April 12, 2013

Mr. W. Owen Thompson
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Subject: Submittal of Draft Dense Non-Aqueous Phase Liquid (DNAPL) Recoverability Evaluation Report
Detrex Source Control Area – Fields Brook Superfund Site
Detrex Corporation, Ashtabula, Ohio
Docket No. V-W-98-C-450

Dear Mr. Thompson:

On behalf of Detrex Corporation (Detrex), URS Corporation (URS) has prepared the attached Draft Dense Non-Aqueous Phase Liquid (DNAPL) Recoverability Evaluation Report. This work was performed in accordance with the Revised Final Additional DNAPL Recovery Well Installation and Testing Work Plan that was submitted to USEPA on November 1, 2012. This report is being submitted to you via email with two (2) hard copies to follow via U.S. Mail.

If you have any questions regarding the information provided in this submittal, please do not hesitate to contact me at your convenience at 216-622-2432.

Sincerely,

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DRAFT

DENSE NON-AQUEOUS PHASE LIQUID (DNAPL) RECOVERABILITY EVALUATION REPORT

DETREX RD/RA SOURCE CONTROL AREA
DETREX FACILITY
ASHTABULA, OH
DOCKET NO. V-W-98-C-450

Prepared for
Detrex Corporation
Ashtabula, OH

April 12, 2013

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URS Corporation (URS), on behalf of Detrex Corporation (Detrex), is providing the following Dense Non-Aqueous Phase Liquid (DNAPL) Recoverability Evaluation Report based on the findings of recently completed work at the Detrex Facility in Ashtabula, Ohio (Site). The work, documented herein, includes the following:

- Geoprobe® Investigation;
- Recovery Well and Monitoring Point Installation;
- DNAPL Recoverability Testing;
- DNAPL and Groundwater Characterization; and
- Study Area Monitoring Well Surveying and Gauging.

All of the completed activities were conducted on behalf of Detrex as part of the Additional DNAPL Recovery Well Installation and Testing Work Plan dated August 24, 2012 (URS, 2012). In preparation for this work effort, Detrex, in response to correspondences from United States Environmental Protection Agency (USEPA), submitted specific procedures for the DNAPL recoverability testing. USEPA approved the Work Plan in November 2012. A Current Site Features Map identifying the DNAPL recoverability study area is provided as Figure 1.1.

The information in this report is presented in the following five sections:

- **Section 1 – Introduction**: This section was presented in the previous paragraphs.
- **Section 2 – Description of Field Procedures**: This section describes the field procedures including: soil boring investigation, recovery well installation, DNAPL and groundwater sampling, well inventory / gauging, and four specific procedures for the DNAPL recoverability testing.
- **Section 3 – DNAPL Recoverability Test Results**: This section summarizes test results for the data collected and evaluation for each test procedure implementation.
- **Section 4 – DNAPL Recoverability Evaluation**: This section presents the review / evaluation of the DNAPL recoverability testing results based on a compilation of historical and current data for the Site.
- **Section 5 – Conclusions and Recommendations**: This section presents the conclusions and recommendations developed from reviewing the data obtained during the recent, DNAPL recoverability testing and historical field activities.

This section of the report describes the field methodologies / procedures, as well as the four (4) specific DNAPL recoverability testing procedures in the North and South DNAPL Recovery Well Areas at the Site.

2.1 PREVIOUS MEMBRANE INTERFACE PROBE (MIP) INVESTIGATION AND ADDITIONAL SOIL BORINGS

The results of a separately completed Membrane Interface Probe (MIP) Investigation, submitted by Detrex to USEPA on April 30, 2012, indicated that DNAPL impacted zones within the Lacustrine Clay and Glacial Till Zones were identified using MIP technology. When DNAPL was encountered in the subsurface soils, it was typically identified in discrete thin lenses from approximately 5 to 25 feet below ground surface (ft-bgs). In order to further confirm the distribution of DNAPL in the study area, seven (7) additional confirmatory soil borings were completed at select locations based on the MIP logs. These borings also indicated that DNAPL was visually observed as ganglia within thin discontinuous saturated zones found in sand lenses. Additionally, it is noted that during drilling any thin crack or void encountered with a DNAPL seep was typically encountered in the range of 10 to 15 ft-bgs. The MIP data further indicated that DNAPL impacts to the soil and groundwater were typically found at or near the base of the former (backfilled) lagoon area, but no thick / extensive zones or layers of DNAPL were observed at the Site (URS, 2012a).

During an April 6, 2012, meeting between Detrex and personnel for Ohio EPA and USEPA, Detrex was requested to complete additional soil borings within and near the former Lagoon Area. These borings were requested to identify the DNAPL occurrence in the backfilled soils and natural deposits in the former lagoon area. Fourteen (14) soil borings were advanced. DNAPL was observed in wet silt lenses beneath the former lagoon area (20 to 25 ft-bgs) and within the screened interval of existing DNAPL recovery wells from 20 to 30 ft-bgs (URS, 2012b).

Both investigations confirmed the previously reported subsurface conditions of low permeability clay soils overlying lower permeability glacial till (URS, 2012a, b). The additional soil borings report submitted to USEPA in May 2012 concluded that the subsurface soils are not conducive for extracting significant quantities of groundwater or DNAPL. Also, due to the low permeability of the fine grained soils, groundwater and DNAPL have limited lateral and vertical mobility.

2.2 GEOPROBE® BORINGS, MONITORING POINTS AND RECOVERY WELLS

2.2.1 Geoprobe® Soil Borings

The Geoprobe® investigation was conducted within and near the former Lagoon area, to further evaluate existing soil, groundwater and DNAPL distribution conditions, in order to locate/identify potential DNAPL recovery well locations and select intervals for screened portions of the wells.

Between October 10 and 12, 2012, URS subcontracted Frontz Drilling to advance seventeen (17) DNAPL investigation soil borings using a Geoprobe® track mounted rig as depicted in

picture **P-1** in **Appendix A**. The Geoprobe® uses direct push technology which uses hydraulics and the weight of the rig to advance a five-foot, acetate lined sampler to a predetermined depth. For this field work, soil samples were collected until encountering the glacial till interface (approximately 15 to 20 ft-bgs). Once the direct push sampler reached each depth interval, the sampler was retrieved. The internal liner was opened to expose the sample core, and the sample was split lengthwise. The exposed surface of the soil samples from each boring were arranged in order of drilling then photographed as depicted in **Appendix A**. A qualified URS geologist collected, classified, and logged soil samples using the Unified Soil Classification System (USCS) in accordance with the American Society of Testing and Materials D2488-00 (ASTM, 2000). The boring logs are included in **Appendix B**. The locations of the soil borings are provided on **Figure 2.1.**

The 17 Geoprobe® soil borings were completed with the following aspects noted from the evaluation of this investigatory work:

- **Former Lagoon Area** – This area is backfilled with compacted low permeability clay soils over low permeability lacustrine silt and clay natural soil deposits. Within this area, DNAPL is generally found in thin lenses at depths ranging from 12.5 to 26 ft-bgs, as depicted in borings GP-51, GP-54, GP-54, GP-57 and GP-59. When encountered, the DNAPL is typically found beneath the backfill material in the underlying lacustrine/glacial till soils.
- **Outside the Former Lagoon Area** – This area is characterized by low permeability natural clay soils over low permeability lacustrine silts and clay deposits and glacial till. Within this area, DNAPL is typically found in thin lenses at depths ranging from 5to 10.5 ft-bgs as depicted in borings GP-60, GP-61, GP-62, GP-64 and GP-66. When encountered, the DNAPL is typically found at the contact between the geo stratigraphic layers.

Based on an evaluation of the plethora of data gathered during the various investigations, the DNAPL Recovery Well Pilot Study Area was divided into two sections, which are referred to as the Northern and Southern Areas. The Northern Area is representative of backfilled soils in the former Lagoon Area, and is depicted in **Figure 2.2**. The Southern Area is representative of undisturbed naturally occurring soils outside the former Lagoon Area and is depicted in **Figure 2.3**.

It is further noted that, based on a review of the Geoprobe® investigation boring logs and discussions between Detrex, URS, OEPA, and USEPA on-site personnel, all parties were in agreement with the selected DNAPL recovery well locations and depth and length of screened intervals.

2.2.2 Recovery Well Installations

Frontz Drilling completed the drilling and installation of six (6) DNAPL recovery wells using a Versa-Drill® sonic truck mounted drill rig as depicted in picture **P-2** in **Appendix A**. Excavated soils from the borings were placed in the Soil Management Area (SMA) located within the former Lagoon Area (i.e., south of RW18) as depicted in **Figure 2.1**.

Three DNAPL recovery wells (RW-15, RW-16, and RW-17) were installed in the Northern Area and three DNAPL recovery wells (RW-18, RW-19 and RW-20) were installed in the Southern Area. The locations of DNAPL recovery wells RW-15 through RW-20 area provided on **Figure 2.1**. The recovery wells were installed as 6-inch stainless steel with a 2 feet bottom sump, 4 feet screened section, and bentonite sealed riser. Recovery well construction diagrams are provided in **Appendix B**.

2.2.3 Monitoring Point and Nested Piezometer Installations

In addition to the DNAPL recovery wells, nine (9) monitoring points were installed in the Northern Area along with nine nested piezometers adjacent to RW-17. The locations of the Northern Area monitoring points and nested piezometers are presented on **Figure 2.2.** In addition to the DNAPL recovery wells, eleven (11) monitoring points were installed in the Southern Area along with eight nested piezometers adjacent to RW-20. The locations of the Southern Area monitoring points and nested piezometers are presented on **Figure 2.3.** The monitoring points in both areas were installed to provide data related to fluid levels and the extent of induced vacuum in the subsurface during recoverability testing. The nested piezometers were installed in both areas to identify the vertical presence of DNAPL within 1 foot depth intervals in the subsurface.

The monitoring points were constructed using 1-inch polyvinyl chloride (PVC) with a slotted screen over the same depth interval as each nearby DNAPL recovery well, #5 filter sand pack and a bentonite sealed riser. The boring logs and construction diagrams are presented in **Appendix B**. Cross Sections depicting site conditions in the Northern and Southern Recovery Well areas are shown on **Figures 2.4** and **2.5.** These cross sections illustrate the screened interval of the recovery wells and adjacent monitoring points. The layout of the nested piezometer arrays are presented in **Figures 2.6** and **2.7**.

2.3 WELL INVENTORY AND GAUGING

On October 23 and 24, 2012, URS located and gauged wells within and around the perimeter of the former Lagoon Area, as outline in the well inventory task of the approved Work Plan. The screened interval of older wells was confirmed by inserting ¼-inch stainless steel tubing along the side of the well casing to manually check the slotted well casing. The results of the well inventory summary are presented in **Table 2.1**. Each location was surveyed relative to a site benchmark using a Leica GNSS / GPS system accurate to within +/- 0.01 feet. The recovery well and monitoring point locations were surveyed for northing and easting coordinates and placed spatially by state plane coordinate system using the Leica GNSS / GPS system. Well coordinates along with DNAPL and Groundwater elevations are provided in **Table 2.1** and in **Appendix D**.

The monitoring wells, recovery wells, and piezometers around the former Lagoon Area were monitored throughout the testing period. Upon completion of the recovery well testing program, all wells in the former Lagoon Area and perimeter were gauged weekly from February 5 through 25, 2013. During this time, four additional 2-inch PVC perimeter wells were located, which were not previously found during the initial well inventory. The locations of all

wells identified during the inventory are presented on **Figure 2.1**. DNAPL and groundwater measurements are presented in **Table 2.2**.

2.4 WELL DEVELOPMENT

Historically, silt accumulation within operating DNAPL recovery wells and monitoring wells at the Site has been problematic. In order to further evaluate silting potential, any silt accumulation in the DNAPL recovery wells and monitoring point wells was removed prior to the start of testing. Silt removal was completed on November 12 through 14, 2012, by surging then purging the initial well volume. Potable water was added to continue cleaning silt from the well in cycles. The purged well volumes were removed via high vacuum mounted tanker truck. The approximate depth to silt, water and DNAPL levels along with the number of surge/purge cycles are presented in **Table 2.3**. Details related to the well development procedures are presented in **Appendix E**.

2.5 RECOVERABILITY TESTING PROGRAM PROCEDURES

The sequential steps for each of the four specific procedures for the DNAPL recoverability testing are provided in **Appendix E**. For recoverability testing involving the use of an enhanced vacuum, URS constructed a well seal headpiece suitable for completing the testing. A Dual Phase Extraction (DPE) trailer, rented from ProAct Services, was utilized to provide the applied vacuum for the DNAPL recoverability testing. The applied vacuum setup is depicted in picture **P-3** in **Appendix A**.

2.5.1 Procedure One – Peristaltic Pump (DNAPL or Groundwater Only)

Procedure One was designed for the removal of DNAPL or Groundwater using a peristaltic pump and disposable tubing without applying a vacuum. The equipment used in this procedure test is depicted in picture **P-4** in **Appendix A**.

2.5.2 Procedure Two - Dual Pumps / Applied Vacuum

Procedure Two was designed for the simultaneous removal of DNAPL and Groundwater using dual piston pumps with applied vacuum. The dual piston pump assembly is depicted in picture **P-5** in **Appendix A**.

2.5.3 Procedure Three - Total Fluids / Applied Vacuum

Procedure Three was designed for the simultaneous removal of DNAPL and Groundwater using a peristaltic pump with applied vacuum. The testing setup is depicted in picture **P-6** in **Appendix A**.

2.5.4 Procedure Four – Recovery Well Groups / Initial Applied Vacuum

Procedure Four was designed to simulate the operation of the previously proposed mobile DNAPL recovery unit (MDRU) as outlined in previous Detrex submittals. This procedure involved the simultaneous testing of three DNAPL recovery wells with the application of an initial applied vacuum followed by shut in of the recovery wells. After allowing a period of time

to pass, DNAPL was removed from the recovery well using a peristaltic pump. The testing setup is depicted in picture **P-7** in **Appendix A**.

2.5.5 Long Term DNAPL Recoverability – RW-17

Following the completion of Procedures One through Four and a preliminary evaluation of the DNAPL recoverability data, long-term DNAPL recoverability testing was completed at RW-17 located in the Northern Area. This procedure was designed to provide for the simultaneous removal of DNAPL and groundwater using dual piston pumps or peristaltic pumps with applied vacuum. The testing steps for the long-term recoverability test are the same as those used in Procedure 2 (see **Appendix E**). The testing assembly is depicted in picture **P-5** in **Appendix A**.

2.6 DNAPL AND GROUNDWATER SAMPLING

URS completed DNAPL and groundwater sampling at two recovery wells (RW-17, RW-19), five monitoring wells (DETMW-6S, DETMW-8S, DETMW-9, DETMW-10, and MW-13-2), and one piezometer (GP-15) in the Study Area for physical and chemical characterization. Per the approved Work Plan, nine sampling locations were proposed; three samples were to be collected from the perimeter of the former Lagoon Area, three samples from the center of the former Lagoon Area and three samples from downgradient wells (URS, 2012c). It is noted that only two samples were collected from the center of the former Lagoon Area, as existing monitoring well MW-14-3 did not contain sufficient DNAPL for sampling.

DNAPL and Groundwater samples were obtained using a bailer from each well and transferred to laboratory supplied containers with the required sample volumes for the noted parameter list. DNAPL samples were submitted to two laboratories, Precision Analytical for chemical characterization and Torkelson Geochemistry for physical characterization. DNAPL samples were submitted to Precision Analytical for volatile organic compound (VOC) and semi-volatile organic compound (SVOC) analysis with Gas Chromatography–Mass Spectrometry (GC-MS) plots. DNAPL samples shipped to Torkelson Geochemistry were submitted for analysis of viscosity, density, surface tension and interfacial tension of DNAPL and groundwater. Groundwater samples were also collected and shipped to Torkelson Geochemistry for analysis of surface tension of groundwater and for the interfacial tension of DNAPL and groundwater.

Physical characterization DNAPL samples were stored without preservatives; however, VOC samples, SVOC samples, and groundwater samples were kept on ice and submitted to the respective laboratory on ice. Proper chain of custody was maintained during sample handling and shipping activities. DNAPL and Groundwater analytical results are discussed in **Section 3.3** and the laboratory analytical reports are included in **Appendix G**.

This section presents a summary of the data collected from the DNAPL Recoverability testing completed in both the Northern and Southern DNAPL Recovery Areas. This section also includes the data from the DNAPL and groundwater sampling and analysis.

3.1 NORTHERN AREA

All four of the DNAPL Recoverability test procedures were completed in the Northern Area (former Lagoon Area backfill). A summary of the results and other pertinent details for each of the testing procedures is presented below. A tabulated summary of all four procedures is presented in **Table 3.1**.

3.1.1 Procedure One – Peristaltic Pump (DNAPL or Groundwater Only)

Groundwater only

Between November 27 and 29, 2012, groundwater was removed from each of the new DNAPL recovery wells in the Northern Area (i.e., RW-15, RW-16 and RW-17). Groundwater removal was facilitated utilizing a peristaltic pump and disposable tubing (see Section 2.5.1 and **Appendix E**). Groundwater was removed from each well and during this testing period surrounding wells were gauged to observe any change in fluid levels with respect to groundwater levels and DNAPL thickness. A tabulated summary of Procedure One – Groundwater Only Removal is presented in **Table 3.2.** Daily reports and field sheets for each test are attached in **Appendix C.**

DNAPL only

On November 30, 2012, DNAPL was removed from each of the new DNAPL recovery wells in the Northern Area utilizing a peristaltic pump and disposable tubing (see Section 2.5.1 and **Appendix E**). DNAPL was removed from each individual recovery well to observe changes in DNAPL thickness, observed DNAPL recharge rates, and fluid levels in surrounding monitoring points. A tabulated summary of Procedure One – DNAPL Only Removal is presented in **Table 3.3.** Daily reports and field sheets for each test are attached in **Appendix C.**

3.1.2 Procedure Two - Dual Pumps / Applied Vacuum

Between December 7 and 14, 2012, DNAPL and groundwater were recovered simultaneously using dual piston pumps and applied vacuum from each of the new DNAPL Recovery wells in the Northern Area (see section 2.5.2 and **Appendix E**). Additionally, monitoring points surrounding each DNAPL Recovery well were equipped with quick-disconnect fittings to facilitate the measurement of observed vacuum radial influence due to the applied vacuum at each DNAPL Recovery well. Vacuum measurements were completed using appropriately scaled magnehelic gauges that were installed on the monitoring points prior to the start of testing. Procedure Two was completed on each of the individual DNAPL recovery wells in the Northern Area (i.e., RW-15, RW-16 and RW-17). However, it is noted that three attempts were completed at DNAPL Recovery well RW-16. The first attempt on December 10, 2012, was aborted due to an electrical short in the groundwater piston pump wiring. The second attempt on December 11, 2012, was the most successful and the results are summarized below. A third

test attempt was made on December 14, 2012, due to low recovery of DNAPL from the second attempt. The third test attempt was aborted because the groundwater piston pump flow rate was not controllable, and as a result the piston pumps were shipped back to the manufacturer for repair. Other than RW-16, the other DNAPL Recovery wells were tested with no significant issues. A tabulated summary of Procedure Two is presented in **Table 3.4.** Daily reports and field sheets for each test are attached in **Appendix C.** Vacuum influence on the surrounding monitoring points and applied vacuum to each recovery well are depicted on **Figures 3.1** through **3.3**, and the observed vacuum data are provided in **Appendix C**.

