** | 918-524-9292 | **Fax No:** | 413-403-9968 | | |
| **Email Report to:** | mattp@pride-energy.com | **Email Report to:** | gil@trident-environmental.com | | |
| **Sampler:** | Gil Van Deventer (Printed) | | (Signature) | | |

| LAB # (lab use only) | FIELD CODE | Date Sampled | Time Sampled | Field Filtered | No. of Containers | Preservative: Ice | HNO3 | HCl BTEX only) | NaOH | H2SO4 (Nitrate only) | None (Cl, SO4, NO3, & TDS) | Other ( Specify) | Matrix: Water | Sludge | Soil | Other (specify): | Analyze For: TCLP: TPH: 418.1 8015M 1005 1006 | TOTAL: BTEX 8021B | Volatiles | Semivolatiles | Metals: As Ag Ba Cd Cr Pb Hg Se | Cations (Ca, Mg, Na, K) | Anions (Cl, SO4, CO3, HCO3) | Chloride (325.3 / SM4500B) | Sulfate - SO4 (EPA 375.1 / SM450 | Nitrate - NO3 (EPA WW 352.1) | TDS (160.1 / SM2540C) | Total Fe | Total Mn | SPLP 1312 | TAT: RUSH (Pre-Schedule) | Standard TAT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1607001-01 | MW - 5 | 07/03/14 | 1330 | N | | X | | | | | | | X | | | | | X | | | | | | X | X | X | X | X | X | | | X |
| -02 | MW - 7 | 07/03/14 | 1200 | N | | X | | | | | | | X | | | | | X | | | | | | X | X | X | X | X | X | | | X |
| -03 | MW - 9 | 07/03/14 | 1100 | N | | X | | | | | | | X | | | | | X | | | | | | X | X | X | X | X | X | | | X |
| -04 | MW - 10 | 07/03/14 | 1000 | N | | X | | | | | | | X | | | | | X | | | | | | X | X | X | X | X | X | | | X |
| -05 | MW - 13 | 07/03/14 | 1300 | N | | X | | | | | | | X | | | | | X | | | | | | X | X | X | X | X | X | | | X |
| -06 | MW - 14 | 07/02/14 | 1550 | N | | X | | | | | | | X | | | | | X | | | | | | X | X | X | X | X | X | | | X |
| -07 | MW - 15 | 07/02/14 | 1700 | N | | X | | | | | | | X | | | | | X | | | | | | X | X | X | X | X | X | | | X |
| -08 | MW - 16 | 07/02/14 | 1510 | N | | X | | | | | | | X | | | | | X | | | | | | X | X | X | X | X | X | | | X |
| -09 | RW - 1d | 07/03/14 | 1410 | N | | X | | | | | | | X | | | | | X | | | | | | X | X | X | X | X | X | | | X |
| -10 | RW - 2d | 07/03/14 | 1500 | N | | X | | | | | | | X | | | | | X | | | | | | X | X | X | X | X | X | | | X |

**Special Instructions:**
**Email results to: gil@trident-environmental.com and mattp@pride-energy.com**

Sample Containers Intact? Y N
Samples Cool? Y N
**Laboratory Comments:**

| Relinquished by: | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|
| | 7/4/14 | 1:30p | | | |
| Relinquished by: | Date | Time | Received by PBEL: | Date | Time |
| | | | | 7/4/14 | 1330 |

3.0 NCF

***PERMIAN BASIN***
***ENVIRONMENTAL LAB, LP***
***10014 SCR 1213***
***Midland, TX 79706***

# Analytical Report

**Prepared for:**

Matt Pride
Pride Energy Company
P.O. BOX 701950
Tulsa, OK 74170-1950

Project: Pride Energy Company
Project Number: South Four Lakes Tank Battery
Location: T12S-R34E, Section 2, Unit Letter G

Lab Order Number: 3F14001

NELAP/TCEQ # T104704156-12-1

Report Date: 06/26/13

Pride Energy Company
P.O. BOX 701950
Tulsa OK, 74170-1950

Project: Pride Energy Company
Project Number: South Four Lakes Tank Battery
Project Manager: Matt Pride

Fax: (918) 524-9292

## ANALYTICAL REPORT FOR SAMPLES

| Sample ID | Laboratory ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| MW-1 | 3F14001-01 | Water | 06/13/13 11:00 | 06-14-2013 14:18 |
| MW-5 | 3F14001-02 | Water | 06/12/13 09:30 | 06-14-2013 14:18 |
| MW-7 | 3F14001-03 | Water | 06/12/13 18:00 | 06-14-2013 14:18 |
| MW-9 | 3F14001-04 | Water | 06/12/13 17:00 | 06-14-2013 14:18 |
| MW-10 | 3F14001-05 | Water | 06/12/13 16:00 | 06-14-2013 14:18 |
| MW-13 | 3F14001-06 | Water | 06/13/13 12:00 | 06-14-2013 14:18 |
| MW-14 | 3F14001-07 | Water | 06/13/13 09:00 | 06-14-2013 14:18 |
| MW-15 | 3F14001-08 | Water | 06/12/13 15:00 | 06-14-2013 14:18 |
| MW-16 | 3F14001-09 | Water | 06/12/13 12:30 | 06-14-2013 14:18 |
| MW-1D | 3F14001-10 | Water | 06/13/13 13:00 | 06-14-2013 14:18 |
| MW-1S | 3F14001-11 | Water | 06/12/13 10:00 | 06-14-2013 14:18 |

Fe and Mn analysis were subcontracted to Test America. Their report is attached to the back of this report. Their certification number is T104704223-10-6-TX.

## MW-1

### 3F14001-01 (Water)

**Permian Basin Environmental Lab, L.P.**

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Organics by GC** | | | | | | | | | |
| **Benzene** | **0.00129** | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| **Toluene** | **0.00369** | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| **Ethylbenzene** | **0.0759** | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| **Xylene (p/m)** | **0.0770** | 0.00200 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| **Xylene (o)** | **0.0115** | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| *Surrogate: 4-Bromofluorobenzene* | | *115 %* | *80-120* | | *P3F1803* | *06/17/13* | *06/18/13* | *EPA 8021B* | |
| *Surrogate: 1,4-Difluorobenzene* | | *99.2 %* | *80-120* | | *P3F1803* | *06/17/13* | *06/18/13* | *EPA 8021B* | |
| **General Chemistry Parameters by EPA / Standard Methods** | | | | | | | | | |
| **Chloride** | **255** | 2.50 | mg/L | 5 | P3F1901 | 06/17/13 | 06/19/13 | EPA 300.0 | |
| **Nitrate as N** | **0.540** | 0.0800 | mg/L | 1 | P3F1901 | 06/17/13 | 06/19/13 | EPA 300.0 | |
| **Total Dissolved Solids** | **815** | 10.0 | mg/L | 1 | P3F2107 | 06/18/13 | 06/21/13 | EPA 160.1 | |
| **Total Metals by EPA / Standard Methods** | | | | | | | | | |
| **Iron** | **0.370** | 1.70 | mg/L | 1 | P3F2605 | 06/18/13 | 06/19/13 | EPA 6010B | SUB-1, J |
| **Manganese** | **0.320** | 0.0170 | mg/L | 1 | P3F2605 | 06/18/13 | 06/19/13 | EPA 6010B | SU |

| | | |
|---|---|---|
| Pride Energy Company | Project: Pride Energy Company | Fax: (918) 524-9292 |
| P.O. BOX 701950 | Project Number: South Four Lakes Tank Battery | |
| Tulsa OK, 74170-1950 | Project Manager: Matt Pride | |