3.1.3 Procedure Three - Total Fluids / Applied Vacuum

Between December 18 through 20, 2012 and on December 26, 2012, DNAPL and Groundwater were recovered as total fluids from each of the new DNAPL Recovery well locations in the Northern Area utilizing a peristaltic pump under applied vacuum (see Section 2.5.3 and **Appendix E)**. Monitoring points surrounding each recovery well were equipped with quick-disconnect fittings to read vacuum influence during each test, as described in **Section 3.1.2**. Procedure Three was also completed on each of the individual DNAPL recovery wells in the Northern Area (i.e., RW-15, RW-16 and RW-17). However, it is noted that two tests were conducted on DNAPL Recovery well RW-16. The first test conducted on December 18, 2012, was truncated due to air entering the peristaltic pump tubing when applied vacuum was increased to 14.0 inches of mercury (Hg). After this test, a check-valve was added to the intake end of the peristaltic pump tubing. A second test on RW-16 was conducted on December 19, 2012 using the check-valve. A tabulated summary of Procedure Three is presented in **Table 3.5.** Daily reports and field sheets for each test are attached in **Appendix C.** Vacuum influence on the surrounding monitoring points and applied vacuum to each recovery well are depicted on **Figures 3.4** through **3.7**, and the observed vacuum data are provided in **Appendix C**.

3.1.4 Procedure Four – Recovery Well Groups / Total Fluids Initial Applied Vacuum

Between January 15 and 16, 2013, DNAPL was recovered from each of the new DNAPL Recovery well locations in the Northern Area utilizing a peristaltic pump after the initial application of an induced vacuum for approximately 3 hours (see Section 2.5.4 and **Appendix E**). Groundwater in each of the DNAPL recovery wells was removed prior to applying the initial vacuum in order to prevent excessive mounding of groundwater under vacuum influence and to prevent groundwater from entering the vacuum line intake. Following the removal of fluids from the DNAPL recovery wells, a vacuum was then applied at 25.0 inches of Hg using the DPE trailer unit. Upon completion of the vacuum application, total fluids were removed from the recovery wells using a peristaltic pump. Monitoring points surrounding each recovery well were equipped with quick-disconnect fittings to read vacuum influence during each test, as described in **Section 3.1.2**. As noted, Procedure Four was also completed simultaneously on all of the individual DNAPL recovery wells in the Northern Area (i.e., RW-15, RW-16 and RW-17). A tabulated summary of Procedure Four is presented in **Table 3.6.** Daily reports and field sheets for each test are attached in **Appendix C.** Vacuum influence on the surrounding monitoring points and applied vacuum to the recovery wells are depicted on **Figure 3.8**, and the observed vacuum data are provided in **Appendix C**.

3.1.5 Long-Term DNAPL Recoverability – RW-17

Following the completion of the individual DNAPL Recovery wells in the Northern Area, a long-term test (i.e., approximately 3.5 days) using Procedure Two was initiated at DNAPL Recovery well RW-17 on January 23, 2013. RW-17 was selected based on data collected from the four testing procedures, which indicated RW-17 had the potential for favorable DNAPL recovery. The initial long-term test was aborted approximately four hours into the test because the DNAPL piston pump experienced an electrical failure. After determining that the DNAPL piston pump could not be repaired in a practical time frame, a second long-term test was initiated on January 29, 2013, using a high volume peristaltic pump to replace the DNAPL piston pump. Twenty-nine (29) hours into the second long-term test, the groundwater piston pump stopped discharging water under the applied vacuum. The test was continued with simultaneous DNAPL and groundwater recovery utilizing the high volume peristaltic pump. It is also noted that the long-term test was operated at a constant vacuum of 10-in Hg based on the evaluation of the data from the individual test. Monitoring points surrounding the recovery well were equipped with quick-disconnect fittings to read vacuum influence during the test. A tabulated summary of Procedure Four is presented in **Table 3.7.** Daily reports and field sheets for the long-term test are attached in **Appendix C.** Vacuum influence on the surrounding monitoring points and applied vacuum to the recovery wells are depicted on **Figure 3.9**, and the observed vacuum data are provided in **Appendix C**.

3.2 SOUTHERN AREA

Three of the DNAPL recoverability test procedures were completed in the Southern Area (Undisturbed subsurface). Procedure Two was not tested in the Southern Area due to groundwater and DNAPL recovery pump issues and trace amounts of DNAPL within two of three of the recovery wells (RW-17, 18, and 20). Summaries of results with evaluations of each test procedure are discussed below.

3.2.1 Procedure One – Peristaltic Pump (DNAPL or Groundwater only)

Groundwater only

Between November 28 and 29, 2012, groundwater was removed from each of the new DNAPL recovery wells in the Southern Area (i.e., RW-18, RW-19 and RW-20). Groundwater removal was facilitated utilizing a peristaltic pump and disposable tubing (see Section 2.5.1 and **Appendix E**). Groundwater was removed from each well and surrounding wells were gauged to observe any change in fluid levels with respect to groundwater levels and DNAPL thickness. A tabulated summary of Procedure One –Groundwater Only removal is presented in **Table 3.2.** Daily reports and field sheets for each test are attached in **Appendix C.**

DNAPL only

On November 30, 2012, DNAPL was removed from only one of the new DNAPL recovery wells (RW-19) in the Southern Area utilizing a peristaltic pump and disposable tubing (see Section 2.5.1 and **Appendix E**). RW-18 and RW-20 did not show the presence of any DNAPL and therefore were determined to be unsuitable for testing DNAPL recovery. DNAPL was removed from RW-19 to observe changes in DNAPL thickness, observed DNAPL recharge rates, and fluid

levels in surrounding monitoring points. No testing was completed in either RW-18 or RW-20 as no DNAPL was observed in RW-18 and only a trace / non-recoverable amount of DNAPL was observed in RW-20. A tabulated summary of Procedure One – DNAPL Only Removal is presented in **Table 3.3.** Daily reports and field sheets for each test are attached in **Appendix C.**

3.2.2 Procedure Two - Dual Pumps / Applied Vacuum

Procedure Two was not completed in any of the new DNAPL Recovery well located in the Southern Area due to operational issues with the dual piston groundwater and DNAPL recovery pumps, as well as the observed presence of limited DNAPL in RW-19. It is noted that DNAPL Recovery wells RW-18 and RW-20 contained less than 0.01 feet of DNAPL. Additionally, as noted in **Section 3.1.2**, the groundwater and DNAPL piston pumps had difficulty with operations and upon discussion with USEPA personnel, Procedure Two was discontinued in the Southern Area.

3.2.3 Procedure Three - Total Fluids / Applied Vacuum

Between January 2 through 9, 2013, DNAPL and groundwater were recovered as total fluids from each of the new DNAPL Recovery well locations (i.e.,RW-18, RW-19 and RW-20) in the Southern Area utilizing a peristaltic pump under applied vacuum (see Section 2.5.3 and **Appendix E)**. Monitoring points surrounding each recovery well were equipped with quick-disconnect fittings to read vacuum influence during each test, as described in **Section 3.1.2**. However, it is noted that three tests were conducted on DNAPL Recovery well RW-19. The first two tests were conducted on January 7 and 8, 2013, but were truncated due to the DPE trailer vacuum system overheating. After the first tests, the auto switch to cool the vacuum compressor was replaced by a manual switch. The third test on RW-19 was conducted on January 9, 2013. A tabulated summary of Procedure Three is presented in **Table 3.5.** Daily reports and field sheets for each test are attached in **Appendix C.** Vacuum influence on the surrounding monitoring points and applied vacuum to each recovery well are depicted on **Figures 3.11** through **3.13**, and the observed vacuum data are provided in **Appendix C**.

3.2.4 Procedure Four – Recovery Well Groups /Initial Applied Vacuum

Between January 14, 2013, DNAPL was recovered from each of the new DNAPL Recovery well locations in the Southern Area utilizing a peristaltic pump after the initial application of an induced vacuum for approximately 2 hours (see Section 2.5.4 and Appendix E). Total fluids in each of the DNAPL recovery wells was removed prior to applying the initial vacuum in order to prevent excessive mounding of groundwater under vacuum influence and to prevent groundwater from entering the vacuum line intake. Following the removal of total fluids from the DNAPL recovery wells, a vacuum was then applied at 25.0 inches of Hg using the DPE trailer unit. Upon completion of the vacuum application, total fluids were removed from the recovery wells using a peristaltic pump. Monitoring points surrounding each recovery well were equipped with quick-disconnect fittings to read vacuum influence during each test, as described in Section 3.1.2. As noted, Procedure Four was also completed simultaneously on all of the individual DNAPL recovery wells in the Southern Area (i.e., RW-18, RW-19 and RW-20). No DNAPL was recovered from RW-18 or RW-20. A tabulated summary of Procedure Four is

presented in Table 3.6. Daily reports and field sheets for each test are attached in Appendix C. Vacuum influence on the surrounding monitoring points and applied vacuum to the recovery wells are depicted on **Figure 3.14**, and the observed vacuum data are provided in **Appendix C**.

3.3 DNAPL AND GROUNDWATER SAMPLING ANALYTICAL RESULTS

Physical characteristics of the DNAPL and groundwater in all eight samples were analyzed by Torkelson Geochemistry; all samples were analyzed at 60°F. The DNAPL and groundwater physical characterization results are provided in **Table 3.6**, and all of the eight samples were observed to vary by location. The DNAPL density ranged from 1.5595 to 1.6416 gm/ml. The air/DNAPL surface tension ranged from 35.1 to 39.3 dynes/cm, and the air/water surface tension ranged from 55.3 to 63.1 dynes/cm. The interfacial tension between water/DNAPL ranged from 11.7 to 21.7 dynes/cm. DNAPL viscosity was observed to range from 1.6 to 5.5 centipoise. The physical characteristics of each of the samples can be attributed to the respective chemical composition, as well as the subsurface environment the samples were collected from. For comparison, physical characteristics of the six main chemical compounds detected during chemical characterization are included on **Table 3.6** as reference chemicals.

The chemical composition of the various DNAPL samples were analyzed by Precision Analytical, and the results are summarized in **Table 3.7**. The chemical characterization results related to each area (North Perimeter of Former Lagoon Area, Middle of Former Lagoon Area, and South Perimeter of Former Lagoon Area) are presented on **Figures 3.15** through **3.17**. Each sample area provided similar results with six main compounds present, three VOCs (i.e., trichloroethene, 1,1,2,2-tetrachloroethane, tetrachloroethene), and three SVOCs (i.e., hexachloroethane, hexachlorobenzene, and hexachlorobutadiene). Samples from the North Perimeter of the Former Lagoon Area and Middle of the Former Lagoon Area were predominately VOCs (trichloroethene and 1,1,2,2-tetrachloroethane). Samples from the South Perimeter of the Former Lagoon Area were predominately SVOCs, with hexachlorobutadiene as the highest chemical concentration measured. It is also noted that the VOC concentrations in the samples from the South Perimeter were much lower than the Middle Area and North Perimeter Area as observed on **Figure 3-17**.

This section presents observations, interpretations and evaluations from the completion of the DNAPL Recoverability testing program completed at the Detrex Site. General observations are first presented, followed by a discussion of the details and observations from each of the individual testing procedures in both the Northern and Southern Areas of the former Lagoon Area.

4.1 GENERAL OBSERVATIONS

Overall, none of the four specific DNAPL Recoverability testing procedures, or the long-term DNAPL Recoverability test resulted in any substantial increase in observed DNAPL recovery rates, DNAPL recovered volumes, or changes in the subsurface DNAPL distribution. As discussed in the MIP investigation, the DNAPL was observed in discontinuous lenses within silt, clay and silt-clay materials with horizontal and vertical permeability values ranging from 1×10^{-4} cm/sec to 1×10^{-8} cm/sec (URS, 2012a). It should be noted that horizontal permeability values are typically 1×10^{-5} $^{cm}/_{s}$ or less; however, in the atypical case of a sandy silt stringer the horizontal permeability can be on the order of 1×10^{-4} $^{cm}/_{s}$. Also, as concluded by the Additional Soil Borings Investigation, the occurrence of DNAPL within thin lenses at multiple depths within the clay backfill and silt-clay soils presents difficulty of removal using vertical well screens or boreholes (URS, 2012b).

As previously concluded, the DNAPL distribution in the subsurface, and the subsequent expression of DNAPL thickness in monitoring wells and piezometers is not representative of the actual thickness of DNAPL observed in the soils during drilling. Also, the DNAPL thickness in a well has no correlation to the amount of DNAPL that can be recovered and is a poor indicator of DNAPL recoverability. The static DNAPL and groundwater levels were gauged at much higher levels than during well/piezometer installation; this is most likely due to confining pressures within the subsurface materials. As a result, the confining conditions create an exaggerated the thickness of DNAPL and groundwater within the well casing. DNAPL pumped from any recovery well, in any test, was removed at a much higher rate than the DNAPL was able to recharge. The fastest recovery rate of DNAPL for any test was 0.02 gallons per min (gpm); the average pumping rate for DNAPL was 0.05 gpm or approximately 200 mL/min which is a typical pumping rate for low-flow groundwater sampling. In addition these recovery rates were not demonstrated to be sustainable over a long period of time.

With regard to the overall interpretation of the DNAPL Recoverability testing results, the following sections will discuss the results from the four DNAPL recovery testing procedures. Based on the overall evaluation of the data, the primary issues related to any potential enhancement of DNAPL recoverability are related to following items:

- Volume of Fluids Recovered;
- DNAPL Recovery Volume & Rate;
- Observed Air Flow associated with the use of the DPE trailer (if applicable);
- Observed Radius of Influence (if applicable); and

- Observed Recovery Well Silting and System Operations Issues.

Evaluation summaries of each of the DNAPL Recoverability testing procedures and the long-term DNAPL Recoverability test are provided in the following sections.

4.2 PROCEDURE-SPECIFIC OBSERVATIONS

4.2.1 Procedure One - Northern Area Evaluation (Groundwater Only)

During the Procedure One testing at DNAPL Recovery wells RW-15, RW-16 and RW-17, groundwater volumes of 25.7 gallons, 40.1 gallons and 28.7 gallons were removed from each of the wells, respectively. For all of the DNAPL Recovery wells in the Northern Area a total of 94.5 gallons of water was removed from RW-15, RW-16, and RW-17, in order to lower the respective water columns in each well. Observed water levels in DNAPL recovery wells RW-15, RW-16 and RW-17 were lowered 15.7, 13.8, and 13.2 feet, respectively. As part of Procedure One, no DNAPL was removed from any of the DNAPL Recovery wells, but changes in DNAPL levels were monitored. At the termination of groundwater removal, DNAPL levels in RW-15, RW-16 and RW-17 had increased slightly by 0.10, 0.40, and 0.75 feet respectively.

Following the cessation of groundwater pumping, the recharge at each well was monitored. The groundwater column in RW-15, RW-16, and RW-17 had recharged within 2.35 feet, 1.40 feet, and 2.45 feet, respectively below pre-pumping static water level. Estimated groundwater recharge rates ranged from 0.0005 – 0.041 gpm over the course of the testing. DNAPL Recovery well RW-16 recovered the fastest in approximately 17 hours, while RW-15 recovered the slowest in approximately 65 hours. Over the same recovery period, observed DNAPL thickness in RW-15, RW-16, and RW-17 increased an additional 0.50 feet, 0.0 feet, and 0.40 feet respectively. The greatest change in DNAPL thickness was observed at RW-17 of 0.80 feet from the initial level. During the groundwater removal tests, water levels in surrounding monitoring points and recovery wells were observed 0.15 feet, 3.15 feet, and 1.50 feet below static levels in RW-16, MP-16A, and MP-17A, respectively. DNAPL levels in the monitoring points, if present, remained constant throughout the test.

Silt accumulation was observed in RW-17 after well installation, and was removed during well development. Following the completion of the test, silt had accumulated in the well and was measured in RW-17 at 0.20 feet at the bottom of the well sump two days after the water removal test.

These results indicate that removing only groundwater did not result in substantial DNAPL thickness changes or enhanced DNAPL recoverability rates in the Northern Area DNAPL Recovery wells or surrounding monitoring points.

4.2.2 Procedure One - Southern Area Evaluation (Groundwater Only)

During the Procedure One testing at DNAPL Recovery wells RW-18, RW-19 and RW-20, groundwater volumes of 25.7 gallons, 40.1 gallons and 28.7 gallons were removed from each of the wells, respectively. For all of the DNAPL Recovery wells in the Southern Area a total of 61.7 gallons of water was removed from RW-18, RW-19, and RW-20, in order to lower the respective

water columns in each well. Observed water levels in DNAPL recovery wells RW-18, RW-19, and RW-20 were lowered 8.2, 11.0, and 12.0 feet, respectively. As part of Procedure One, no DNAPL was removed from any of the DNAPL Recovery wells, but changes in DNAPL levels were monitored. At the termination of groundwater removal, DNAPL levels in RW-18, RW-19, and RW-20 remained relatively unchanged with only RW-19 increasing slightly by 0.15 ft. No measureable DNAPL was detected in either RW-18 or RW-20.

Following the cessation of groundwater pumping, the recharge at each well was monitored. The groundwater column in RW-18, RW-19, and RW-20 had recharged within 1.1 feet, 10.8 feet, and 6.9 feet, respectively below pre-pumping static water level. Estimated groundwater recharge rates ranged from 0.001 – 0.017 gpm over the course of the testing. DNAPL Recovery well RW-18 recovered the fastest in approximately 40 hours, while RW-19 and RW-20 had only partially recovered in similar time frames indicating relatively slow recharge at these locations. Over the same recovery period, observed DNAPL thickness in RW-18, RW-19, and RW-20 increased an additional 0.50 feet, 0.0 feet, and 0.40 feet respectively. The only observed change in DNAPL thickness was observed at RW-19 at 0.45 feet from the initial level following the extended recharge period. No DNAPL was observed in either RW-18 or RW-20. During the water removal tests, water levels in surrounding monitoring points and recovery wells were observed 3.10 feet, 1.70 feet, 0.25 feet, and 1.10 feet below static levels in MP-18A, MP-19B, MP-19A, and MP-20A respectively. Upon termination of pumping water, DNAPL levels in MP-19A was observed 0.25 feet lower than initial level, other monitoring points gauged did not contain DNAPL or remained constant throughout the tests.

These results indicate that removing only groundwater did not result in substantial DNAPL thickness changes or enhanced DNAPL recoverability rates in the Southern Area DNAPL Recovery wells or surrounding monitoring points.

4.2.3 Procedure One - Northern Area Evaluation (DNAPL Only)

During the Procedure One testing at DNAPL Recovery wells RW-15, RW-16 and RW-17, DNAPL volumes of 3.4 gallons, 2.1 gallons and 8.0 gallons were removed from each of the wells, respectively. For all of the DNAPL Recovery wells in the Northern Area a total of 13.5 gallons of DNAPL was removed from RW-15, RW-16, and RW-17 in order to observe the subsequent DNAPL recharge in each well. It is noted that DNAPL was pumped until all recoverable product was removed. Observed DNAPL levels in recovery wells RW-15, RW-16 and RW-17 were lowered 1.7, 1.4, and 3.2 feet, respectively. As part of Procedure One, no groundwater was removed from any of the DNAPL Recovery wells, but changes in groundwater levels were monitored. At the termination of DNAPL removal, groundwater levels in RW-15, RW-16 and RW-17 had decreased 1.8, 0.7, and 2.7 feet respectively. In RW-15, the DNAPL level lowered by pumping corresponded to the observed water level decline However in RW-16 and RW-17, the water levels were lowered approximately 20% to 50% less than the DNAPL levels lowered by pumping. This may be due to water entering the well screen at a greater rate that DNAPL, thus maintaining a higher water level within the well casing. During the DNAPL removal tests, water levels in surrounding monitoring points were observed 0.00 feet, 0.05 feet, and 0.15 feet below static levels in MP-15A, MP-16A, and MP-17A respectively. DNAPL levels in the monitoring

points were observed 0.15 feet, 0.05 feet, and 0.05 feet below the initial levels in MP-15A, MP-16A, and MP-17A respectively.

Following the cessation of DNAPL pumping, the recharge at each well was monitored. The DNAPL column in RW-15, RW-16, and RW-17, after approximately 4 hours, recovered 0.1, 0.2 and 0.1 feet, respectively from levels at the end of the pumping period. In the same time period, groundwater levels in RW-15, RW-16, and RW-17 recovered 0.4, 0.1 and 0.3 feet from end of test levels in each respective well. Based on the observed DNAPL recovery, the estimated DNAPL recharge rates for RW-15, RW-16 and RW-17 were 0.01, 0.0 and 0.001 gpm while product was actively being removed from each well. Additionally, following the cessation of product removal, observed increases in DNAPL thickness were limited and similar in value indicating a low rate of recharge into the well.

These results indicate that removing only DNAPL did not result in substantial DNAPL thickness changes or enhanced DNAPL recoverability rates in the Northern Area DNAPL Recovery wells or surrounding monitoring points.

Silt accumulation was observed in RW-16 and RW-17 during DNAPL removal with both wells having a measured silt thickness of 0.2 ft after the DNAPL removal test.

4.2.4 Procedure One - Southern Area Evaluation (DNAPL Only)

During the Procedure One testing, field work was only completed at RW-19 since RW-18 and RW-20 did not have any DNAPL present in the well. The DNAPL recovery volume in RW-19 was 3.3 gallons over the course of the test. The observed DNAPL level in RW-19 was lowered 1.7 feet. As part of Procedure One, no groundwater was removed from any of the DNAPL Recovery wells, but changes in groundwater levels were monitored. At the termination of DNAPL removal the observed groundwater level in RW-19 had decreased 1.7 feet. During the test, the observed DNAPL and water levels were both lowered 1.7 feet as compared to initial baseline levels. During the DNAPL removal test, water levels in surrounding monitoring points were observed 0.4 feet and 0.05 feet below the static water level in MP-19A and MP-19B, respectively, DNAPL levels in the monitoring points remained constant throughout the tests.

Following the cessation of DNAPL pumping, the recharge at each well was monitored. The DNAPL column in RW-19, after approximately 1 hour, recovered 0.1 from levels at the end of the pumping period. In the same time period, groundwater levels in RW-19 recovered 0.2 feet from observed levels at the end of test. Based on the observed DNAPL recovery, the estimated DNAPL recharge rate for RW-19 was approximately 0.003 gpm. Additionally, after approximately 2.5 hours the observed DNAPL level in RW-19 had decreased 0.05 feet, while groundwater level had increased another 0.15 feet.

No significant silt accumulation was observed in RW-19 during DNAPL removal and this is likely attributable to the minimal volume produced and the short testing period.

These results indicate that removing only DNAPL did not result in substantial DNAPL thickness changes or enhanced DNAPL recoverability rates in the Southern Area DNAPL Recovery wells or surrounding monitoring points.

4.2.5 Procedure Two - Northern Area Evaluation

During the Procedure Two testing at DNAPL Recovery wells RW-15, RW-16 and RW-17, DNAPL volumes of 0.0 gallons, 0.13 gallons and 2.62 gallons were recovered from each of the wells, respectively. For all of the DNAPL Recovery wells in the Northern Area a total of 2.75 gallons of DNAPL was recovered. Also, during Procedure Two testing groundwater was recovered with 24.57 gallons, 18.10 gallons, and 20.39 gallons of groundwater were recovered from RW-15, RW-16 and RW-17, respectively. For all of the DNAPL Recovery wells in the Northern Area a total of 63.06 gallons of groundwater was recovered. It is noted that DNAPL and groundwater were pumped until the piston pumps were unable to discharge each fluid due to increasing vacuum applied to each well or a malfunction of the piston pumps. Observed DNAPL levels reacted independently in each recovery well due to the applied vacuum and concurrent pumping of DNAPL and groundwater. RW-17 was the only location where DNAPL was lowered throughout the test. Upon cessation of pumping, the DNAPL level in RW-17 was 0.85 feet lower than the initial baseline level. The DNAPL level in RW-15 was too low in the well casing to recover any DNAPL with the piston pump. At the end of the test, the DNAPL level in RW-15 had risen 0.35 feet due to the applied vacuum. The DNAPL level in RW-16 was lowered 0.10 feet from the initial level 90 minutes into the test until the DNAPL pump discontinued discharging. During the test, water levels dropped 5.65 feet, 4.60 feet, and 11.30 feet from initial baseline levels in RW-15, RW-16, and RW-17 respectively.

During each Procedure Two test, vacuum influence was measured in the surrounding monitoring points. Magnehelic gauges were utilized to measure the induced vacuum in inches of water. During the test on RW-15, the highest measured influence was observed at MP-15D with 22.0 inches of water, at this time the applied vacuum on RW-15 was 19.6 inches of mercury (266.5 inches of water). During the Procedure Two test on RW-16, the highest measured influence was observed at MP-15A with 30.0 inches of water, at this time the applied vacuum on RW-16 was 10.2 inches of mercury (138.7 inches of water). During the Procedure Two test on RW-17, the highest measured influence was observed at MP-17B with 6.5 inches of water, at this time the applied vacuum on RW-17 was 10.0 inches of mercury (135.9 inches of water)..

Based on the observed DNAPL recovery, the estimated DNAPL recharge rates for RW-15, RW-16 and RW-17 were 0.0006, 0.000 and 0.005 gpm while product was actively being removed from each well.

These results indicate that simultaneously removing DNAPL and groundwater did not result in substantial DNAPL thickness changes or enhanced DNAPL recoverability rates in the Northern Area DNAPL Recovery wells or surrounding monitoring points**.** During all tests, no measureable airflow was observed through the vacuum system and therefore the observed vacuum influences at the monitoring points are likely attributable to observed groundwater drawdown and not to any enhanced vacuum from the operation of the DPE trailer. Further, increasing the vacuum applied to each recovery well lowered DNAPL and groundwater pump outputs and in most cases stopped discharge of each pump. Also, on multiple occasions, the water and DNAPL piston pumps were unable to operate under the induced conditions, as well as the aggressive conditions in the subsurface, and upon discussion with USEPA, Procedure Two testing was

discontinued. Operational issues with the dual pumps reduce confidence in their use to recover the corrosive DNAPL. Seals in the groundwater piston pumps were replaced to improve output lift. Electrical connections were changed to prevent the fluids from entering the sealed parts of the pumps.

Silt accumulation was observed in RW-17 during testing, 0.20 ft of silt was measured after the conclusion of the Procedure Two DNAPL and groundwater recovery test.

4.2.6 Procedure Two - Southern Area Evaluation

Procedure Two was not completed in any of the new DNAPL Recovery well located in the Southern Area due to the limited presence of observed DNAPL in any of the recovery wells.

4.2.7 Procedure Three - Northern Area Evaluation

During the Procedure Three testing in the Northern Area, DNAPL and groundwater were removed as total fluids, a total of 101.5 gallons of fluids were recovered. The total fluid was comprised of groundwater, DNAPL and DNAPL emulsion phases. At DNAPL Recovery wells RW-15, RW-16 and RW-17, DNAPL volumes of 2.0, 3.8 and 4.5 gallons were recovered from each of the wells, respectively. For all of the DNAPL Recovery wells in the Northern Area a total of 10.3 gallons of DNAPL was recovered. At DNAPL Recovery wells RW-15, RW-16 and RW-17, groundwater volumes of 25.0, 38.5 and 23.0 gallons were recovered from each of the wells, respectively. For all of the DNAPL Recovery wells in the Northern Area, a total of 86.50 gallons of groundwater was recovered. Since DNAPL and groundwater were recovered as total fluids, an emulsion of DNAPL and groundwater was observed. The DNAPL and groundwater emulsion recovered from each well was measured as 1.5, 2.7, and 0.5 gallons from RW-15, RW-16, and RW-17 respectively for a total of 4.7 gallons.

It is noted that total fluids were pumped until the peristaltic pump was unable to discharge fluids due to increasing vacuum applied to each well. Observed DNAPL levels in recovery wells RW-15, RW-16 (Test 1/Test 2) and RW-17 were lowered 0.65, 1.40/0.30, and 0.95 feet, respectively. During each test, water levels dropped 7.15, 6.30/1.70, and 10.20 feet from initial baseline levels in RW-15, RW-16 (Test 1/Test 2) and RW-17 respectively. Water levels were lowest in RW-15 and both tests of RW-16 prior to increasing applied vacuum to 10.0 inches of mercury of vacuum (135.9 inches of water). The water level in RW-17 was the lowest after the peristaltic pump stopped discharging total fluids.

During each Procedure Three test, vacuum influence was measured in the surrounding monitoring points in inches of water. During the test on RW-15, the highest measured influence was observed at MP-15A with 4.5 inches of water, at this time the applied vacuum on RW-15 was 14.2 inches of mercury (193.1 inches of water). During the first test on RW-16, the highest measured influence was observed at MP-15A with 37.0 inches of water, at this time the applied vacuum on RW-16 was 14.0 inches of mercury (190.3 inches of water). During the second test on RW-16, the highest measured influence was observed at MP-16A with 19.0 inches of water, this influence was measured during the applied vacuum on RW-16 at 10.0 and 14.0 inches of mercury (190.3 inches of water). During the test on RW-17, the highest

measured influence was observed at MP-16C with 3.8 inches of water, at this time the applied vacuum on RW-17 was 13.8 inches of mercury (187.6 inches of water).

Following the cessation of total fluids recovery, the recharge at each well was monitored. The DNAPL column recovered 0.35 and 0.30 feet after approximately 14 hours, in RW-15 and RW-16 respectively and 0.50 feet after approximately 18 hours in RW-17, from levels at the end of the pumping period. In the same time periods, groundwater levels in RW-15, RW-16 (test 1/test 2), and RW-17 recovered 1.80, 3.80 / 1.70 and 8.55 feet from end of test levels in each respective well. Based on the observed DNAPL recovery, the estimated DNAPL recharge rates for RW-15, RW-16 (test 1/test 2) and RW-17 were 0.006, 0.001 / 0.003, and 0.008 gpm while total fluids were actively being removed from each well.

These results indicate that removing total fluids under vacuum did not result in substantial DNAPL thickness changes or enhanced DNAPL recoverability rates in the Northern Area DNAPL Recovery wells or surrounding monitoring points**.** During all tests, no measureable airflow was observed through the vacuum system. Increasing the vacuum applied to each recovery well lowered total fluids output and in most cases stopped discharge of the peristaltic pump.

Silt accumulation was not observed in the Northern Area during Procedure Three testing.

4.2.8 Procedure Three - Southern Area Evaluation

During the Procedure Three testing in the Southern Area, DNAPL and groundwater were removed as total fluids, a total of 112.7 gallons of fluids were recovered. DNAPL was not recovered from RW-18 or RW-20 due to minimal or no amount of DNAPL. At DNAPL Recovery wells RW-18, RW-19 and RW-20, DNAPL volumes of 0.0, 5.5 and 0.0 gallons were recovered from each of the wells, respectively. For all of the DNAPL Recovery wells in the Southern Area a total of 5.5 gallons of DNAPL was recovered. At DNAPL Recovery wells RW-18, RW-19 and RW-20, groundwater volumes of 54.0, 21.0 and 32.0 gallons were recovered from each of the wells, respectively. For all of the DNAPL Recovery wells in the Southern Area, a total of 107.00 gallons of groundwater was recovered. Since DNAPL and groundwater were recovered as total fluids, an emulsion of DNAPL and groundwater was observed. The DNAPL and groundwater emulsion recovered from RW-19 was measured as 0.2 gallons.

It is noted that total fluids were pumped until the peristaltic pump was unable to discharge fluids due to increasing vacuum applied to each well. Observed DNAPL levels in recovery wells RW-19 and RW-20 were lowered 0.90, and 0.00 feet, respectively. During each test, water levels dropped 10.40, 7.15, and 10.95 feet from initial baseline levels in RW-18, RW-19, and RW-20 respectively. Water levels were lowest in all DNAPL recovery wells prior to increasing the recovery well vacuum to 14.0 inches of mercury (190.3 inches of water) in each test.

During each Procedure Three test, vacuum influence was measured in the surrounding monitoring points in inches of water. During the test on RW-18, the highest measured influence was observed at MP-19B with 56.0 inches of water, at this time the applied vacuum on RW-18 was 22.0 inches of mercury (299.1 inches of water). During the test on RW-19, the highest measured influence was observed at MP-19B with 15.0 inches of water, at this time the applied vacuum on RW-19 was 22.0 inches of mercury (299.1 inches of water). During the test

on RW-20, the highest measured influence was observed at MP-20A with 31.0 inches of water, at this time the applied vacuum on RW-20 was 18.0 inches of mercury (244.7 inches of water).

Following the cessation of total fluids recovery, the recharge at each well was monitored. The DNAPL column recovered 0.65 (Test 1), 1.10 (Test 2), and 0.10 feet (Test 3) after approximately 12, 23, and 15 hours, in RW-19 from levels at the end of the pumping period. The first two attempts at the Procedure Three test were truncated due to an overheating issue with the DPE trailer. No DNAPL was recovered from RW-18 due to no DNAPL being present, and no DNAPL was recovered from RW-20 due to the minimal amount of DNAPL in the well sump (~0.1 feet). Fifteen hours after each of the completed tests, groundwater levels in RW-18, RW-19, and RW-20 recovered 0.00, 0.80 and 1.60 feet from end of test levels in each respective well. Based on the observed DNAPL recovery, the estimated DNAPL recharge rate for RW-19 was approximately 0.002 gpm while total fluids were actively being removed from the well.

The results from the Procedure Three testing indicate that removing total fluids under vacuum did not result in substantial DNAPL thickness changes or enhanced DNAPL recoverability rates in the Southern Area DNAPL Recovery wells or surrounding monitoring points. During all tests, no measureable airflow was observed through the vacuum system. Increasing the vacuum applied to each recovery well lowered total fluids output and in most cases stopped discharge of the peristaltic pump.

Silt accumulation was observed in all three Southern Area DNAPL recovery wells during fluids removal with each well having a measured silt thickness of 0.20 ft, 0.10 ft, and 0.20 ft in RW-18, RW-19, and RW-20 respectively.

4.2.9 Procedure Four - Northern Area Evaluation

During the Procedure Four testing at DNAPL Recovery wells RW-15, RW-16 and RW-17, DNAPL volumes of 0.5, 0.0 and 5.0 gallons were recovered from each of the wells, respectively. These tests were completed on January 16, 2013. An additional 8.3 gallons of DNAPL was recovered from RW-17 on January 17, 2013, after the test. For all of the DNAPL Recovery wells in the Northern Area a total of 13.8 gallons of DNAPL was recovered. Groundwater was recovered from RW-15 and RW-16 the day prior to the test, January 15, 2013, with 20.0 gallons of groundwater being recovered from each of the DNAPL recovery wells. On January 16, 2013, immediately prior to inducing vacuum, an additional 28.0 gallons of water was removed from RW-15, 30.0 gallons from RW-16, and 28.0 gallons from RW-17 for a total of 126.0 gallons of groundwater removed from the Northern Area during Procedure Four testing.

It is noted that DNAPL was pumped, with a peristaltic pump, until all recoverable DNAPL was removed from the well. During groundwater purging only on January 15, 2013, observed DNAPL levels in RW-15 and RW-16 were lowered 0.50 feet and 2.00 feet, respectively, from initial baseline levels. At the same time, water levels were lowered 11.80 feet and 11.60 feet from initial baseline levels in RW-15 and RW-16, respectively. During groundwater purging only on January 16, 2013, the DNAPL level was lowered 1.80 feet from the initial baseline level in RW-17 only. At the same time, water levels were lowered 17.0 feet, 18.8 feet, and 17.30 feet from initial levels in RW-15, RW-16, and RW-17, respectively.

During induced vacuum of 25.0 inches of mercury (339.9 inches of water) in all Northern Area DNAPL recovery wells simultaneously, the DNAPL levels in all three DNAPL recovery wells increased from initial baseline levels. The DNAPL levels increased 1.0 foot, 0.40 feet, and 1.30 feet in RW-15, RW-16, and RW-17 respectively.

During the Procedure Four test, vacuum influence was measured in the surrounding monitoring points in inches of water. The highest measured influence near RW-15 was observed at MP-15A with 102 inches of water. The highest measured influence near RW-16 was observed at MP-16A with 100 inches of water. The highest measured influence near RW-17 was observed at MP-17A with 20 inches of water.