## MW-5

**3F14001-02 (Water)**

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Permian Basin Environmental Lab, L.P.** | | | | | | | | | |
| **Organics by GC** | | | | | | | | | |
| Benzene | ND | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| **Toluene** | **0.00144** | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| **Ethylbenzene** | **0.00241** | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| **Xylene (p/m)** | **0.00347** | 0.00200 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| Xylene (o) | ND | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| *Surrogate: 4-Bromofluorobenzene* | | *109 %* | *80-120* | | *P3F1803* | *06/17/13* | *06/18/13* | *EPA 8021B* | |
| *Surrogate: 1,4-Difluorobenzene* | | *106 %* | *80-120* | | *P3F1803* | *06/17/13* | *06/18/13* | *EPA 8021B* | |
| **General Chemistry Parameters by EPA / Standard Methods** | | | | | | | | | |
| **Chloride** | **372** | 12.5 | mg/L | 25 | P3F1901 | 06/17/13 | 06/19/13 | EPA 300.0 | |
| **Nitrate as N** | **5.00** | 0.400 | mg/L | 5 | P3F1901 | 06/17/13 | 06/19/13 | EPA 300.0 | |
| **Total Dissolved Solids** | **1220** | 10.0 | mg/L | 1 | P3F2107 | 06/18/13 | 06/21/13 | EPA 160.1 | |
| **Total Metals by EPA / Standard Methods** | | | | | | | | | |
| **Iron** | **2.80** | 1.70 | mg/L | 1 | P3F2605 | 06/18/13 | 06/19/13 | EPA 6010B | SUB-1 |
| **Manganese** | **0.200** | 0.0170 | mg/L | 1 | P3F2605 | 06/18/13 | 06/19/13 | EPA 6010B | SUB-1 |

## MW-7

**3F14001-03 (Water)**

**Permian Basin Environmental Lab, L.P.**

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Organics by GC** | | | | | | | | | |
| Benzene | ND | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| **Toluene** | **0.00126** | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| **Ethylbenzene** | **0.00183** | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| **Xylene (p/m)** | **0.00231** | 0.00200 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| Xylene (o) | ND | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| *Surrogate: 4-Bromofluorobenzene* | | *97.2 %* | *80-120* | | *P3F1803* | *06/17/13* | *06/18/13* | *EPA 8021B* | |
| *Surrogate: 1,4-Difluorobenzene* | | *108 %* | *80-120* | | *P3F1803* | *06/17/13* | *06/18/13* | *EPA 8021B* | |
| **General Chemistry Parameters by EPA / Standard Methods** | | | | | | | | | |
| **Chloride** | **192** | 12.5 | mg/L | 25 | P3F1901 | 06/17/13 | 06/19/13 | EPA 300.0 | |
| **Nitrate as N** | **0.915** | 0.400 | mg/L | 5 | P3F1901 | 06/17/13 | 06/19/13 | EPA 300.0 | |
| **Total Dissolved Solids** | **830** | 10.0 | mg/L | 1 | P3F2107 | 06/18/13 | 06/21/13 | EPA 160.1 | |
| **Total Metals by EPA / Standard Methods** | | | | | | | | | |
| **Iron** | **0.210** | 1.70 | mg/L | 1 | P3F2605 | 06/18/13 | 06/19/13 | EPA 6010B | SUB-1, J |
| **Manganese** | **0.0670** | 0.0170 | mg/L | 1 | P3F2605 | 06/18/13 | 06/19/13 | EPA 6010B | SUB-1 |

| | | |
|---|---|---|
| Pride Energy Company | Project: Pride Energy Company | Fax: (918) 524-9292 |
| P.O. BOX 701950 | Project Number: South Four Lakes Tank Battery | |
| Tulsa OK, 74170-1950 | Project Manager: Matt Pride | |

## MW-9

**3F14001-04 (Water)**

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Permian Basin Environmental Lab, L.P.** | | | | | | | | | |
| **Organics by GC** | | | | | | | | | |
| Benzene | ND | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| **Toluene** | **0.00143** | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| Ethylbenzene | ND | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| Xylene (p/m) | ND | 0.00200 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| Xylene (o) | ND | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| *Surrogate: 4-Bromofluorobenzene* | | *107 %* | *80-120* | | *P3F1803* | *06/17/13* | *06/18/13* | *EPA 8021B* | |
| *Surrogate: 1,4-Difluorobenzene* | | *108 %* | *80-120* | | *P3F1803* | *06/17/13* | *06/18/13* | *EPA 8021B* | |
| **General Chemistry Parameters by EPA / Standard Methods** | | | | | | | | | |
| **Chloride** | **329** | 12.5 | mg/L | 25 | P3F1901 | 06/17/13 | 06/19/13 | EPA 300.0 | |
| **Nitrate as N** | **0.775** | 0.400 | mg/L | 5 | P3F1901 | 06/17/13 | 06/19/13 | EPA 300.0 | |
| **Total Dissolved Solids** | **1360** | 10.0 | mg/L | 1 | P3F2107 | 06/18/13 | 06/21/13 | EPA 160.1 | |
| **Total Metals by EPA / Standard Methods** | | | | | | | | | |
| **Iron** | **0.0870** | 1.70 | mg/L | 1 | P3F2605 | 06/18/13 | 06/19/13 | EPA 6010B | SUB-1, J |
| **Manganese** | **0.140** | 0.0170 | mg/L | 1 | P3F2605 | 06/18/13 | 06/19/13 | EPA 6010B | SUB-1 |