Following the cessation of applied vacuum, the recharge at each well was monitored. The DNAPL levels dropped 0.05 feet, 0.20 feet, and 0.08 feet after approximately 26 hours, in RW-15, RW-16, and RW-17 respectively from levels at the end of the applied vacuum. In the same time period, groundwater levels in RW-15 and RW-17 recovered 2.20 feet and 1.10 feet from end of test levels in each respective well. Also, after approximately 26 hours the groundwater level dropped 0.60 feet in RW-16 from the end of the applied vacuum groundwater level. Based on the observed DNAPL recovery, the estimated DNAPL recharge rates for RW-15, RW-16, and RW-17 were 0.010, 0.004, and 0.019 gpm while product was actively being removed from each well.

These results indicate that Procedure Four testing did not result in substantial DNAPL thickness changes or enhanced DNAPL recoverability rates in the Northern Area DNAPL Recovery wells or surrounding monitoring points**.** During the test, no measureable airflow was observed through the vacuum system.

Silt accumulation was observed in all three Northern Area DNAPL recovery wells during fluids removal with each well having a measured silt thickness of 0.50 ft, 0.30 ft, and 0.40 ft in RW-15, RW-16, and RW-17 respectively.

4.2.10 Long-Term DNAPL Recoverability – RW-17 Evaluation

Following the conclusion of Procedure One through Four testing, a long-term DNAPL Recoverability test was completed at RW-17. This well was selected based on the results of the previously completed testing. During the Long-Term DNAPL Recoverability test at RW-17, a total of 27.0 gallons of DNAPL and 187.5 gallons of groundwater were recovered over three and a half days. It is noted that DNAPL and groundwater were pumped as the water level or DNAPL level recharged throughout the test, refer to **Appendix C** for timeline of water and DNAPL recovery. The groundwater piston pump continued to run throughout test but did not discharge under vacuum, when vacuum was stopped the piston pump would discharge approximately 0.01 gpm. Throughout the Long-Term test, vacuum was applied at 10-inches of mercury (139.9 inches of water).

During the Long-Term DNAPL Recoverability test, vacuum influence was measured in the surrounding monitoring points in inches of water. The highest measured vacuum influence was observed 46 hours into the test at NPZ-7-7 with 48.0 inches of water.

Following the cessation of the Long-Term DNAPL Recoverability test, the recharge at RW-17 was monitored. After approximately 24.5 hours, the DNAPL level dropped 1.70 feet from the end of test, and DNAPL was observed within the silt at the bottom of the well sump. Three days after the cessation of the Long-Term test, the DNAPL level in RW-17 was observed 1.00 feet lower than the end of the test DNAPL level. After approximately 24.5 hours, the groundwater level was observed 1.40 feet lower than the end of test groundwater level. Three days after the cessation of the Long-Term test, the groundwater level in RW-17 had recovered 9.50 feet from the end of the test groundwater level.

Based on the observed DNAPL recovery, the estimated DNAPL recharge rates for RW-17 varied from 0.013 to 0.003 gpm while product was actively being removed from the well. As DNAPL was recovered the amount recovered began to diminish and was observed to contain silt in suspension, this trend is depicted on **Figure 3.10.** During the test, no measureable airflow was observed through the vacuum system. As shown, the recharge rate continuously decreased during the test and was 0.003 gpm at the conclusion of the test. The data also has a high correlation coefficient (R^2=0.96).

Silt accumulation was observed in RW-17 during testing, 1.30 ft of silt was measured after the DNAPL and groundwater recovery test. Three days after the Long-Term DNAPL Recoverability test, silt in RW-17 was measured at 1.70 feet in the bottom of the well sump. Multiple problems with the stainless piston pumps were encountered and during the Long-Term test, were replaced or supplemented by a peristaltic pump. Induced vacuum drastically reduced pump output and the vacuum was momentarily ceased to recover the DNAPL or groundwater during the test.

4.2.11 Procedure Four – Southern Area Evaluation

During the Procedure Four testing at DNAPL Recovery wells RW-18, RW-19 and RW-20, DNAPL volumes of 0.0, 4.0 and 0.0 gallons were recovered from each of the wells, respectively. For all of the DNAPL Recovery wells in the Southern Area a total of 4.0 gallons of DNAPL was recovered due to no DNAPL observed in RW-18 and a minimal amount (0.02 feet) of DNAPL in RW-20. At DNAPL Recovery wells RW-18, RW-19 and RW-20, groundwater volumes of 22.0, 24.0 and 19.00 gallons were recovered from each of the wells, respectively. For all of the DNAPL Recovery wells in the Southern Area, a total of 65.0 gallons of groundwater was recovered. All fluids were recovered prior to inducing vacuum.

It is noted that DNAPL was pumped, with a peristaltic pump, until all recoverable DNAPL was removed from RW-19. Prior to applying vacuum, groundwater levels were lowered 13.8, 13.5 and 11.6 feet from initial baseline levels in RW-18, RW-19, and RW-20, respectively. Based on the observed DNAPL recovery, the estimated DNAPL recharge rates for RW-18, RW-19, and RW-20 were 0.000, 0.011, and 0.004 gpm while product was actively being removed from each well.

During induced vacuum of 25.0 inches of mercury (339.9 inches of water) in all wells simultaneously, the DNAPL levels in the two recovery wells, with measurable DNAPL, increased from initial baseline levels. The DNAPL level increased 0.60 foot in RW-19 and 0.20 feet in RW-20. During the Procedure Four test, vacuum influence was measured in the surrounding monitoring points in inches of water. The highest measured influence near RW-18 was

observed at MP-18A with 100 inches of water. The highest measured influence near RW-19 was observed at MP-19A with 27.0 inches of water. The highest measured influence near RW-20 was observed at MP-20A with 52.0 inches of water.

Following the cessation of applied vacuum, the recharge at each well was monitored. The DNAPL levels dropped 0.0 and 0.20 feet, after approximately 17 hours, in RW-19 and RW-20, respectively from DNAPL levels at the end of the applied vacuum. In the same time period, groundwater levels in RW-18 and RW-20 dropped 0.6 and 2.4 feet from end of test groundwater levels in each respective well. The groundwater level in RW-19 recovered 4.4 feet, after approximately 17 hours, from the end of test groundwater level. After approximately 40.5 hours the DNAPL levels in RW-19 and RW-20 recovered 0.10 feet and 0.00 feet from the end of test DNAPL levels in each respective well. Groundwater levels in DNAPL Recovery Wells RW-18, RW-19, and RW-20 recovered 1.1, 8.4, and dropped 2.0 feet respectively, from the end of test groundwater levels after approximately 40.5 hours.

These results indicate that Procedure Four testing did not result in substantial DNAPL thickness changes or enhanced DNAPL recoverability rates in the Southern Area DNAPL Recovery wells or surrounding monitoring points. During the test, no measureable airflow was observed through the vacuum system. Groundwater recharge outpaced DNAPL recharge the two days monitored following the test.

Silt accumulation was observed in all three Southern Area DNAPL recovery wells during fluids removal with each well having a measured silt thickness of 0.05, 0.10, and 0.10 ft in RW-18, RW-19, and RW-20, respectively.

This section presents conclusions and recommendations from the completed DNAPL Recoverability Testing in the former Lagoon Area of the Site.

5.1 CONCLUSIONS

- The DNAPL recovery well installation and testing program was generally completed in accordance with the USEPA approved Work Plan.
- Procedure One testing did not result in significant changes in DNAPL thickness or recovery from static (i.e., pre-pumping) conditions.
- Procedures Two and Three did not result in significant changes in DNAPL thickness or substantial DNAPL recharge rate increases.
- The DNAPL recovery approach proposed by FBAG (i.e., Procedure #2) was not effective at enhancing DNAPL recovery in the former Source Area of the Site and resulted in the least volume of DNAPL recovered during recoverability testing. Also, the FBAG model for DNAPL occurrence at the bottom of a water-bearing zone or aquifer is completely erroneous and not supported by subsurface geologic data collected at the site.
- The use of a peristaltic pump provided the best / most reliable recovery of DNAPL and groundwater. The peristaltic pump would also be the easiest and cheapest to maintain as there are not moving parts inside the well casing.
- Procedure Four did not result in significant changes in DNAPL thickness or recovery rate increases. RW-17 was the only well installed that showed potential for DNAPL recovery. Site geologic conditions which consist of low permeability silty clay and clay soils and resulting variable DNAPL distribution do not appear conducive to enhanced DNAPL recovery techniques using vacuum extraction.
- Site geologic conditions and resulting DNAPL distribution are not conducive to enhanced DNAPL recovery techniques using high vacuum.
- Site hydrogeological conditions indicate the presence of confining conditions and there is no correlation of DNAPL thicknesses in wells and piezometers with DNAPL observed during well installation. Also, the thickness of DNAPL observed in wells is exaggerated as well diameter decreases and is not representative of DNAPL thickness in the formation.
- There is no correlation between observed DNAPL thickness in monitoring wells or recovery wells and DNAPL recharge rates throughout the Site.

- The operational (O&M) and DNAPL composition/corrosion issues related to potentially employing Procedures Two, Three and Four were problematic, and would be difficult to implement on a large scale.
    - Multiple problems with the stainless piston pumps were encountered, seals were replaced and the pumps were re-wired but the dual pump system did not perform as well as a peristaltic pump. Induced vacuum further inhibited the piston pumps from recovering any fluid, as the piston had to fight the vacuum in order to pump vertically.
- The highest volume of DNAPL recovered was 27.0 gallons during the 3.5 day long term test on RW-17; however, the recovery and recharge rate of DNAPL steadily decreased over time. At the conclusion of the long-term testing program, the recharge rate was only 0.003 gpm. The second greatest amount of DNAPL recovered was 13.3 gallons using Procedure Four at RW-17, which was pumped over two days using a peristaltic pump after induced vacuum. During Procedure One, approximately 8.0 gallons of DNAPL was recovered from RW-17 in approximately six hours.
- The use of an induced vacuum on the DNAPL recovery wells did provide for slight observed increases in DNAPL and groundwater levels within the recovery wells, but not significantly enough to extract considerable amounts more than pumping DNAPL with the peristaltic pump alone.
- No air flow through the DPE unit was measured while inducing vacuum on any recovery well throughout all Procedures using applied vacuum.
- Potential operational issues were observed due to silt accumulation after applying vacuum to aid in the extraction of DNAPL or moving large quantities of groundwater through fine-grained subsurface soils. Over the entire course of testing on DNAPL recovery well RW-17, silt in the well casing increased approximately 1.7 foot from initial levels. This finding is indicative that well re-development would have to occur on at least a monthly basis in order to keep recovery well screens from plugging.
- The results obtained from this testing program have produced data that verifies the operational issues that Detrex has encountered during the past 12 years. In particular it is noted that DNAPL recovery has diminished over time, excessive silt has accumulated into wells as a result of fine grained soils subjected to high vacuum levels, short circuiting of well vacuum has occurred in many existing wells due to the presence of backfill soil to depths of 15 feet in the former Lagoon Area, and little if any increase in DNAPL recovery rates have occurred when increased levels of vacuum are applied to recovery wells.
- The subsurface geologic conditions that were observed during drilling recovery wells and monitoring points are consistent with all previous subsurface data collection phases that have been reported to USEPA since June 2005. Also these observations are

consistent with data presented in the Source Control Remedial Investigation Report submitted to USEPA in 1995. Most importantly, it should be noted that the low permeability silty clay and clay soils found at the Detrex Site are not representative of aquifer materials as proposed by FBAG in their DNAPL recovery concept, but rather of a formation that restricts water flow and does not transmit water readily such as an aquitard.

5.2 RECOMMENDATIONS

As a result of completing this DNAPL Recoverability Testing Program, the following recommendations have been developed for the Detrex Site.

- The use of induced high vacuum extraction on the DNAPL recovery wells is not an effective means to remove enhance DNAPL removal from the subsurface soils at this Site, and an alternative method of DNAPL recovery that is more cost effective and more readily implemented should be considered.

- Based on the evaluation of the completed testing procedures, historical operational information and the refined understanding of subsurface conditions and DNAPL distribution, the use of wells for the recovery of DNAPL has been demonstrated to be significantly problematic and is not the optimal use of resources to address the former Lagoon Area of the Site.

- The results from this recoverability testing program continue to support the existing Site Conceptual Model; which indicate DNAPL is not migrating towards Fields Brook. The slurry wall located on the western portion of the site and the groundwater collection trench that was installed along the entire southern property boundary in 2006 are effective in mitigating potential DNAPL migration towards Fields Brook. Also, groundwater analytical data and observations from site wide monitoring wells further indicate the absence of a downgradient dissolved phase VOC plume and no indication of DNAPL migrating towards Fields Brook. As a result, Detrex is recommending that DNAPL recovery from recovery wells be suspended and the two groundwater collection trenches and slurry wall be used as a final remedy along with groundwater monitoring from existing monitoring wells.

- Detrex requests that the existing DNAPL recovery well system be suspended, and then decommissioned. Detrex requests that USEPA consider a modification of the Source Control ROD.

URS, 2012a – April 30, 2012 Letter Results of Membrane Interface Probe and Soil Borings Investigation, Detrex RD/RA Source Control Area, Detrex Facility, Ashtabula, Ohio. Docket No. V-W.98-C-450. Prepared for Detrex Corporation, Ashtabula, Ohio. April 30, 2012.

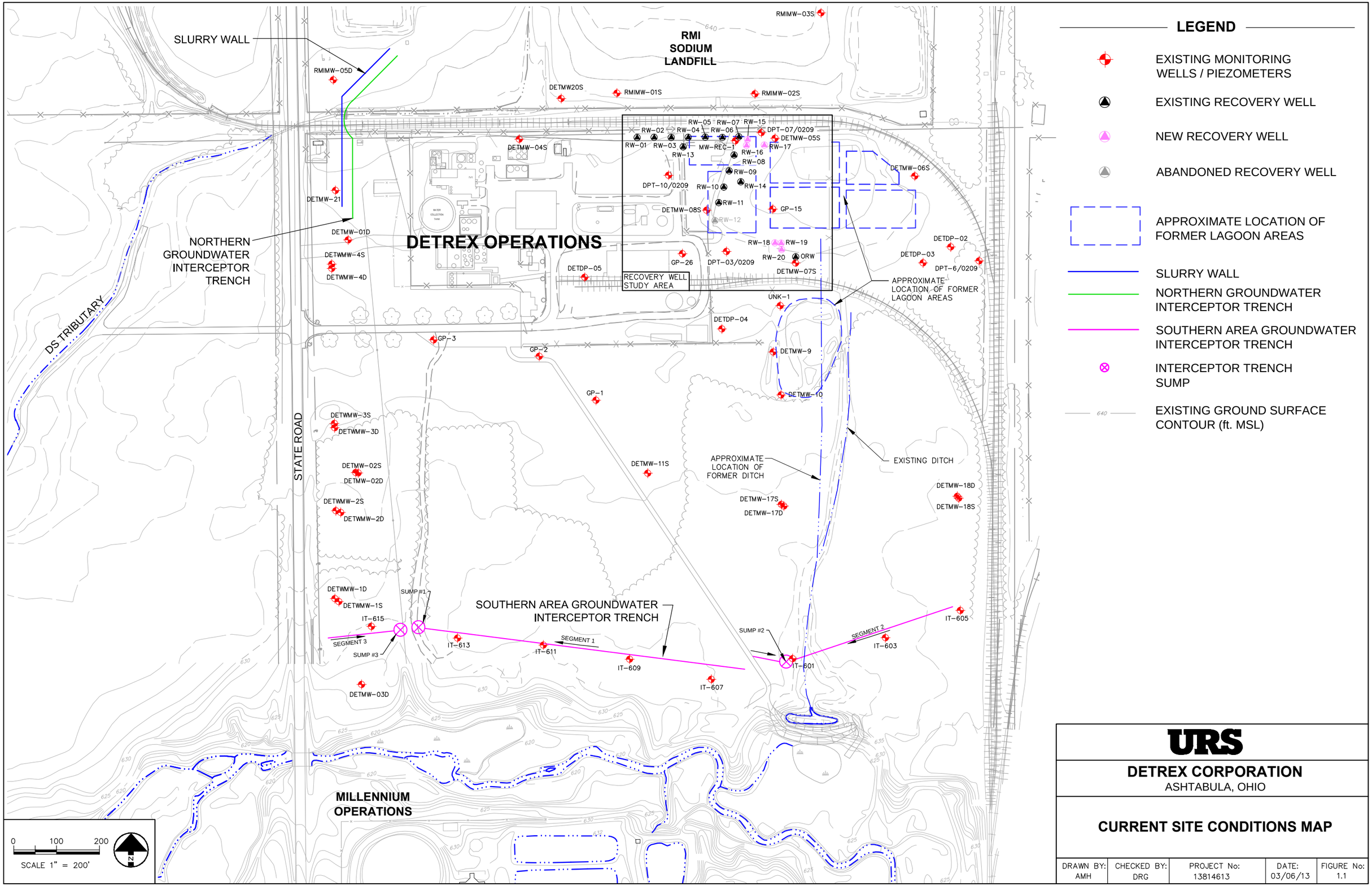
URS, 2012b – May 24, 2012 Letter, Results of Additional Soil Borings Investigation, Detrex RD/RA Source Control Area, Detrex Facility, Ashtabula, Ohio. Docket No. V-W.98-C-450. Prepared for Detrex Corporation, Ashtabula, Ohio. May 24, 2012.

URS, 2012c – Additional DNAPL Recovery Well Installation and Testing Work Plan, Detrex RD/RA Source Control Area, Detrex Facility, Ashtabula, Ohio. Docket No. V-W.98-C-450. Prepared for Detrex Corporation, Ashtabula, Ohio. August 24, 2012.

Perry and Chilton, 1973 – Chemical Engineers' Handbook 5th Edition, McGraw-Hill Book Company, 1973

CAMEO 2013 – CAMEO Chemicals Online Tool – Emergency Response Division of National Oceanic and Atmospheric Administration, 2013.

FIGURES



K:\Projects\D\Detrex\13816274\DWGs\Figures\Figure 1.1 – 2013 current features.dwg User: anton_heitger Apr 12, 2013 – 12:27pm

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CURRENT SITE CONDITIONS MAP

DRAWN BY:	CHECKED BY:	PROJECT No:	DATE:	FIGURE No:
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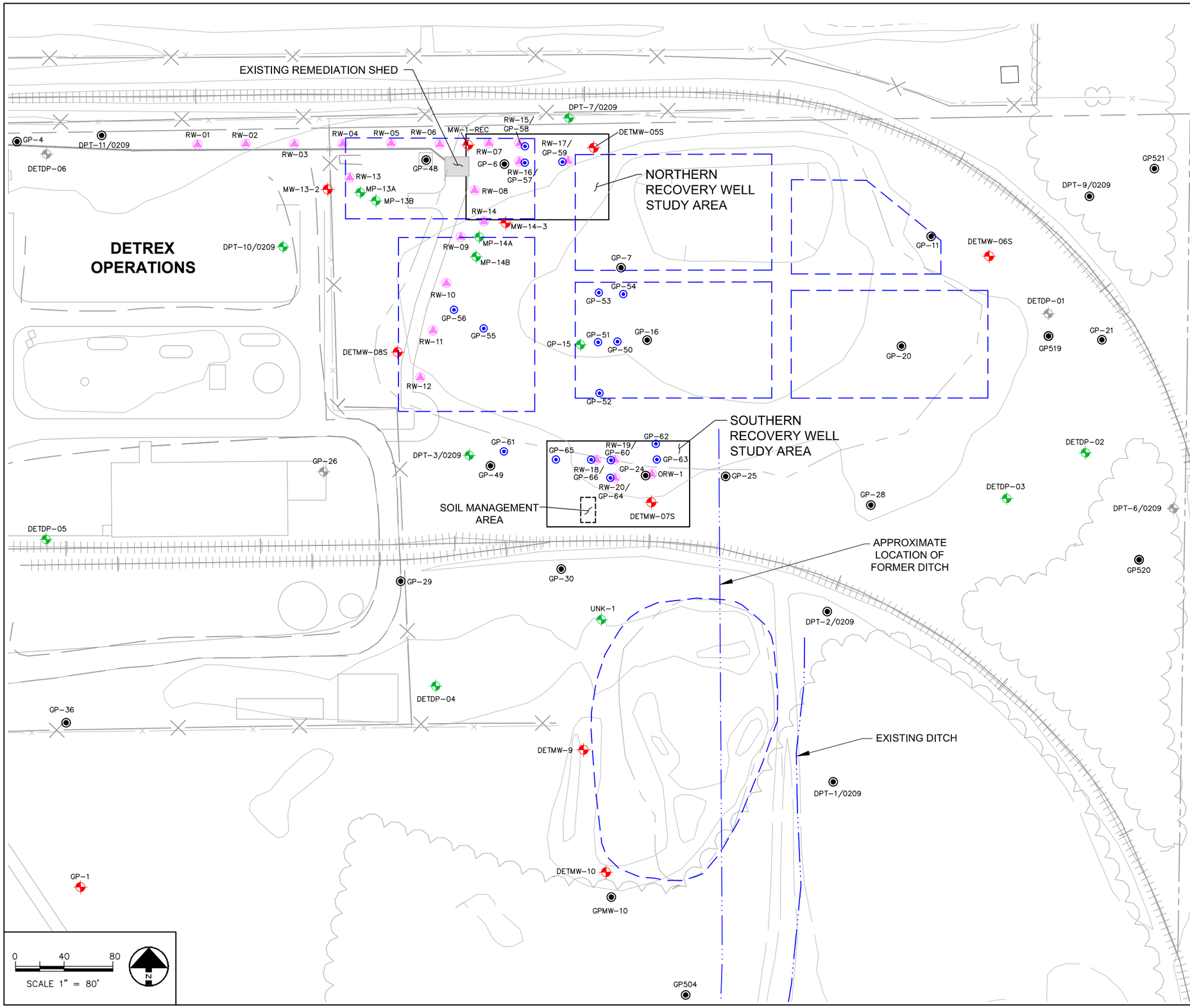

LEGEND

- RECOVERY WELL
- MONITORING WELL
- PIEZOMETER
- WELL OR PIEZOMETER NOT LOCATED
- DNAPL RECOVERABILITY INVESTIGATION SOIL BORING
- PREVIOUS INVESTIGATIONS SOIL BORINGS
- 640 — EXISTING GROUND SURFACE CONTOUR (ft. MSL)
- APPROXIMATE LOCATION OF FORMER LAGOON AREAS

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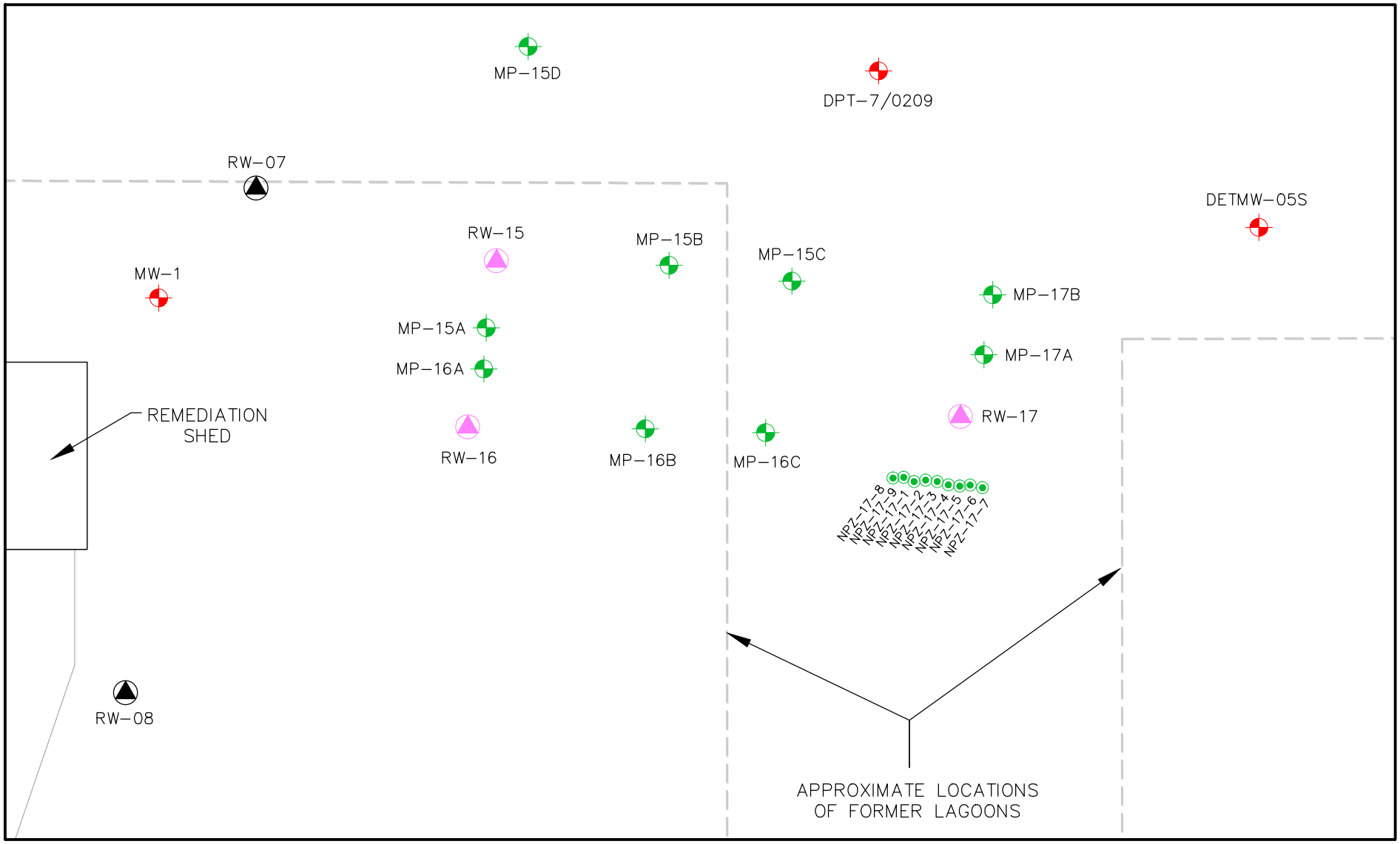
RECOVERY WELL PILOT STUDY AREA LOCATION MAP

DRAWN BY:	CHECKED BY:	PROJECT No:	DATE:	FIGURE No:
AMH	MLS	13814613	3/20/13	2.1

K:\Projects\D\Detrex\13816274\DWGs\Figures\Figure 2.1 – DNAPL Recovery Well Study Area Location Map.dwg User: anton_heitger Apr 12, 2013 – 12:26pm



LEGEND

- EXISTING RECOVERY WELL
- NEW RECOVERY WELL
- EXISTING MONITORING WELL / PIEZOMETER
- NEW RECOVERY WELL MONITORING POINT
- NEW NESTED PIEZOMETER

0 6 12

SCALE 1" = 12'

N

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NORTHERN DNAPL RECOVERY WELL STUDY AREA

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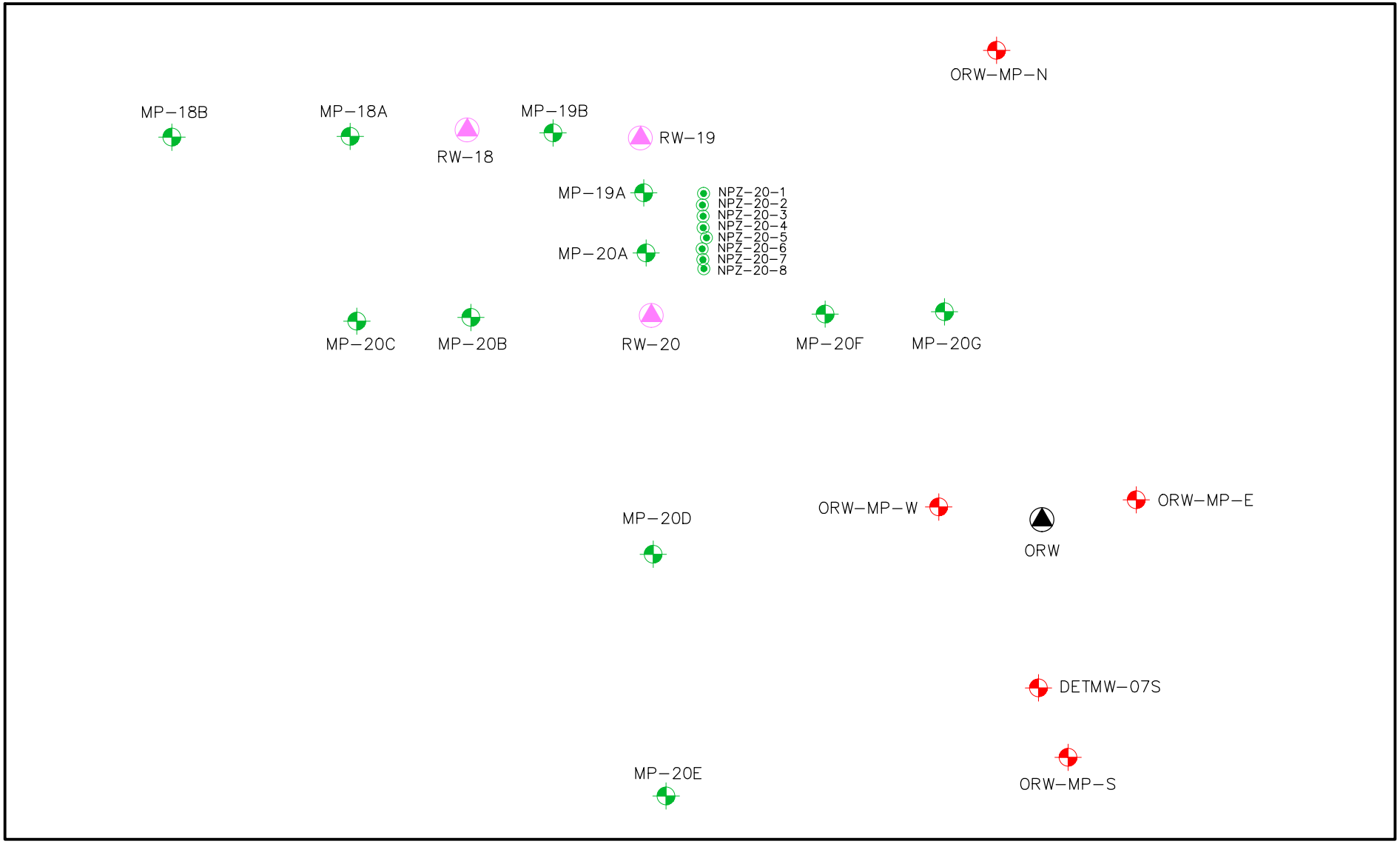
AMH	DRG	13816274	11/7/12	2.2

K:\Projects\D\Detrex\13816274\DWGs\Figures\Figure 2.2 - Northern DNAPL Recovery Well Area.dwg User: anton_heitger Apr 12, 2013 - 12:43pm



LEGEND

- EXISTING RECOVERY WELL
- NEW RECOVERY WELL
- EXISTING MONITORING WELL / PIEZOMETER
- NEW RECOVERY WELL MONITORING POINT
- NEW NESTED PIEZOMETER

0 6 12

SCALE 1" = 12'

N

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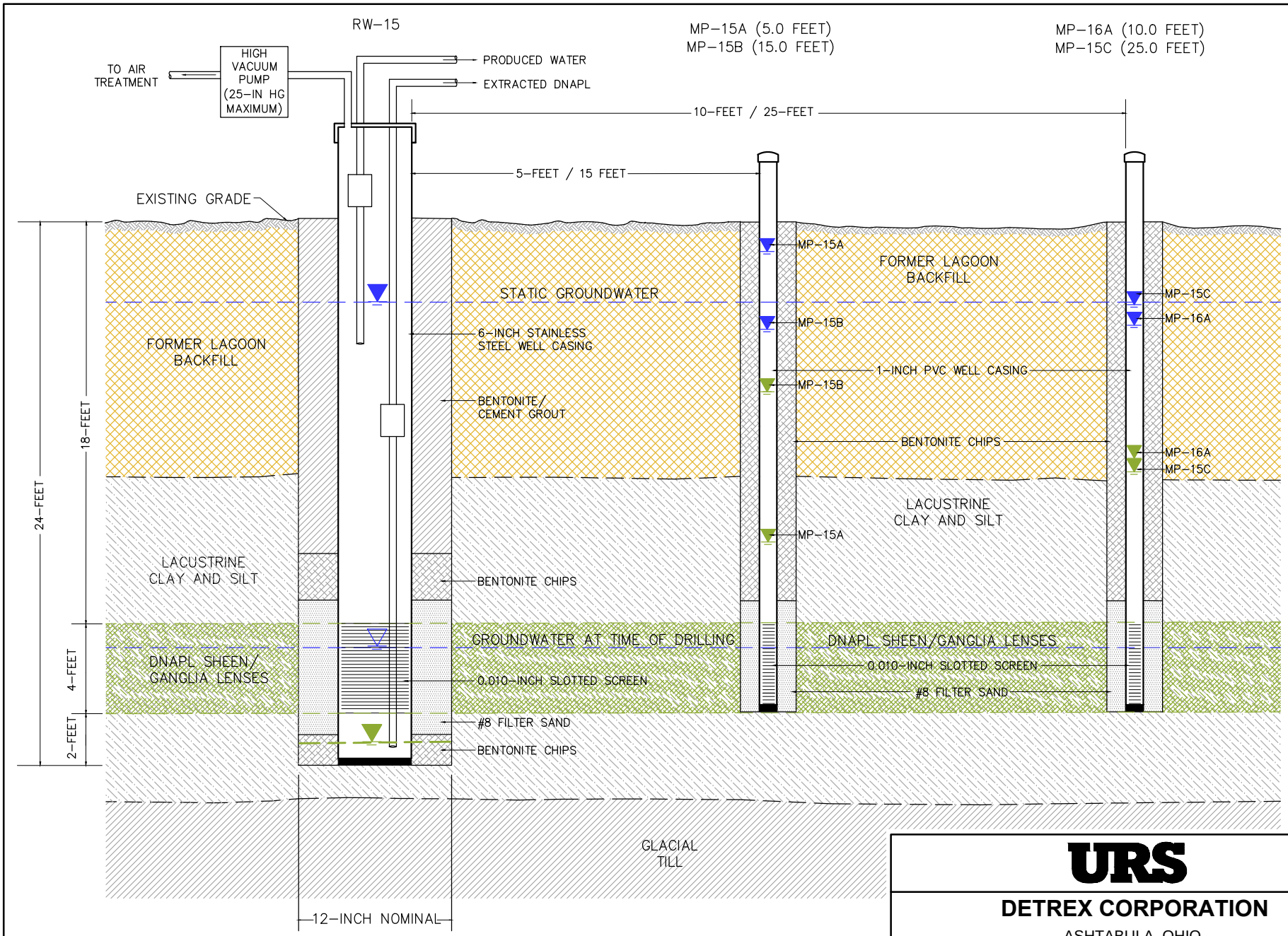
SOUTHERN DNAPL RECOVERY WELL STUDY AREA

DRAWN BY:	CHECKED BY:	PROJECT No:	DATE:	FIGURE No:
AMH	DRG	13816274	11/7/12	2.3

K:\Projects\D\Detrex\13816274\DWGs\Figures\Figure 2.3 - South Pilot Study Area.dwg User:anton_heitger Apr 12, 2013 - 12:30pm



LEGEND

- WATER LEVEL AT TIME OF DRILLING
- STATIC WATER LEVEL (3/14/13)
- STATIC DNAPL LEVEL (3/14/13)

NOTES:

1. GENERALIZED LITHOLOGY FROM RECOVERY WELL RW-15 / GP-58
2. FIGURE ILLUSTRATES PROCEDURE #2 TESTING CONDITIONS

0 3 6

VERTICAL SCALE 1" = 6'