## MW-10

**3F14001-05 (Water)**

**Permian Basin Environmental Lab, L.P.**

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Organics by GC** | | | | | | | | | |
| Benzene | ND | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| Toluene | ND | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| **Ethylbenzene** | **0.00216** | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| **Xylene (p/m)** | **0.00417** | 0.00200 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| Xylene (o) | ND | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| *Surrogate: 4-Bromofluorobenzene* | | *90.1 %* | *80-120* | | *P3F1803* | *06/17/13* | *06/18/13* | *EPA 8021B* | |
| *Surrogate: 1,4-Difluorobenzene* | | *108 %* | *80-120* | | *P3F1803* | *06/17/13* | *06/18/13* | *EPA 8021B* | |
| **General Chemistry Parameters by EPA / Standard Methods** | | | | | | | | | |
| **Chloride** | **213** | 12.5 | mg/L | 25 | P3F1901 | 06/17/13 | 06/19/13 | EPA 300.0 | |
| **Nitrate as N** | **3.44** | 0.400 | mg/L | 5 | P3F1901 | 06/17/13 | 06/19/13 | EPA 300.0 | |
| **Total Dissolved Solids** | **1120** | 10.0 | mg/L | 1 | P3F2107 | 06/18/13 | 06/21/13 | EPA 160.1 | |
| **Total Metals by EPA / Standard Methods** | | | | | | | | | |
| Iron | ND | 1.70 | mg/L | 1 | P3F2605 | 06/18/13 | 06/19/13 | EPA 6010B | SUB-1 |
| Manganese | ND | 0.0170 | mg/L | 1 | P3F2605 | 06/18/13 | 06/19/13 | EPA 6010B | SUB-1 |

## MW-13

**3F14001-06 (Water)**

**Permian Basin Environmental Lab, L.P.**

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Organics by GC** | | | | | | | | | |
| **Benzene** | **0.819** | 0.00500 | mg/L | 5 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| **Toluene** | **0.0202** | 0.00500 | mg/L | 5 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| **Ethylbenzene** | **0.205** | 0.00500 | mg/L | 5 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| **Xylene (p/m)** | **0.453** | 0.0100 | mg/L | 5 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| **Xylene (o)** | **0.0440** | 0.00500 | mg/L | 5 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| *Surrogate: 4-Bromofluorobenzene* | | *82.6 %* | *80-120* | | *P3F1803* | *06/17/13* | *06/18/13* | *EPA 8021B* | |
| *Surrogate: 1,4-Difluorobenzene* | | *94.5 %* | *80-120* | | *P3F1803* | *06/17/13* | *06/18/13* | *EPA 8021B* | |
| **General Chemistry Parameters by EPA / Standard Methods** | | | | | | | | | |
| **Chloride** | **2310** | 25.0 | mg/L | 50 | P3F1901 | 06/17/13 | 06/19/13 | EPA 300.0 | |
| **Nitrate as N** | **0.705** | 0.400 | mg/L | 5 | P3F1901 | 06/17/13 | 06/19/13 | EPA 300.0 | |
| **Total Dissolved Solids** | **5720** | 10.0 | mg/L | 1 | P3F2107 | 06/18/13 | 06/21/13 | EPA 160.1 | |
| **Total Metals by EPA / Standard Methods** | | | | | | | | | |
| **Iron** | **13.0** | 1.70 | mg/L | 1 | P3F2605 | 06/18/13 | 06/19/13 | EPA 6010B | SUB-1 |
| **Manganese** | **4.00** | 0.0170 | mg/L | 1 | P3F2605 | 06/18/13 | 06/19/13 | EPA 6010B | SUB-1 |

| | | |
|---|---|---|
| Pride Energy Company | Project: Pride Energy Company | Fax: (918) 524-9292 |
| P.O. BOX 701950 | Project Number: South Four Lakes Tank Battery | |
| Tulsa OK, 74170-1950 | Project Manager: Matt Pride | |

## MW-14

### 3F14001-07 (Water)

**Permian Basin Environmental Lab, L.P.**

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Organics by GC** | | | | | | | | | |
| Benzene | ND | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| Toluene | ND | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| **Ethylbenzene** | **0.00108** | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| Xylene (p/m) | ND | 0.00200 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| Xylene (o) | ND | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| *Surrogate: 4-Bromofluorobenzene* | | *78.4 %* | *80-120* | | *P3F1803* | *06/17/13* | *06/18/13* | *EPA 8021B* | *S-GC* |
| *Surrogate: 1,4-Difluorobenzene* | | *114 %* | *80-120* | | *P3F1803* | *06/17/13* | *06/18/13* | *EPA 8021B* | |
| **General Chemistry Parameters by EPA / Standard Methods** | | | | | | | | | |
| **Chloride** | **302** | 12.5 | mg/L | 25 | P3F1901 | 06/17/13 | 06/19/13 | EPA 300.0 | |
| **Nitrate as N** | **27.8** | 0.400 | mg/L | 5 | P3F1901 | 06/17/13 | 06/19/13 | EPA 300.0 | |
| **Total Dissolved Solids** | **1380** | 10.0 | mg/L | 1 | P3F2107 | 06/18/13 | 06/21/13 | EPA 160.1 | |
| **Total Metals by EPA / Standard Methods** | | | | | | | | | |
| Iron | ND | 1.70 | mg/L | 1 | P3F2605 | 06/18/13 | 06/19/13 | EPA 6010B | SUB-1 |
| Manganese | ND | 0.0170 | mg/L | 1 | P3F2605 | 06/18/13 | 06/19/13 | EPA 6010B | SUB-1 |

| | | |
|---|---|---|
| Pride Energy Company | Project: Pride Energy Company | Fax: (918) 524-9292 |
| P.O. BOX 701950 | Project Number: South Four Lakes Tank Battery | |
| Tulsa OK, 74170-1950 | Project Manager: Matt Pride | |

## MW-15

**3F14001-08 (Water)**

**Permian Basin Environmental Lab, L.P.**

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Organics by GC** | | | | | | | | | |
| **Benzene** | **0.00565** | 0.00500 | mg/L | 5 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| **Toluene** | **0.0295** | 0.00500 | mg/L | 5 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| **Ethylbenzene** | **0.205** | 0.00500 | mg/L | 5 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| **Xylene (p/m)** | **0.471** | 0.0100 | mg/L | 5 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| **Xylene (o)** | **0.0713** | 0.00500 | mg/L | 5 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| *Surrogate: 4-Bromofluorobenzene* | | *78.2 %* | *80-120* | | *P3F1803* | *06/17/13* | *06/18/13* | *EPA 8021B* | *S-GC* |
| *Surrogate: 1,4-Difluorobenzene* | | *98.7 %* | *80-120* | | *P3F1803* | *06/17/13* | *06/18/13* | *EPA 8021B* | |
| **General Chemistry Parameters by EPA / Standard Methods** | | | | | | | | | |
| **Chloride** | 770 | 12.5 | mg/L | 25 | P3F1901 | 06/17/13 | 06/19/13 | EPA 300.0 | |
| **Nitrate as N** | **0.905** | 0.400 | mg/L | 5 | P3F1901 | 06/17/13 | 06/19/13 | EPA 300.0 | |
| **Total Dissolved Solids** | **1960** | 10.0 | mg/L | 1 | P3F2107 | 06/18/13 | 06/21/13 | EPA 160.1 | |
| **Total Metals by EPA / Standard Methods** | | | | | | | | | |
| **Iron** | **4.00** | 1.70 | mg/L | 1 | P3F2605 | 06/18/13 | 06/19/13 | EPA 6010B | SUB-1 |
| **Manganese** | **2.60** | 0.0170 | mg/L | 1 | P3F2605 | 06/18/13 | 06/19/13 | EPA 6010B | SUB-1 |