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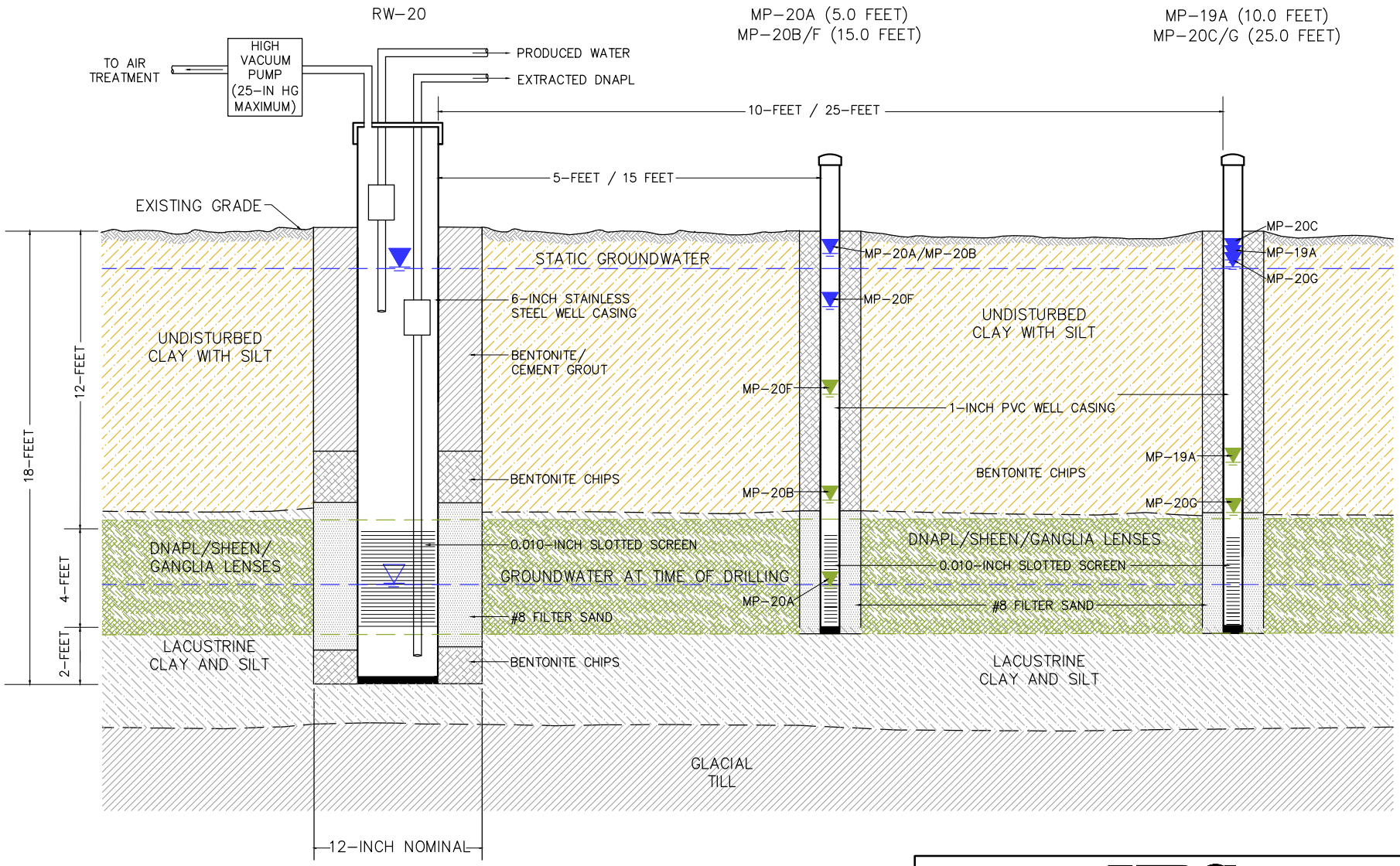
TYPICAL NORTHERN DNAPL AREA - RECOVERY WELL CROSS SECTION

DRAWN BY:	CHECKED BY:	PROJECT No:	DATE:	FIGURE No:
AMH	MLS	13816274	04/12/13	2.4

K:\Projects\D\Detrex\13816274\DWGs\Figures\Figure 2.4 - North Extraction Well Detail Cross Section.dwg User:anton_heitger Apr 12, 2013 - 2:44pm



0 3 6

VERTICAL SCALE 1" = 6'

LEGEND

NOTES:

1. GENERALIZED LITHOLOGY FROM RECOVERY WELL RW-20 / GP-64
2. FIGURE ILLUSTRATES PROCEDURE #2 TESTING CONDITIONS

- WATER LEVEL AT TIME OF DRILLING
- STATIC WATER LEVEL (3/14/13)
- STATIC DNAPL LEVEL (3/14/13)

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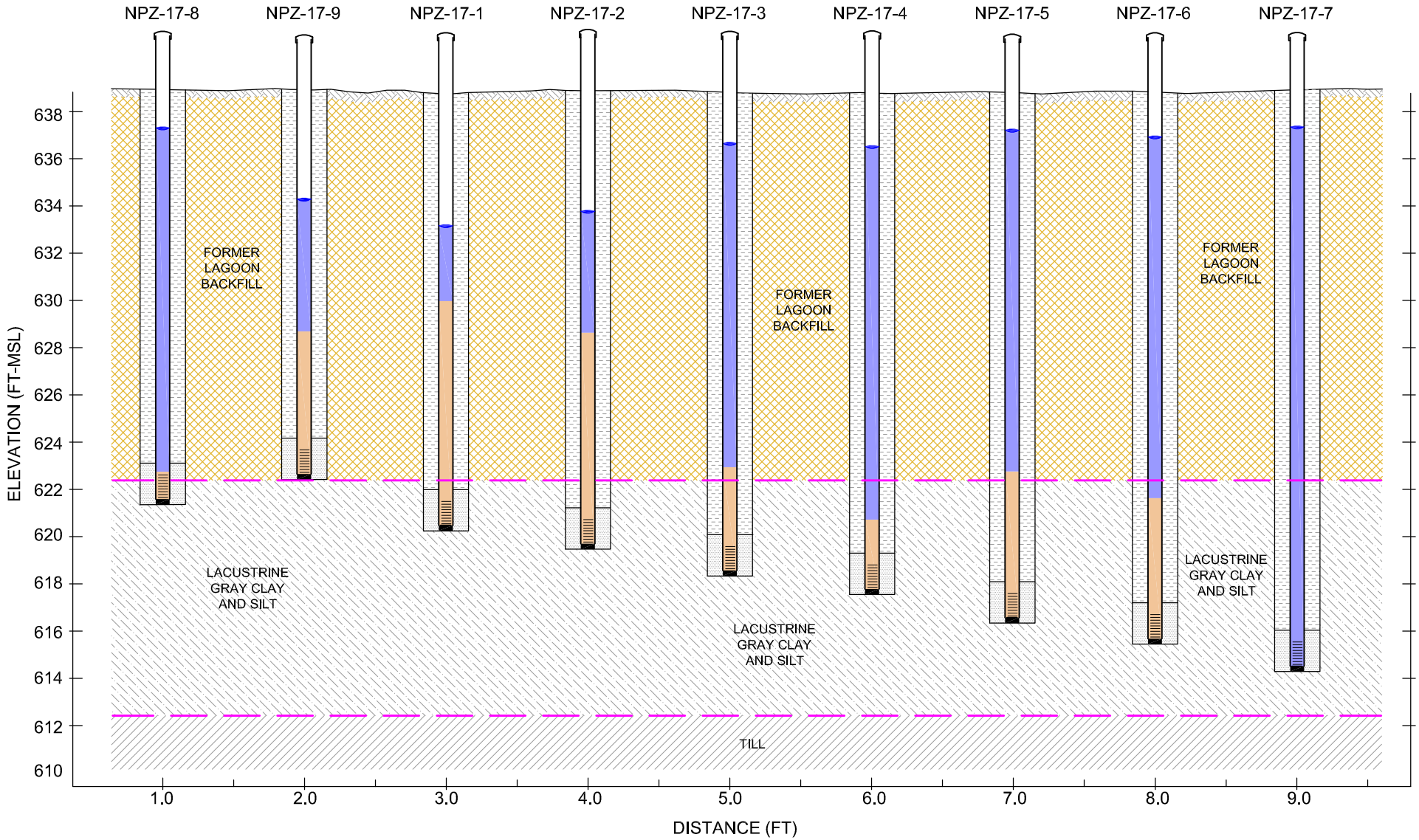
TYPICAL SOUTHERN DNAPL AREA - RECOVERY WELL CROSS SECTION

DRAWN BY:	CHECKED BY:	PROJECT No:	DATE:	FIGURE No:
AMH	MLS	13816274	03/20/13	2.5

K:\Projects\D\Detrex\13816274\DWGs\Figures\Figure 2.5 - South Extraction Well Detail Cross Section.dwg User:anton_heitger Apr 12, 2013 - 2:29pm



LEGEND

NOTES:

1) WATER LEVEL AND DNAPL LEVEL MEASUREMENTS COLLECTED MARCH 14, 2013

2) GENERALIZED LITHOLOGY FROM ADJACENT RECOVERY WELL RW-17

NESTED PIEZOMETER AND SCREENED INTERVAL (1.0 FOOT)

GROUNDWATER COLUMN

DNAPL COLUMN

APPROXIMATE GEOCONTACT

0 3 6

VERTICAL SCALE 1" = 6'
HORIZONTAL SCALE 1" = 1'

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NORTHERN AREA CROSS SECTION NESTED PIEZOMETERS - NPZ-17 (03/14/13)

DRAWN BY:	CHECKED BY:	PROJECT No:	DATE:	FIGURE No:
AMH	MLS	13816274	03/22/13	2.6

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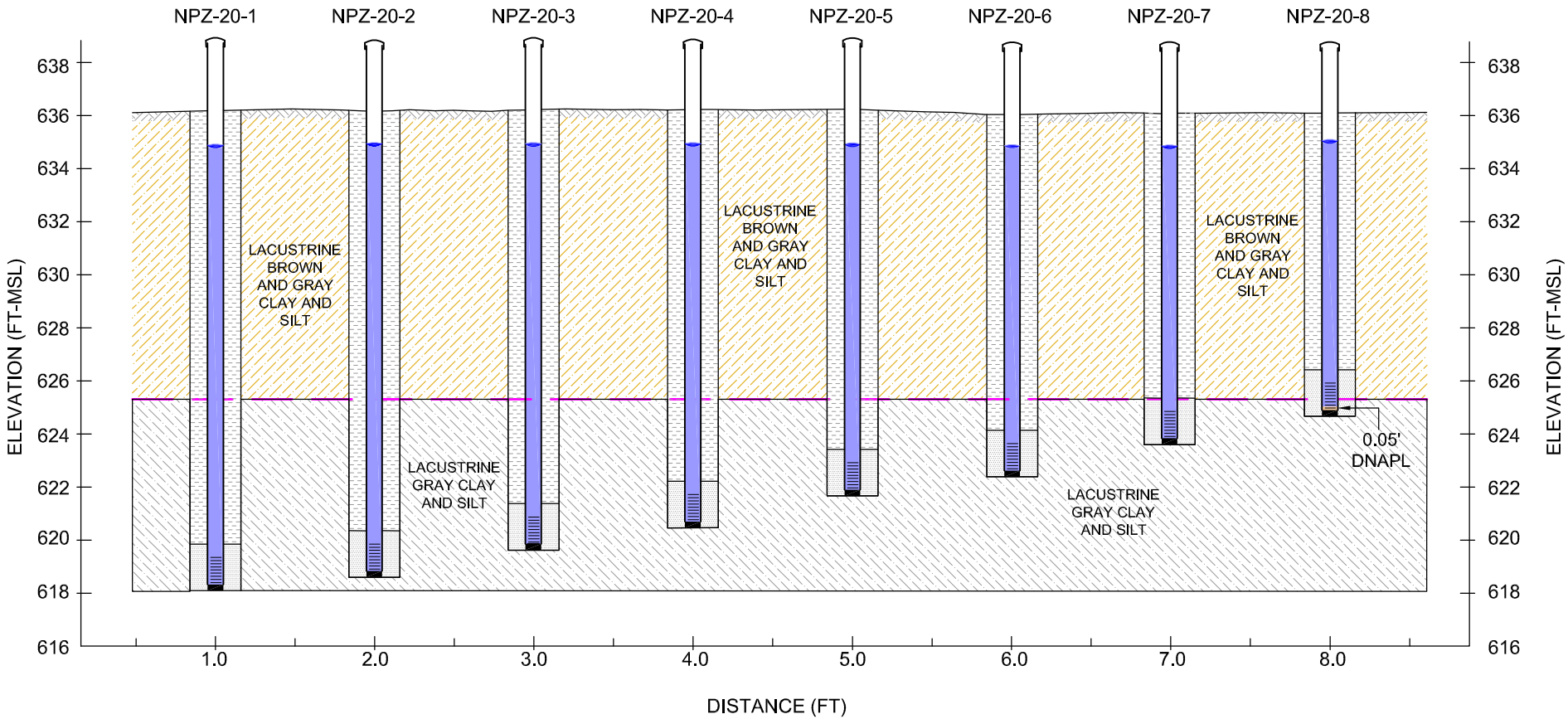

LEGEND

NOTES:

1) WATER LEVEL AND DNAPL LEVEL MEASUREMENTS COLLECTED MARCH 14, 2013.

2) GENERALIZED LITHOLOGY FROM ADJACENT RECOVERY WELL RW-20

NESTED PIEZOMETER AND SCREENED INTERVAL (1.0 FOOT)

GROUNDWATER COLUMN

DNAPL COLUMN

APPROXIMATE GEOCONTACT

0 3 6

VERTICAL SCALE 1" = 6'
HORIZONTAL SCALE 1" = 1'

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SOUTH AREA CROSS SECTION
NESTED PIEZOMETERS NPZ-20
(03/14/2013)

DRAWN BY:	CHECKED BY:	PROJECT No:	DATE:	FIGURE No:
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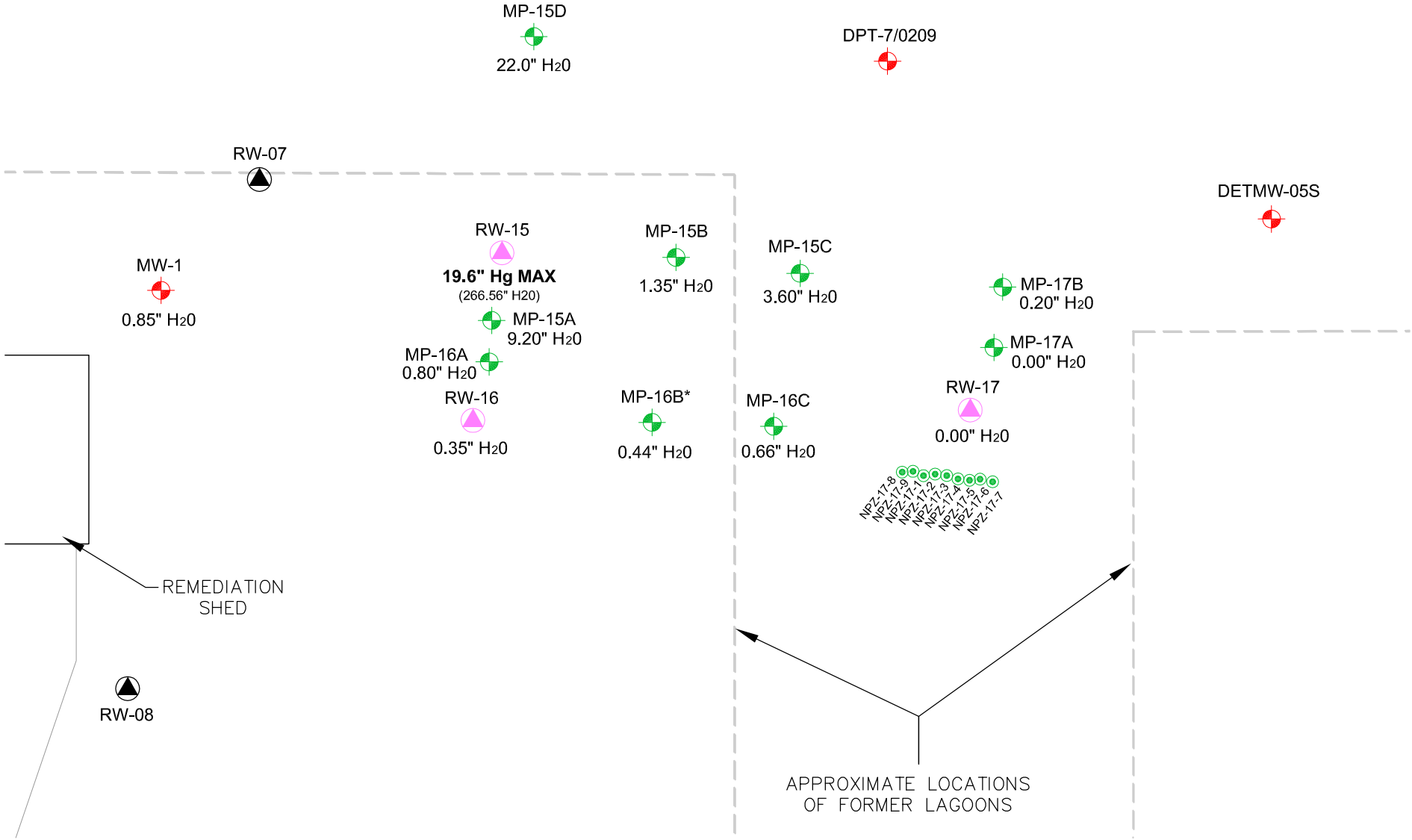

LEGEND

- EXISTING RECOVERY WELL
- NEW RECOVERY WELL
- EXISTING MONITORING WELL / PIEZOMETER
- NEW RECOVERY WELL MONITORING POINT
- NEW NESTED PIEZOMETER

*NOTE:

MP–16B NOT MEASURABLE EVEN AFTER REPLACING CAP VALVE AT 270 MINUTES INTO TEST

0 6 12

SCALE 1" = 12'

N

19.6" Hg MAX	MAXIMUM VACUUM INDUCED WITHIN RECOVERY WELL
(266.56" H20)	MAXIMUM VACUUM IN INCHES OF WATER
5.0" H20	VACUUM INFLUENCE AT MONITORING POINT IN INCHES OF WATER