## MW-16

**3F14001-09 (Water)**

**Permian Basin Environmental Lab, L.P.**

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Organics by GC** | | | | | | | | | |
| Benzene | ND | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| Toluene | ND | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| Ethylbenzene | ND | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| Xylene (p/m) | ND | 0.00200 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| Xylene (o) | ND | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| *Surrogate: 4-Bromofluorobenzene* | | *96.9 %* | *80-120* | | *P3F1803* | *06/17/13* | *06/18/13* | *EPA 8021B* | |
| *Surrogate: 1,4-Difluorobenzene* | | *117 %* | *80-120* | | *P3F1803* | *06/17/13* | *06/18/13* | *EPA 8021B* | |
| **General Chemistry Parameters by EPA / Standard Methods** | | | | | | | | | |
| **Chloride** | **799** | 12.5 | mg/L | 25 | P3F1901 | 06/17/13 | 06/19/13 | EPA 300.0 | |
| **Nitrate as N** | **4.14** | 0.400 | mg/L | 5 | P3F1901 | 06/17/13 | 06/19/13 | EPA 300.0 | |
| **Total Dissolved Solids** | **1700** | 10.0 | mg/L | 1 | P3F2107 | 06/18/13 | 06/21/13 | EPA 160.1 | |
| **Total Metals by EPA / Standard Methods** | | | | | | | | | |
| Iron | ND | 1.70 | mg/L | 1 | P3F2605 | 06/18/13 | 06/19/13 | EPA 6010B | SUB-1 |
| Manganese | ND | 0.0170 | mg/L | 1 | P3F2605 | 06/18/13 | 06/19/13 | EPA 6010B | SUB-1 |

Pride Energy Company
P.O. BOX 701950
Tulsa OK, 74170-1950

Project: Pride Energy Company
Project Number: South Four Lakes Tank Battery
Project Manager: Matt Pride

Fax: (918) 524-9292

## MW-1D

**3F14001-10 (Water)**

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Permian Basin Environmental Lab, L.P.** | | | | | | | | | |
| **Organics by GC** | | | | | | | | | |
| **Benzene** | **0.872** | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| **Toluene** | **0.00657** | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| **Ethylbenzene** | **0.441** | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| **Xylene (p/m)** | **2.00** | 0.00200 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| **Xylene (o)** | **0.576** | 0.00100 | mg/L | 1 | P3F1803 | 06/17/13 | 06/18/13 | EPA 8021B | |
| *Surrogate: 4-Bromofluorobenzene* | | *109 %* | *80-120* | | *P3F1803* | *06/17/13* | *06/18/13* | *EPA 8021B* | |
| *Surrogate: 1,4-Difluorobenzene* | | *123 %* | *80-120* | | *P3F1803* | *06/17/13* | *06/18/13* | *EPA 8021B* | *S-GC* |
| **General Chemistry Parameters by EPA / Standard Methods** | | | | | | | | | |
| **Chloride** | **813** | 12.5 | mg/L | 25 | P3F1901 | 06/17/13 | 06/19/13 | EPA 300.0 | |
| **Nitrate as N** | **0.795** | 0.400 | mg/L | 5 | P3F1901 | 06/17/13 | 06/19/13 | EPA 300.0 | |
| **Total Dissolved Solids** | **1830** | 10.0 | mg/L | 1 | P3F2107 | 06/18/13 | 06/21/13 | EPA 160.1 | |
| **Total Metals by EPA / Standard Methods** | | | | | | | | | |
| Iron | ND | 1.70 | mg/L | 1 | P3F2605 | 06/18/13 | 06/19/13 | EPA 6010B | SUB-1 |
| **Manganese** | **0.220** | 0.0170 | mg/L | 1 | P3F2605 | 06/18/13 | 06/19/13 | EPA 6010B | SUB-1 |

## MW-1S

**3F14001-11 (Water)**

**Permian Basin Environmental Lab, L.P.**

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Organics by GC** | | | | | | | | | |
| **Benzene** | **1.98** | 0.0250 | mg/L | 25 | P3F1903 | 06/19/13 | 06/19/13 | EPA 8021B | |
| **Toluene** | **0.0308** | 0.0250 | mg/L | 25 | P3F1903 | 06/19/13 | 06/19/13 | EPA 8021B | |
| **Ethylbenzene** | **0.492** | 0.0250 | mg/L | 25 | P3F1903 | 06/19/13 | 06/19/13 | EPA 8021B | |
| **Xylene (p/m)** | **2.57** | 0.0500 | mg/L | 25 | P3F1903 | 06/19/13 | 06/19/13 | EPA 8021B | |
| **Xylene (o)** | **0.794** | 0.0250 | mg/L | 25 | P3F1903 | 06/19/13 | 06/19/13 | EPA 8021B | |
| *Surrogate: 4-Bromofluorobenzene* | | *87.8 %* | *80-120* | | *P3F1903* | *06/19/13* | *06/19/13* | *EPA 8021B* | |
| *Surrogate: 1,4-Difluorobenzene* | | *99.0 %* | *80-120* | | *P3F1903* | *06/19/13* | *06/19/13* | *EPA 8021B* | |
| **General Chemistry Parameters by EPA / Standard Methods** | | | | | | | | | |
| **Chloride** | **323** | 12.5 | mg/L | 25 | P3F1901 | 06/17/13 | 06/19/13 | EPA 300.0 | |
| **Nitrate as N** | **0.680** | 0.400 | mg/L | 5 | P3F1901 | 06/17/13 | 06/19/13 | EPA 300.0 | |
| **Total Dissolved Solids** | **1120** | 10.0 | mg/L | 1 | P3F2107 | 06/18/13 | 06/21/13 | EPA 160.1 | |
| **Total Metals by EPA / Standard Methods** | | | | | | | | | |
| **Iron** | **3.70** | 1.70 | mg/L | 1 | P3F2605 | 06/18/13 | 06/19/13 | EPA 6010B | SUB-1 |
| **Manganese** | **0.420** | 0.0170 | mg/L | 1 | P3F2605 | 06/18/13 | 06/19/13 | EPA 6010B | SUB-1 |