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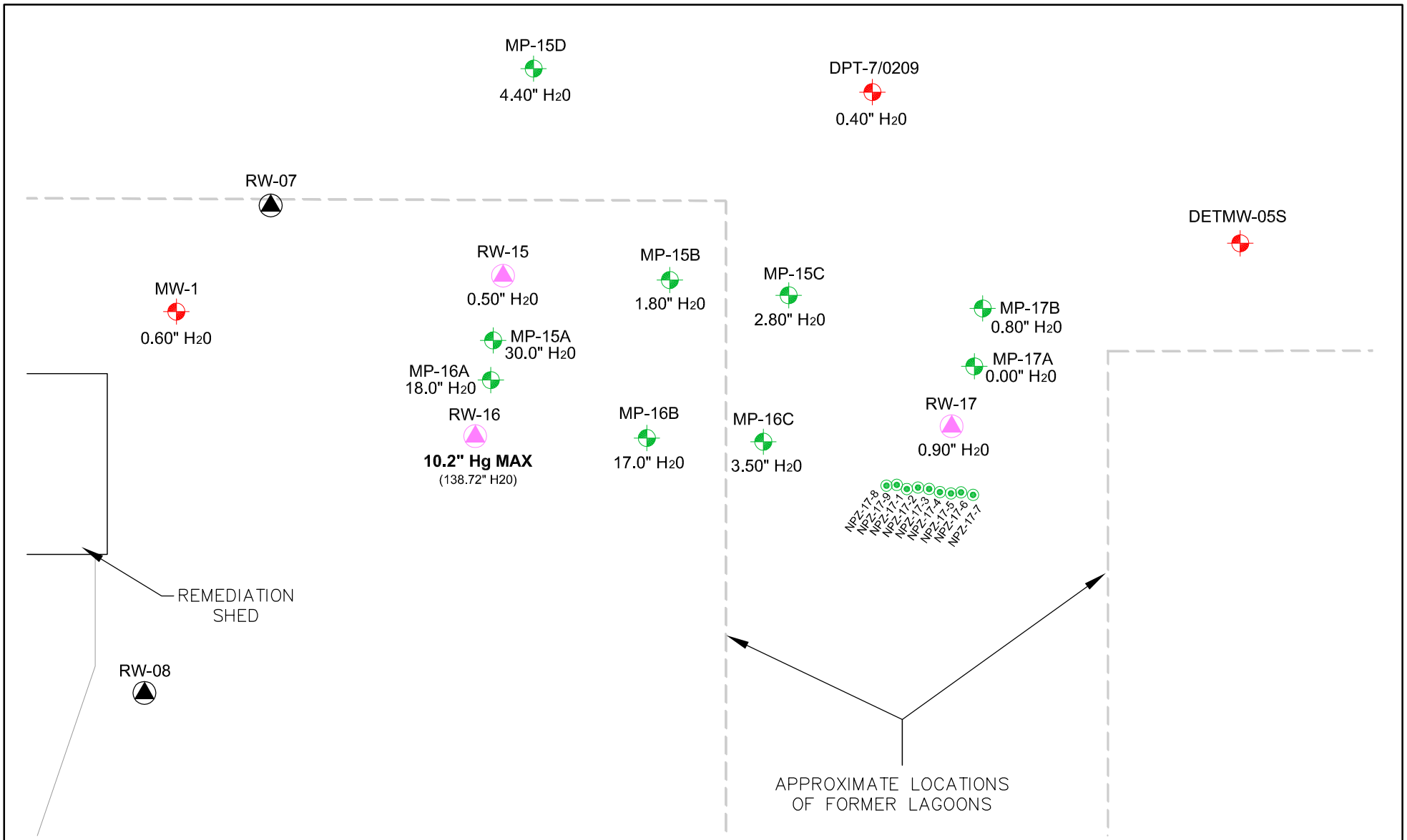
RADIUS OF VACUUM INFLUENCE PROCEDURE #2 NORTHERN AREA (RW-15)

DRAWN BY:	CHECKED BY:	PROJECT No:	DATE:	FIGURE No:
AMH	MLS	13816274	01/28/13	3.1

K:\Projects\D\Detrex\13816274\DWGs\Figures\DNAPL recovery Vac Maps\Fig 3.1 RW-15 Procedure 2 induced Vac.dwg User: anton_heitger Mar 25, 2013 – 4:07pm



LEGEND

- EXISTING RECOVERY WELL
- NEW RECOVERY WELL
- EXISTING MONITORING WELL / PIEZOMETER
- NEW RECOVERY WELL MONITORING POINT
- NEW NESTED PIEZOMETER

10.2" Hg MAX	MAXIMUM VACUUM INDUCED WITHIN RECOVERY WELL
(138.72" H20)	MAXIMUM VACUUM IN INCHES OF WATER
5.0" H20	VACUUM INFLUENCE AT MONITORING POINT IN INCHES OF WATER

0 6 12

SCALE 1" = 12'

N

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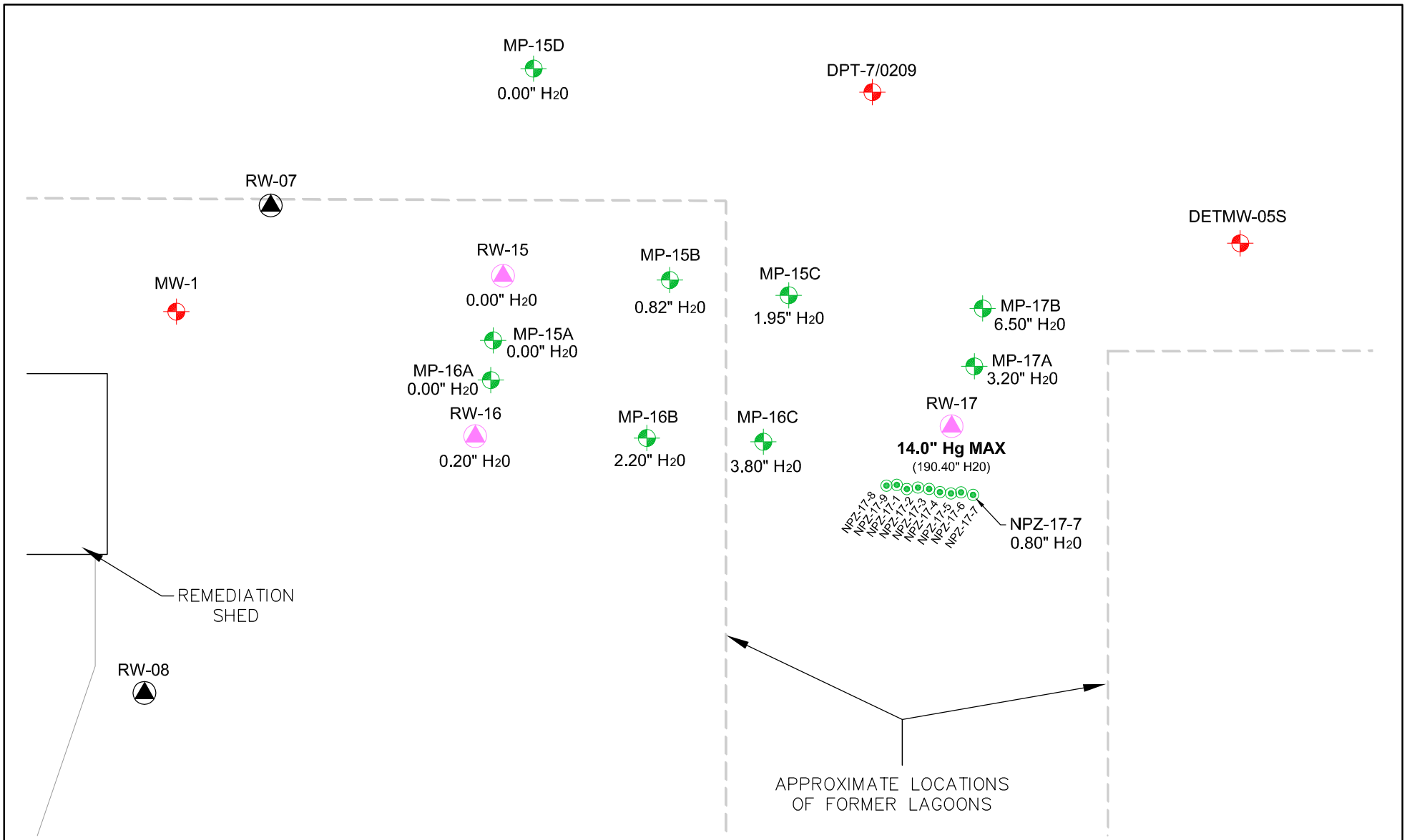
RADIUS OF VACUUM INFLUENCE PROCEDURE #2 NORTHERN AREA (RW-16)

DRAWN BY:	CHECKED BY:	PROJECT No:	DATE:	FIGURE No:
AMH	MLS	13816274	01/28/13	3.2

K:\Projects\D\Detrex\13816274\DWGs\Figures\DNAPL recovery Vac Maps\Fig 3.2 RW-16 Procedure 2 induced Vac.dwg User: anton_heitger Mar 25, 2013 – 4:15pm



LEGEND

- EXISTING RECOVERY WELL
- NEW RECOVERY WELL
- EXISTING MONITORING WELL / PIEZOMETER
- NEW RECOVERY WELL MONITORING POINT
- NEW NESTED PIEZOMETER

14.0" Hg MAX	MAXIMUM VACUUM INDUCED WITHIN RECOVERY WELL
(190.40" H20)	MAXIMUM VACUUM IN INCHES OF WATER
5.0" H_2O	VACUUM INFLUENCE AT MONITORING POINT IN INCHES OF WATER

0 6 12

SCALE 1" = 12'

N

URS

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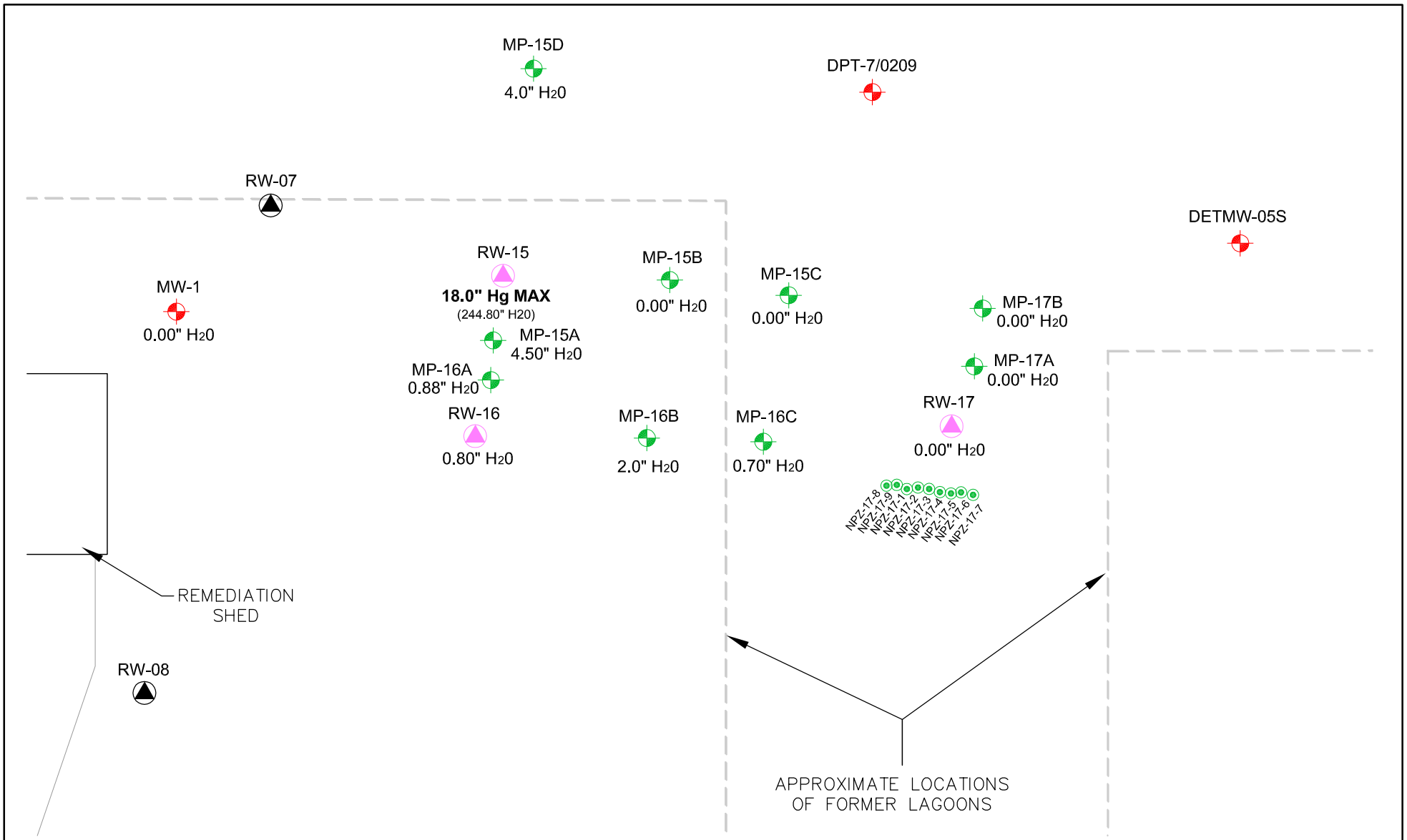
RADIUS OF VACUUM INFLUENCE PROCEDURE #2 NORTHERN AREA (RW-17)

DRAWN BY:	CHECKED BY:	PROJECT No:	DATE:	FIGURE No:
AMH	MLS	13816274	01/28/13	3.3

K:\Projects\D\Detrex\13816274\DWGs\Figures\DNAPL recovery Vac Maps\Fig 3.3 RW-17 Procedure 2 induced Vac.dwg User: anton_heitger Mar 25, 2013 – 4:18pm



LEGEND

- EXISTING RECOVERY WELL
- NEW RECOVERY WELL
- EXISTING MONITORING WELL / PIEZOMETER
- NEW RECOVERY WELL MONITORING POINT
- NEW NESTED PIEZOMETER

18.0" Hg MAX	MAXIMUM VACUUM INDUCED WITHIN RECOVERY WELL
(244.80" H20)	MAXIMUM VACUUM IN INCHES OF WATER
5.0" H20	VACUUM INFLUENCE AT MONITORING POINT IN INCHES OF WATER

0 6 12

SCALE 1" = 12'

N

URS

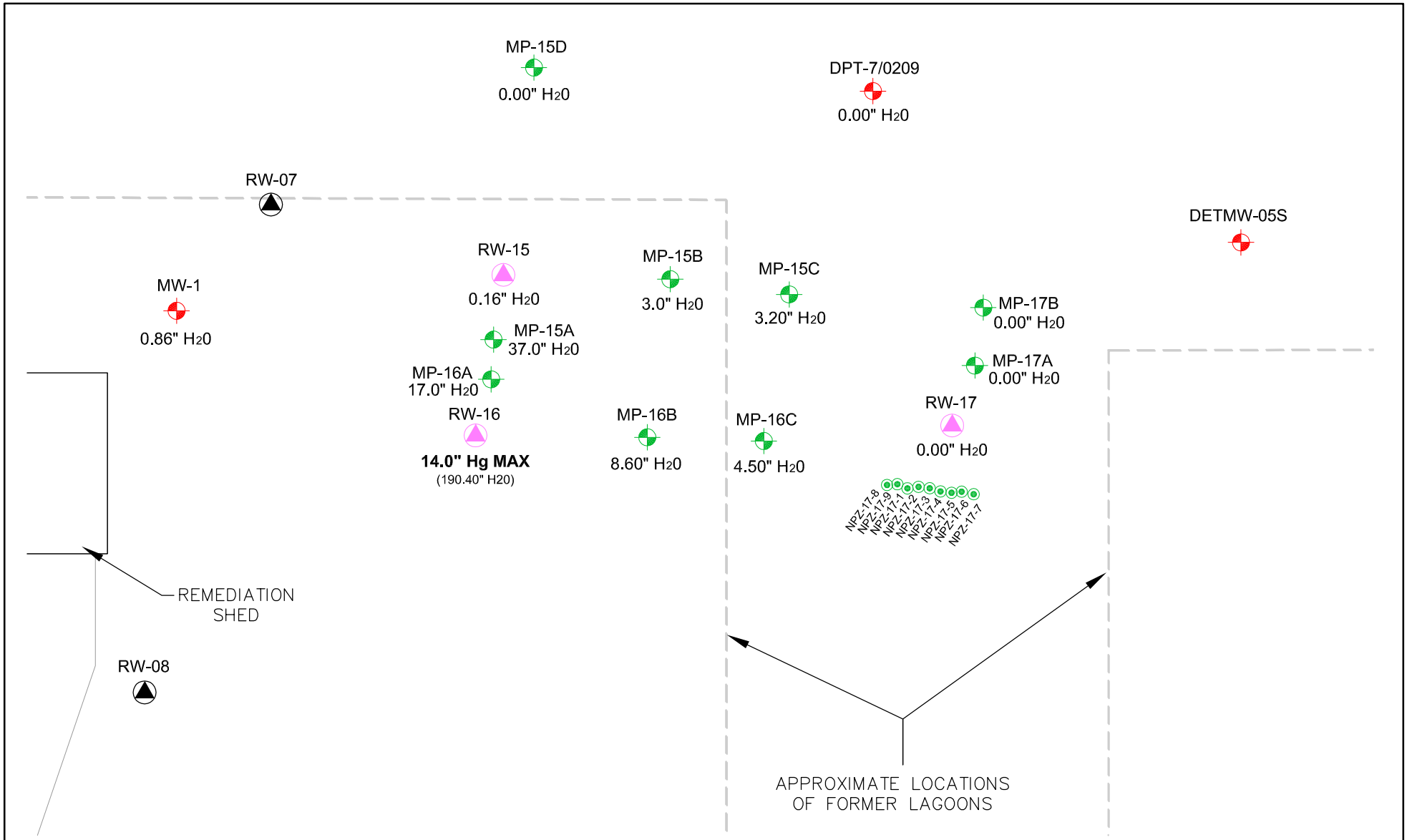
DETREX CORPORATION

ASHTABULA, OHIO

RADIUS OF VACUUM INFLUENCE PROCEDURE #3 NORTHERN AREA (RW-15)

DRAWN BY:	CHECKED BY:	PROJECT No:	DATE:	FIGURE No:
AMH	MLS	13816274	01/28/13	3.4

K:\Projects\D\Detrex\13816274\DWGs\Figures\DNAPL recovery Vac Maps\Fig 3.4 RW-15 Procedure 3 induced Vac.dwg User: anton_heitger Mar 25, 2013 – 4:59pm



LEGEND

- EXISTING RECOVERY WELL
- NEW RECOVERY WELL
- EXISTING MONITORING WELL / PIEZOMETER
- NEW RECOVERY WELL MONITORING POINT
- NEW NESTED PIEZOMETER

14.0" Hg MAX	MAXIMUM VACUUM INDUCED WITHIN RECOVERY WELL
(190.40" H20)	MAXIMUM VACUUM IN INCHES OF WATER
5.0" H20	VACUUM INFLUENCE AT MONITORING POINT IN INCHES OF WATER

0 6 12

SCALE 1" = 12'