## Organics by GC - Quality Control

## Permian Basin Environmental Lab, L.P.

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch P3F1803 - General Preparation (GC)** | | | | | | | | | | |
| **Blank (P3F1803-BLK1)** | | | | Prepared: 06/17/13 Analyzed: 06/18/13 | | | | | | |
| Benzene | ND | 0.00100 | mg/L | | | | | | | |
| Toluene | ND | 0.00100 | " | | | | | | | |
| Ethylbenzene | ND | 0.00100 | " | | | | | | | |
| Xylene (p/m) | ND | 0.00200 | " | | | | | | | |
| Xylene (o) | ND | 0.00100 | " | | | | | | | |
| *Surrogate: 4-Bromofluorobenzene* | *56.4* | | *ug l* | *60.0* | | *93.9* | *80-120* | | | |
| *Surrogate: 1,4-Difluorobenzene* | *64.4* | | *"* | *60.0* | | *107* | *80-120* | | | |
| **LCS (P3F1803-BS1)** | | | | Prepared: 06/17/13 Analyzed: 06/18/13 | | | | | | |
| Benzene | 0.102 | 0.00100 | mg/L | 0.100 | | 102 | 80-120 | | | |
| Toluene | 0.0855 | 0.00100 | " | 0.100 | | 85.5 | 80-120 | | | |
| Ethylbenzene | 0.0840 | 0.00100 | " | 0.100 | | 84.0 | 80-120 | | | |
| Xylene (p/m) | 0.180 | 0.00200 | " | 0.200 | | 90.0 | 80-120 | | | |
| Xylene (o) | 0.0842 | 0.00100 | " | 0.100 | | 84.2 | 80-120 | | | |
| *Surrogate: 4-Bromofluorobenzene* | *56.8* | | *ug l* | *60.0* | | *94.6* | *80-120* | | | |
| *Surrogate: 1,4-Difluorobenzene* | *52.2* | | *"* | *60.0* | | *87.0* | *80-120* | | | |
| **LCS Dup (P3F1803-BSD1)** | | | | Prepared: 06/17/13 Analyzed: 06/18/13 | | | | | | |
| [redacted] | 0.0878 | 0.00100 | mg/L | 0.100 | | 87.8 | 80-120 | 14.5 | 20 | |
| Toluene | 0.0843 | 0.00100 | " | 0.100 | | 84.3 | 80-120 | 1.46 | 20 | |
| Ethylbenzene | 0.0803 | 0.00100 | " | 0.100 | | 80.3 | 80-120 | 4.47 | 20 | |
| Xylene (p/m) | 0.166 | 0.00200 | " | 0.200 | | 83.2 | 80-120 | 7.80 | 20 | |
| Xylene (o) | 0.0851 | 0.00100 | " | 0.100 | | 85.1 | 80-120 | 0.992 | 20 | |
| *Surrogate: 4-Bromofluorobenzene* | *61.4* | | *ug l* | *60.0* | | *102* | *80-120* | | | |
| *Surrogate: 1,4-Difluorobenzene* | *57.1* | | *"* | *60.0* | | *95.2* | *80-120* | | | |
| **Matrix Spike (P3F1803-MS1)** | | **Source: 3F14001-01** | | Prepared: 06/17/13 Analyzed: 06/18/13 | | | | | | |
| Benzene | 0.0344 | 0.00100 | mg/L | 0.100 | 0.00129 | 33.1 | 80-120 | | | QM-05 |
| Toluene | 0.0296 | 0.00100 | " | 0.100 | 0.00369 | 25.9 | 80-120 | | | QM-05 |
| Ethylbenzene | 0.0578 | 0.00100 | " | 0.100 | 0.0759 | NR | 80-120 | | | QM-05 |
| Xylene (p/m) | 0.0855 | 0.00200 | " | 0.200 | 0.0770 | 4.24 | 80-120 | | | QM-05 |
| Xylene (o) | 0.0255 | 0.00100 | " | 0.100 | 0.0115 | 14.0 | 80-120 | | | QM-05 |
| *Surrogate: 4-Bromofluorobenzene* | *64.7* | | *ug l* | *60.0* | | *108* | *80-120* | | | |
| *Surrogate: 1,4-Difluorobenzene* | *64.2* | | *"* | *60.0* | | *107* | *80-120* | | | |

## Organics by GC - Quality Control

## Permian Basin Environmental Lab, L.P.

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch P3F1903 - General Preparation (GC)** | | | | | | | | | | |
| **Blank (P3F1903-BLK1)** | | | | Prepared & Analyzed: 06/19/13 | | | | | | |
| Benzene | ND | 0.00100 | mg/L | | | | | | | |
| Toluene | ND | 0.00100 | " | | | | | | | |
| Ethylbenzene | ND | 0.00100 | " | | | | | | | |
| Xylene (p/m) | ND | 0.00200 | " | | | | | | | |
| Xylene (o) | ND | 0.00100 | " | | | | | | | |
| *Surrogate: 4-Bromofluorobenzene* | *40.4* | | *ug l* | *60.0* | | *67.3* | *80-120* | | | *S-GC* |
| *Surrogate: 1,4-Difluorobenzene* | *60.9* | | *"* | *60.0* | | *102* | *80-120* | | | |
| **LCS (P3F1903-BS1)** | | | | Prepared & Analyzed: 06/19/13 | | | | | | |
| Benzene | 0.0924 | 0.00100 | mg/L | 0.100 | | 92.4 | 80-120 | | | |
| Toluene | 0.0814 | 0.00100 | " | 0.100 | | 81.4 | 80-120 | | | |
| Ethylbenzene | 0.0848 | 0.00100 | " | 0.100 | | 84.8 | 80-120 | | | |
| Xylene (p/m) | 0.167 | 0.00200 | " | 0.200 | | 83.4 | 80-120 | | | |
| Xylene (o) | 0.0815 | 0.00100 | " | 0.100 | | 81.5 | 80-120 | | | |
| *Surrogate: 4-Bromofluorobenzene* | *51.9* | | *ug l* | *60.0* | | *86.5* | *80-120* | | | |
| *Surrogate: 1,4-Difluorobenzene* | *63.7* | | *"* | *60.0* | | *106* | *80-120* | | | |
| **LCS Dup (P3F1903-BSD1)** | | | | Prepared & Analyzed: 06/19/13 | | | | | | |
| Benzene | 0.0856 | 0.00100 | mg/L | 0.100 | | 85.6 | 80-120 | 7.60 | 20 | |
| Toluene | 0.0819 | 0.00100 | " | 0.100 | | 81.9 | 80-120 | 0.563 | 20 | |
| Ethylbenzene | 0.0829 | 0.00100 | " | 0.100 | | 82.9 | 80-120 | 2.24 | 20 | |
| Xylene (p/m) | 0.164 | 0.00200 | " | 0.200 | | 81.9 | 80-120 | 1.92 | 20 | |
| Xylene (o) | 0.0806 | 0.00100 | " | 0.100 | | 80.6 | 80-120 | 1.10 | 20 | |
| *Surrogate: 4-Bromofluorobenzene* | *57.0* | | *ug l* | *60.0* | | *95.0* | *80-120* | | | |
| *Surrogate: 1,4-Difluorobenzene* | *59.5* | | *"* | *60.0* | | *99.1* | *80-120* | | | |
| **Matrix Spike (P3F1903-MS1)** | **Source: 3F18001-01** | | | Prepared & Analyzed: 06/19/13 | | | | | | |
| Benzene | 0.169 | 0.00100 | mg/L | 0.100 | ND | 169 | 80-120 | | | QM-05 |
| Toluene | 0.148 | 0.00100 | " | 0.100 | ND | 148 | 80-120 | | | QM-05 |
| Ethylbenzene | 0.130 | 0.00100 | " | 0.100 | ND | 130 | 80-120 | | | QM-05 |
| Xylene (p/m) | 0.280 | 0.00200 | " | 0.200 | ND | 140 | 80-120 | | | QM-05 |
| Xylene (o) | 0.115 | 0.00100 | " | 0.100 | ND | 115 | 80-120 | | | |
| *Surrogate: 4-Bromofluorobenzene* | *64.2* | | *ug l* | *60.0* | | *107* | *80-120* | | | |
| *Surrogate: 1,4-Difluorobenzene* | *68.3* | | *"* | *60.0* | | *114* | *80-120* | | | |

## General Chemistry Parameters by EPA / Standard Methods - Quality Control

## Permian Basin Environmental Lab, L.P.

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch P3F1901 - *** DEFAULT PREP *** ** | | | | | | | | | | |
| **Blank (P3F1901-BLK1)** | | | | Prepared: 06/17/13 Analyzed: 06/19/13 | | | | | | |
| Chloride | ND | 0.500 | mg/L | | | | | | | |
| Nitrate as N | ND | 0.0800 | " | | | | | | | |
| **LCS (P3F1901-BS1)** | | | | Prepared: 06/17/13 Analyzed: 06/19/13 | | | | | | |
| Chloride | 9.84 | | mg/L | 10.0 | | 98.4 | 80-120 | | | |
| Nitrate as N | 2.75 | | " | 2.00 | | 137 | 80-120 | | | |
| **LCS Dup (P3F1901-BSD1)** | | | | Prepared: 06/17/13 Analyzed: 06/19/13 | | | | | | |
| Chloride | 9.75 | | mg/L | 10.0 | | 97.5 | 80-120 | 0.970 | 20 | |
| Nitrate as N | 2.73 | | " | 2.00 | | 137 | 80-120 | 0.584 | 20 | |
| **Duplicate (P3F1901-DUP1)** | **Source: 3F14001-01** | | | Prepared: 06/17/13 Analyzed: 06/19/13 | | | | | | |
| Chloride | 250 | 2.50 | mg/L | | 255 | | | 2.10 | 20 | |
| Nitrate as N | 1.18 | 0.400 | " | | 0.540 | | | 74.1 | 20 | |
| **Matrix Spike (P3F1901-MS1)** | **Source: 3F14001-01** | | | Prepared: 06/17/13 Analyzed: 06/19/13 | | | | | | |
| Chloride | 300 | 2.50 | mg/L | 42.5 | 255 | 106 | 80-120 | | | |
| Nitrate as N | 13.7 | 0.400 | " | 8.50 | 0.540 | 155 | 80-120 | | | |
| **Matrix Spike (P3F1901-MS2)** | **Source: 3F14001-11** | | | Prepared: 06/17/13 Analyzed: 06/19/13 | | | | | | |
| Nitrate as N | 53.4 | 2.00 | mg/L | 50.0 | 0.680 | 106 | 80-120 | | | |
| Chloride | 539 | 12.5 | " | 250 | 323 | 86.3 | 80-120 | | | |
| **Batch P3F2107 - *** DEFAULT PREP *** ** | | | | | | | | | | |
| **Blank (P3F2107-BLK1)** | | | | Prepared: 06/18/13 Analyzed: 06/21/13 | | | | | | |
| Total Dissolved Solids | ND | 10.0 | mg/L | | | | | | | |

Pride Energy Company
P.O. BOX 701950
Tulsa OK, 74170-1950

Project: Pride Energy Company
Project Number: South Four Lakes Tank Battery
Project Manager: Matt Pride

Fax: (918) 524-9292

## General Chemistry Parameters by EPA / Standard Methods - Quality Control

## Permian Basin Environmental Lab, L.P.

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch P3F2107 - *** DEFAULT PREP ***** | | | | | | | | | | |
| **Duplicate (P3F2107-DUP1)** | **Source: 3F14001-01** | | | Prepared: 06/18/13 Analyzed: 06/21/13 | | | | | | |
| Total Dissolved Solids | 770 | 10.0 | mg/L | | 815 | | | 5.68 | 20 | |

## Notes and Definitions

| | |
|---|---|
| SUB-1 | Subcontract of analyte/analysis to Test America TCEQ/NELAC # T104704223-10-6-TX |
| S-GC | Surrogate recovery outside of control limits. The data was accepted based on valid recovery of the remaining surrogate. |
| QM-05 | The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable. |
| J | Detected but below the Reporting Limit; therefore, result is an estimated concentration (CLP J-Flag). |
| DET | Analyte DETECTED |
| ND | Analyte NOT DETECTED at or above the reporting limit |
| NR | Not Reported |
| dry | Sample results reported on a dry weight basis |
| RPD | Relative Percent Difference |
| LCS | Laboratory Control Spike |
| MS | Matrix Spike |
| Dup | Duplicate |

Report Approved By: Brent Barron Date: 6/26/2013

Brent Barron, Laboratory Director/Technical Director

PBELAB
Permian Basin Environmental Lab, LP
10014 S. County Road 1213
Midland, Texas 79706
Phone: 432-661-4184

# CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST



| | | | | | |
|---|---|---|---|---|---|
| **Company Name:** | Pride Energy Company | **Company Name:** | Trident Environmental | **Project Name:** | Pride Energy Company |
| **Direct Invoice To:** | Matt Pride | **Project Manager:** | Gil Van Deventer | **Project #:** | South Four Lakes Tank Battery |
| **Billing Address:** | P. O. Box 701950 | **Address:** | PO Box 12177 | **Project Location:** | T12S-R34E, Section 2, Unit Letter G |
| **City, State, Zip Code:** | Tulsa, OK 74170-1950 | **City, State, Zip Code:** | Odessa TX 79768-2177 | **COC #:** | V-126-0613-1 |
| **Telephone No:** | 918-524-9200 | **Telephone No:** | 432-638-8740 | | |
| **Fax No:** | 918-524-9292 | **Fax No:** | 413-403-9968 | | |
| **Email Report to:** | mattp@pride-energy.com | **Email Report to:** | gil@trident-environmental.com | | |
| **Sampler:** | Gil Van Deventer (Printed) | | (Signature) | | |

3F14001

| LAB # (lab use only) | FIELD CODE | Date Sampled | Time Sampled | Field Filtered | No. of Containers | Preservative: Ice | $HNO_3$ | HCl BTEX only) | NaOH | $H_2SO_4$ (Nitrate only) | None (Cl, $SO_4$, $NO_3$, & TDS) | Other ( Specify) | Matrix: Water | Sludge | Soil | Other (specify): | Analyze For: TCLP: TPH: 418.1 8015M 1005 1006 | BTEX 8021B | Volatiles | Semivolatiles | Metals: As Ag Ba Cd Cr Pb Hg Se | Cations (Ca, Mg, Na, K) | Anions (Cl, SO4, CO3, HCO3) | Chloride (325.3 / SM4500B) | Sulfate - $SO_4$ (EPA 375.1 / SM450 | Nitrate - $NO_3$ (EPA WW 352.1) | TDS (160.1 / SM2540C) | Total Fe | Total Mn | SPLP 1312 | TAT: RUSH (Pre-Schedule) | Standard TAT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -01 | MW - 1 | 6-13-13 | 1100 | N | | X | | | | | | | X | | | | | X | | | | | | X | | X | X | X | X | | X |
| -02 | MW - 5 | 6-12-13 | 0930 | N | | X | | | | | | | X | | | | | X | | | | | | X | | X | X | X | X | | X |
| -03 | MW - 7 | 6-13-13 | 1800 | N | | X | | | | | | | X | | | | | X | | | | | | X | | X | X | X | X | | X |
| -04 | MW - 9 | 6-12-13 | 1700 | N | | X | | | | | | | X | | | | | X | | | | | | X | | X | X | X | X | | X |
| -05 | MW - 10 | 6-12-13 | 1600 | N | | X | | | | | | | X | | | | | X | | | | | | X | | X | X | X | X | | X |
| -06 | MW - 13 | 6-13-13 | 1200 | N | | X | | | | | | | X | | | | | X | | | | | | X | | X | X | X | X | | X |
| -07 | MW - 14 | 6-13-13 | 0900 | N | | X | | | | | | | X | | | | | X | | | | | | X | | X | X | X | X | | X |
| -08 | MW - 15 | 6-12-13 | 1500 | N | | X | | | | | | | X | | | | | X | | | | | | X | | X | X | X | X | | X |
| -09 | MW - 16 | 6-12-13 | 1230 | N | | X | | | | | | | X | | | | | X | | | | | | X | | X | X | X | X | | X |
| -10 | RW - 1D | 6-13-13 | 1300 | N | | X | | | | | | | X | | | | | X | | | | | | X | | X | X | X | X | | X |
| -11 | RW - 2S | 6-12-13 | 1000 | N | | X | | | | | | | X | | | | | X | | | | | | X | | X | X | X | X | | X |

**Special Instructions:**
**Email results to: gil@trident-environmental.com and mattp@pride-energy.com**

Sample Containers Intact? Y N
Samples Cool? 3.8 ENCAP N
Laboratory Comments:

| Relinquished by: | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|
| | 6/14/13 | 14:10 | | | |
| Relinquished by: | Date | Time | Received by PBEL: | Date | Time |
| | | | | 6/14/13 | 14:18 |

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

# ANALYTICAL REPORT

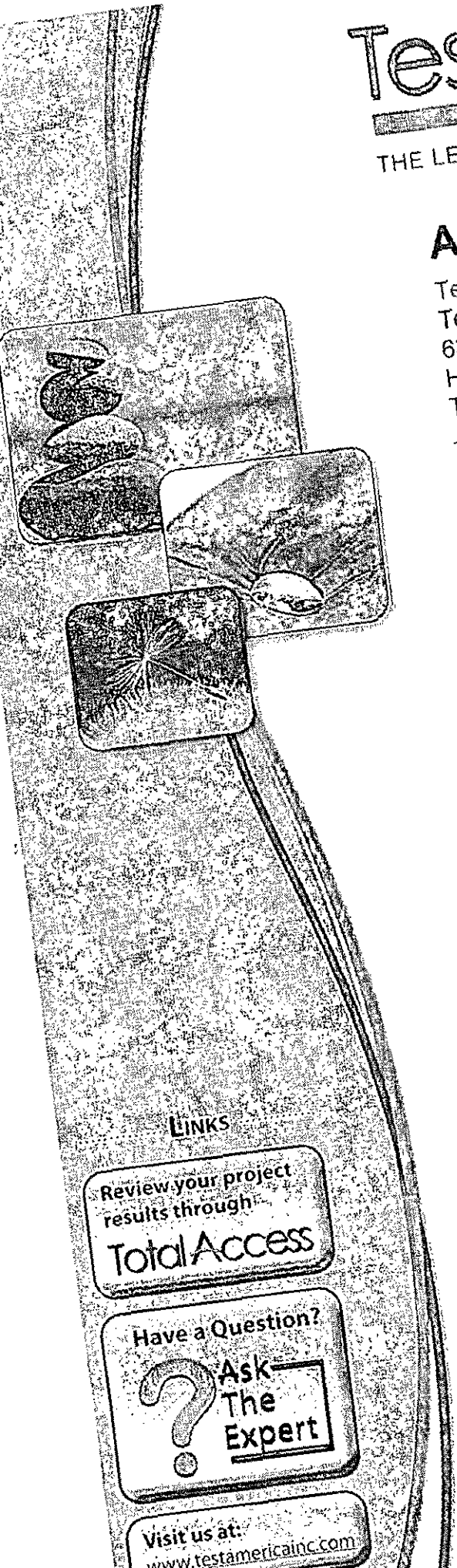
TestAmerica Laboratories, Inc.
TestAmerica Houston
6310 Rothway Street
Houston, TX 77040
Tel: (713)690-4444

TestAmerica Job ID: 600-74862-1
Client Project/Site: Analytical
Revision: 1

For:
Permian Basin Environmental Lab
10014 SCR 1213
Midland, Texas 79706

Attn: Brent Barron

*Authorized for release by:*
*6/26/2013 3:49:40 PM*
Ed Fry, Project Manager II
ed.fry@testamericainc.com



# APPENDIX C

## Well Sample Data Form

## WELL SAMPLING DATA FORM

CLIENT: Pride Energy Company
SITE NAME: South Four Lakes Tank Battery (1R-204)
SITE LOCATION: T12S - R34E - Sec 2, Lea County, NM
SAMPLER: Gil Van Deventer

TRIDENT ENVIRONMENTAL

PURGING METHOD: ☑ Hand Bailed ☑ Pump Type: 12V submersible (MW-15, MW-16, RW1d & RW-2d)
SAMPLING METHOD: ☑ Disposable Bailer ☐ Direct from Discharge Hose ☐ Other:
DISPOSAL METHOD OF PURGE WATER: ☐ On-site Drum ☐ On site discharge ☑ On site SWD (Tank Battery)
DECONTAMINATION METHODS: Nitile gloves, Alconox, and Distilled Water Rinse.

| Date | Time | Monitoring Well No. | Depth to Water (ft btoc) | Total Depth (ft) | Water Column Height (ft) | Volume Purged (gal) | No. of Well Volumes Purged | Purge Method (Hand Bail or Pump) | Field Measurements | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Temp. °C | Cond. (mS/cm) | pH | DO (mg/L) | $Fe^{+2}$ (mg/L) | $NO^{-3}$ (mg/L) |
| 07/03/14 | 1330 | MW-5 | 27.43 | 30.9 | 3.5 | 3 | 5.2 | Hand Bail | 20.6 | 1.04 | 7.56 | 4.7 | 0.61 | 2.4 |
| 07/03/14 | 1200 | MW-7 | 26.15 | 34.0 | 7.9 | 4 | 3.1 | Hand Bail | 20.6 | 1.24 | 7.32 | 1.5 | 0.15 | 2.9 |
| 07/03/14 | 1100 | MW-9 | 26.55 | 30.0 | 3.5 | 4 | 7.0 | Hand Bail | 21.0 | 1.69 | 7.16 | 2.5 | 1.87 | 2.2 |
| 07/03/14 | 1000 | MW-10 | 26.85 | 32.2 | 5.4 | 5 | 5.6 | Hand Bail | 19.1 | 1.33 | 7.32 | 6.3 | 2.00 | 3.5 |
| 07/03/14 | 1300 | MW-13 | 27.86 | 34.0 | 6.1 | 4 | 3.9 | Hand Bail | 20.0 | 4.99 | 6.77 | 2.4 | 8.05 | 2.6 |
| 07/02/14 | 1550 | MW-14 | 30.06 | 37.3 | 7.2 | 4 | 3.3 | Hand Bail | 19.1 | 1.65 | 7.12 | 4.9 | 0.01 | 13.5 |
| 07/02/14 | 1700 | MW-15 | 28.59 | 36.8 | 8.2 | 5 | 3.7 | Pump | 19.2 | 2.66 | 7.05 | 3.5 | 2.01 | 1.7 |
| 07/02/14 | 1510 | MW-16 | 29.75 | 36.4 | 6.7 | 4 | 3.6 | Pump | 19.6 | 1.86 | 7.14 | 3.8 | 0.01 | >25 |
| 07/03/14 | 1410 | RW-1d | 25.57 | 39.5 | 13.9 | 30 | 3.2 | Pump | 21.6 | 2.96 | 7.41 | 1.0 | 1.93 | 1.5 |
| 07/03/14 | 1500 | RW-2d | 25.59 | 39.5 | 14.0 | 30 | 3.2 | Pump | 21.1 | 1.14 | 7.69 | 3.5 | 0.09 | 3.0 |

Comments: Hanna Model 98130 meter used to measure pH, conductivity & temperature. Milwaukee Model SM600 used to measure Dissolved Oxygen.
Hach Model DR-890 used to measure ferrous iron ($Fe^{+2}$) using Method 8146 and nitrate (NO-3) using Method 8171.
Hand delivered samples to Permian Basin Laboratories for BTEX, chloride, sulfate, nitrate, TDS, iron, and manganese analysis.

## WELL SAMPLING DATA FORM

CLIENT: Pride Energy Company
SITE NAME: South Four Lakes Tank Battery
SITE LOCATION: T12S - R34E - Sec 2, Lea County, NM
SAMPLER: Gil Van Deventer

PURGING METHOD: ☑ Hand Bailed ☑ Pump Type: 12V submersible (MW-15, MW-16, & RW1d)
SAMPLING METHOD: ☑ Disposable Bailer ☐ Direct from Discharge Hose ☐ Other:
DISPOSAL METHOD OF PURGE WATER: ☐ On-site Drum ☐ On site discharge ☑ On site SWD (Tank Battery)
DECONTAMINATION METHODS: Nitile gloves, Alconox, and Distilled Water Rinse.

| Date | Time | Monitoring Well No. | Depth to Water (ft btoc) | Total Depth (ft) | Water Column Height (ft) | Volume Purged (gal) | No. of Well Volumes Purged | Purge Method (Hand Bail or Pump) | Field Measurements | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Temp. °F | Cond. (mS/cm) | pH | DO (mg/L) | $Fe^{+2}$ (mg/L) | $NO^{-3}$ (mg/L) | $SO_4$ (mg/L) |
| 6/13/2013 | 1100 | MW-1 | 26.44 | 31.0 | 4.6 | 4 | 5.3 | Hand Bail | 77.0 | 1.07 | 7.07 | 1.4 | 0.77 | 2.4 | |
| 6/12/2013 | 0930 | MW-5 | 27.73 | 30.9 | 3.2 | 3 | 5.7 | Hand Bail | 66.3 | 1.96 | 7.61 | 4.2 | 1.00 | 3.1 | 190 |
| 6/12/2013 | 1800 | MW-7 | 26.55 | 34.0 | 7.5 | 4 | 3.2 | Hand Bail | 70.8 | 1.30 | 7.50 | 1.1 | 2.08 | 0.9 | 150 |
| 6/12/2013 | 1700 | MW-9 | 26.92 | 30.0 | 3.1 | 3 | 5.8 | Hand Bail | 69.9 | 1.91 | 7.43 | 1.8 | 1.23 | 0.6 | 280 |
| 6/12/2013 | 1600 | MW-10 | 27.29 | 32.2 | 4.9 | 5 | 6.1 | Hand Bail | 71.0 | 1.54 | 7.32 | 5.0 | 0.69 | 2.3 | 290 |
| 6/13/2013 | 1200 | MW-13 | 28.19 | 34.0 | 5.8 | 4 | 4.1 | Hand Bail | 75.0 | 5.59 | 7.05 | 2.1 | 19.3 | 1.7 | |
| 6/13/2013 | 0900 | MW-14 | 30.27 | 37.3 | 7.0 | 2 | 1.7 | Hand Bail | 66.1 | 1.86 | 7.20 | 3.5 | 0.00 | 16.3 | 180 |
| 6/13/2013 | 1500 | MW-15 | 28.87 | 36.8 | 7.9 | 6 | 4.5 | Pump | 74.0 | 3.24 | 7.04 | 2.3 | 12.3 | 0.0 | 12 |
| 6/12/2013 | 1230 | MW-16 | 29.93 | 36.4 | 6.5 | 5 | 4.6 | Pump | 70.0 | 2.10 | 7.08 | 3.5 | 0.00 | 4.4 | |
| 6/13/2013 | 1300 | RW-1d | 26.03 | 39.5 | 13.5 | 40 | 4.5 | Pump | 74.5 | 3.17 | 8.50 | 1.3 | 3.80 | 0.80 | |
| 6/13/2013 | 1000 | RW-2s | NM | 39.5 | 14.0 | 50 | 5.4 | Windmill | 74.0 | 1.78 | 7.25 | 2.3 | 3.80 | 0.80 | 55 |

COMMENTS: Hanna Model 98130 meter used to obtain pH, conductivity, and temperature readings. Milwaukee Model SM600 used for DO readings. Hach Model DR-890 used to measure ferrous iron ($Fe^{+2}$), nitrate ($NO^{-3}$), and sulfate ($SO_4$) using Hach Methods 8146, 8171, and 8000, respectively.

Hand delivered samples to Permian Basin Laboratories for BTEX, chloride, TDS, sulfate, iron, and manganese analysis.