N

URS

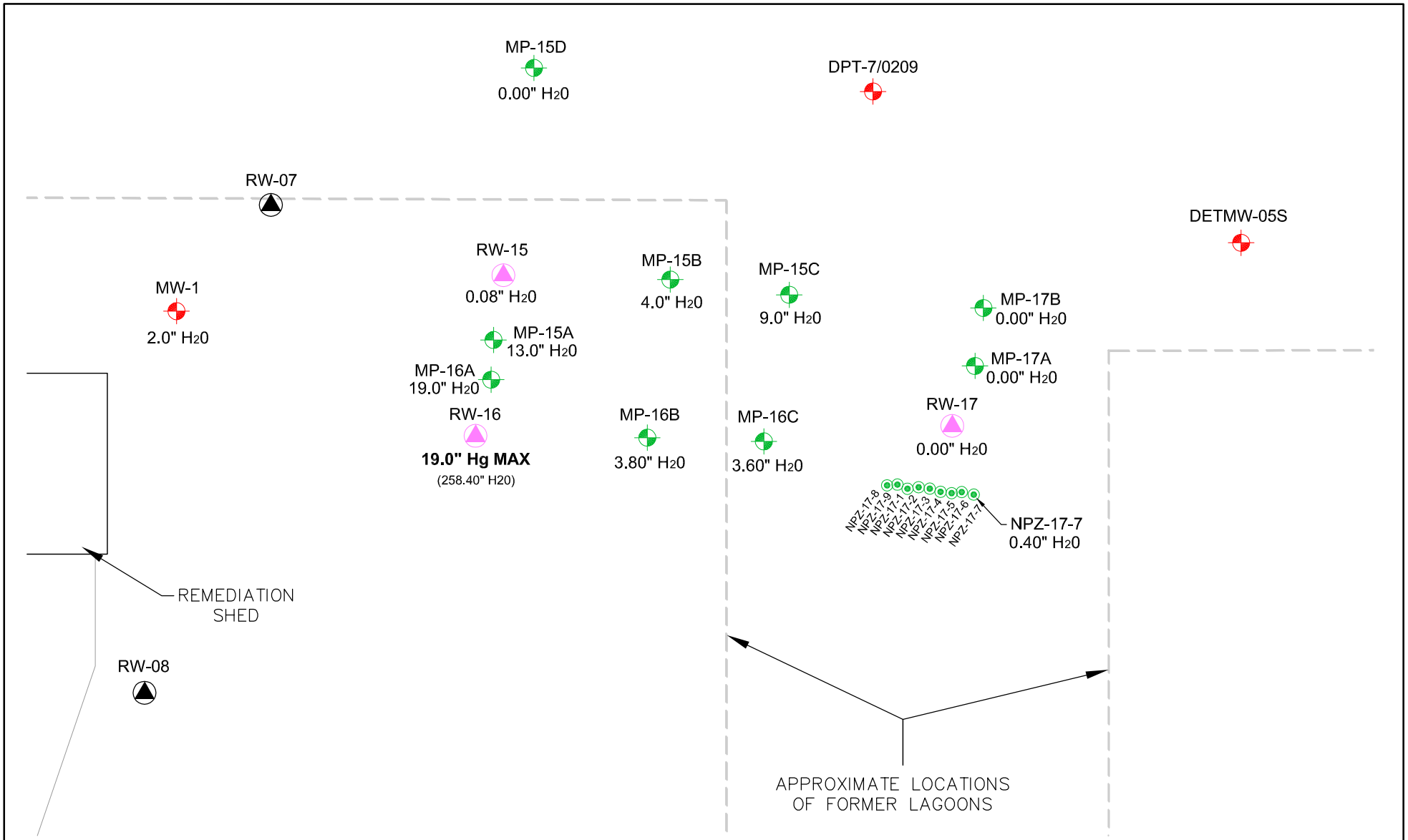
DETREX CORPORATION

ASHTABULA, OHIO

RADIUS OF VACUUM INFLUENCE PROCEDURE #3 NORTHERN AREA (RW-16 TEST 1)

DRAWN BY:	CHECKED BY:	PROJECT No:	DATE:	FIGURE No:
AMH	MLS	13816274	01/28/13	3.5

K:\Projects\D\Detrex\13816274\DWGs\Figures\DNAPL recovery Vac Maps\Fig 3.5 RW-16 Procedure 3 ind Vac 1.dwg User: anton_heitger Mar 25, 2013 - 5:41pm



LEGEND

- EXISTING RECOVERY WELL
- NEW RECOVERY WELL
- EXISTING MONITORING WELL / PIEZOMETER
- NEW RECOVERY WELL MONITORING POINT
- NEW NESTED PIEZOMETER

19.0" Hg MAX	MAXIMUM VACUUM INDUCED WITHIN RECOVERY WELL
(258.40" H20)	MAXIMUM VACUUM IN INCHES OF WATER
5.0" H20	VACUUM INFLUENCE AT MONITORING POINT IN INCHES OF WATER

0 6 12

SCALE 1" = 12'

N

URS

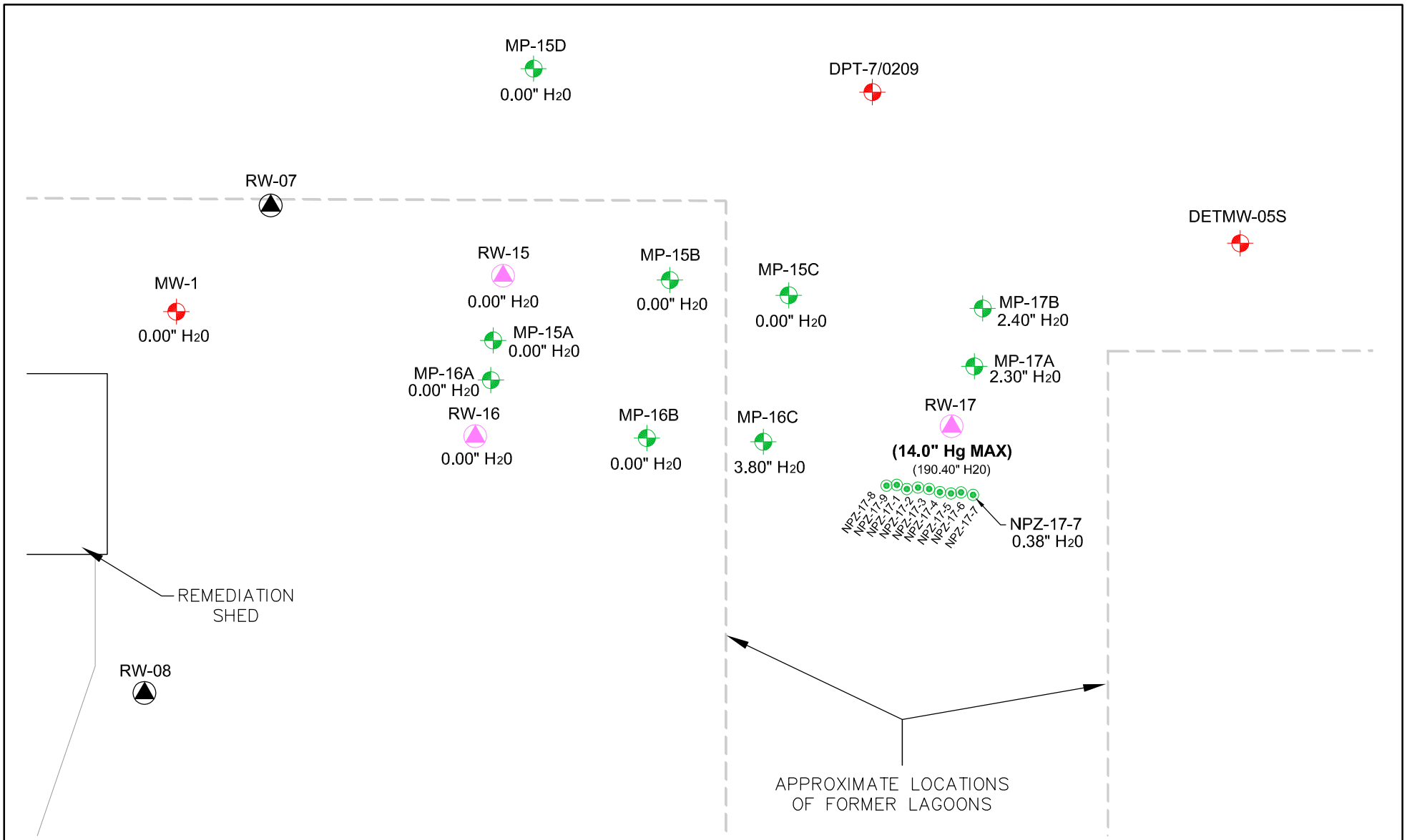
DETREX CORPORATION

ASHTABULA, OHIO

RADIUS OF VACUUM INFLUENCE PROCEDURE #3 NORTHERN AREA (RW-16 TEST 2)

DRAWN BY:	CHECKED BY:	PROJECT No:	DATE:	FIGURE No:
AMH	MLS	13816274	01/28/13	3.6

K:\Projects\D\Detrex\13816274\DWGs\Figures\DNAPL recovery Vac Maps\Fig 3.6 RW-16 Procedure 3 induced Vac 2.dwg User:anton_heitger Mar 25, 2013 - 5:03pm



LEGEND

- EXISTING RECOVERY WELL
- NEW RECOVERY WELL
- EXISTING MONITORING WELL / PIEZOMETER
- NEW RECOVERY WELL MONITORING POINT
- NEW NESTED PIEZOMETER

14.0" Hg MAX — MAXIMUM VACUUM INDUCED WITHIN RECOVERY WELL

(190.40" H20) — MAXIMUM VACUUM IN INCHES OF WATER

5.0" H_2O — VACUUM INFLUENCE AT MONITORING POINT IN INCHES OF WATER

0 6 12

SCALE 1" = 12'

N

URS

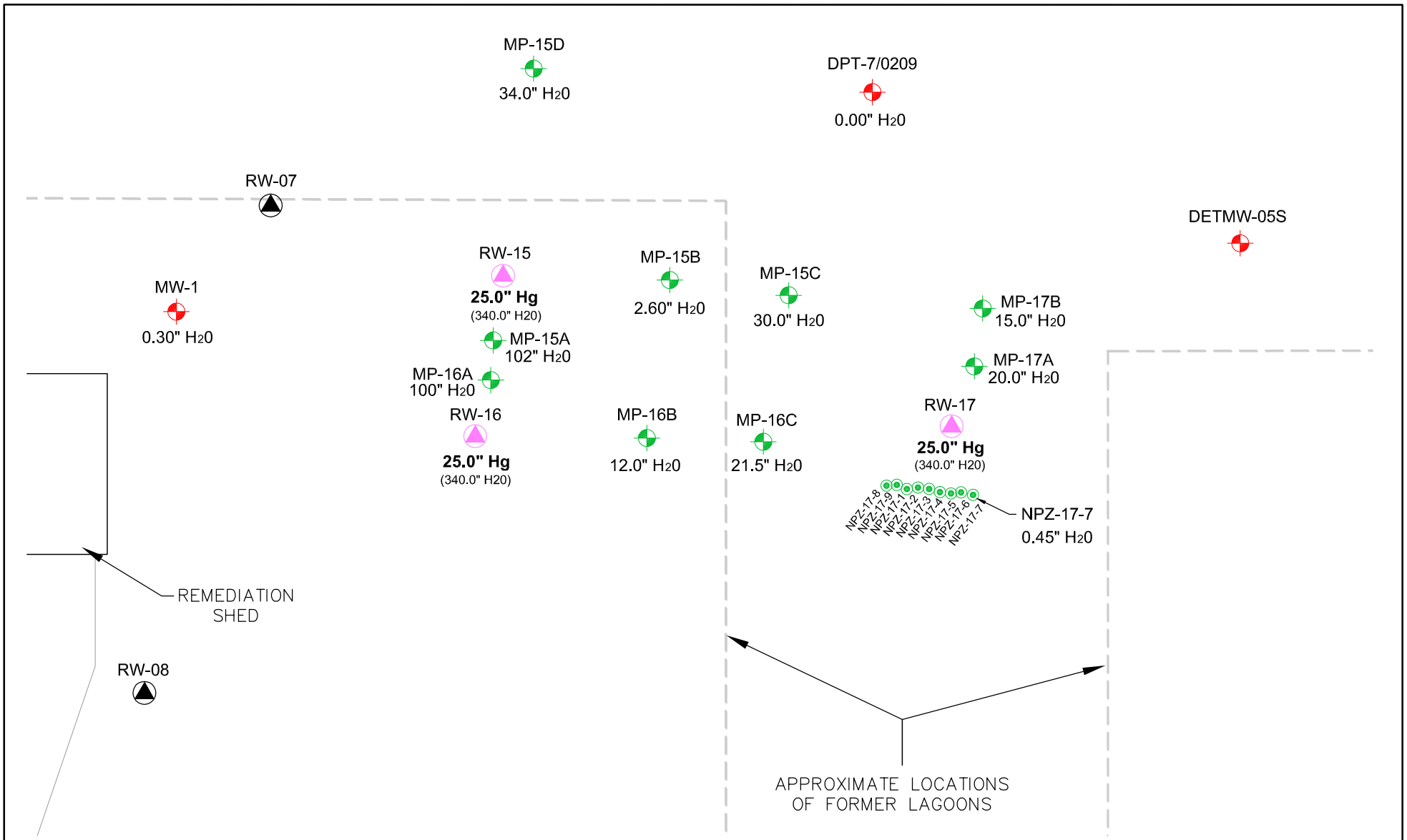
DETREX CORPORATION

ASHTABULA, OHIO

RADIUS OF VACUUM INFLUENCE PROCEDURE #3 NORTHERN AREA (RW-17)

DRAWN BY:	CHECKED BY:	PROJECT No:	DATE:	FIGURE No:
AMH	MLS	13816274	01/28/13	3.7

K:\Projects\D\Detrex\13816274\DWGs\Figures\DNAPL recovery Vac Maps\Fig 3.7 RW-17 Procedure 3 induced Vac.dwg User: anton_heitger Mar 25, 2013 - 5:05pm



LEGEND

- EXISTING RECOVERY WELL
- NEW RECOVERY WELL
- EXISTING MONITORING WELL / PIEZOMETER
- NEW RECOVERY WELL MONITORING POINT
- NEW NESTED PIEZOMETER

25.0" Hg MAX	MAXIMUM VACUUM INDUCED WITHIN RECOVERY WELL
(340.0" H20)	MAXIMUM VACUUM IN INCHES OF WATER
5.0" H20	VACUUM INFLUENCE AT MONITORING POINT IN INCHES OF WATER

0 6 12

SCALE 1" = 12'

N

URS

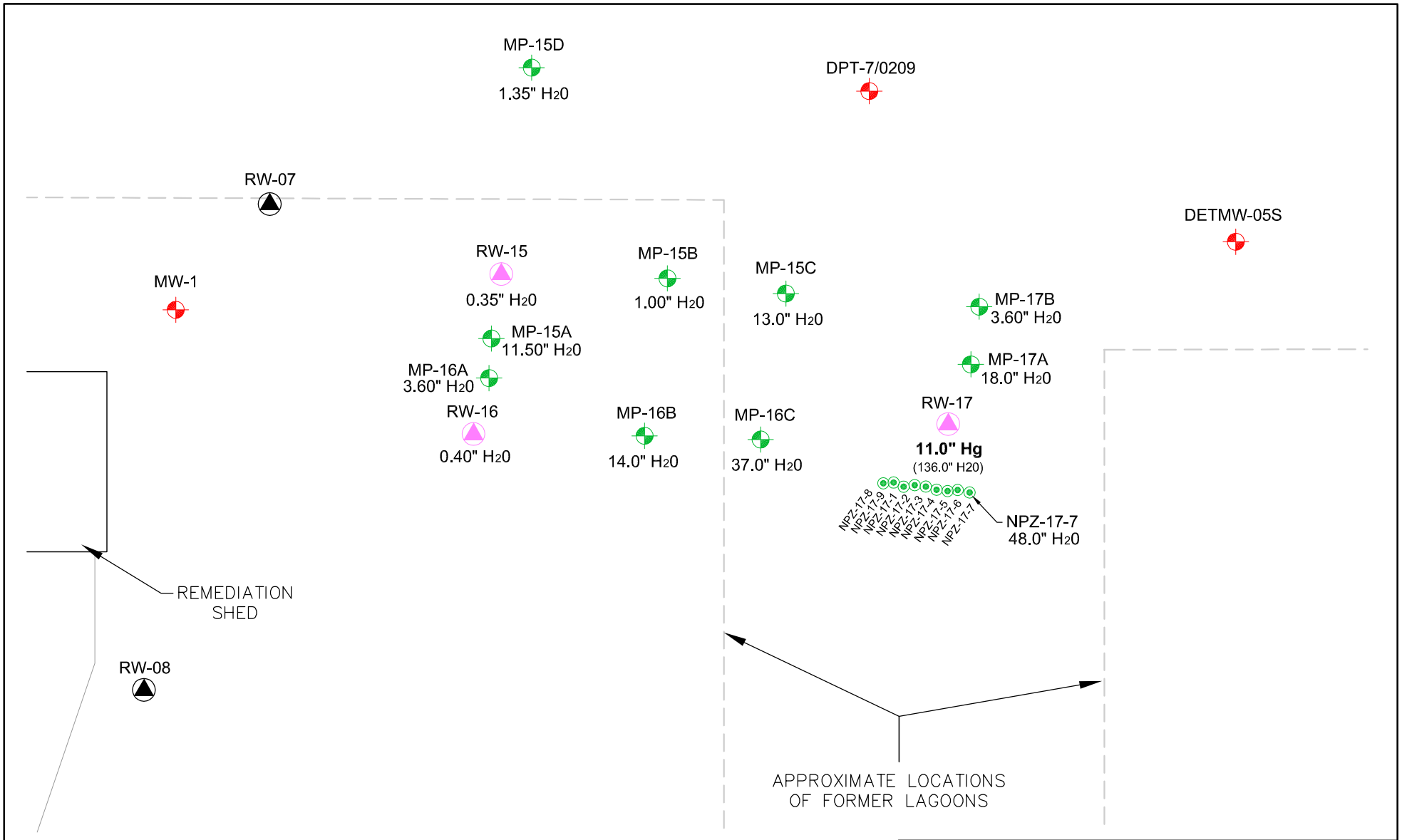
DETREX CORPORATION

ASHTABULA, OHIO

RADIUS OF VACUUM INFLUENCE
PROCEDURE #2 NORTHERN AREA

DRAWN BY:	CHECKED BY:	PROJECT No:	DATE:	FIGURE No:
AMH	MLS	13816274	01/28/13	3.8

K:\Projects\D\Detrex\13816274\DWGs\Figures\DNAPL recovery Vac Maps\Fig 3.8 RW-15, 16, 17 Procedure 4 induced Vac.dwg User: anton_heitger Mar 25, 2013 - 5:



LEGEND

- EXISTING RECOVERY WELL
- NEW RECOVERY WELL
- EXISTING MONITORING WELL / PIEZOMETER
- NEW RECOVERY WELL MONITORING POINT
- NEW NESTED PIEZOMETER
- **10.0" Hg** — VACUUM INDUCED WITHIN RECOVERY WELL
- (136.0" H20) — VACUUM INDUCED IN INCHES OF WATER
- 5.0" H_2O — MAXIMUM VACUUM INFLUENCE AT THE MONITORING POINT IN INCHES OF WATER

0 6 12

SCALE 1" = 12'

N

URS

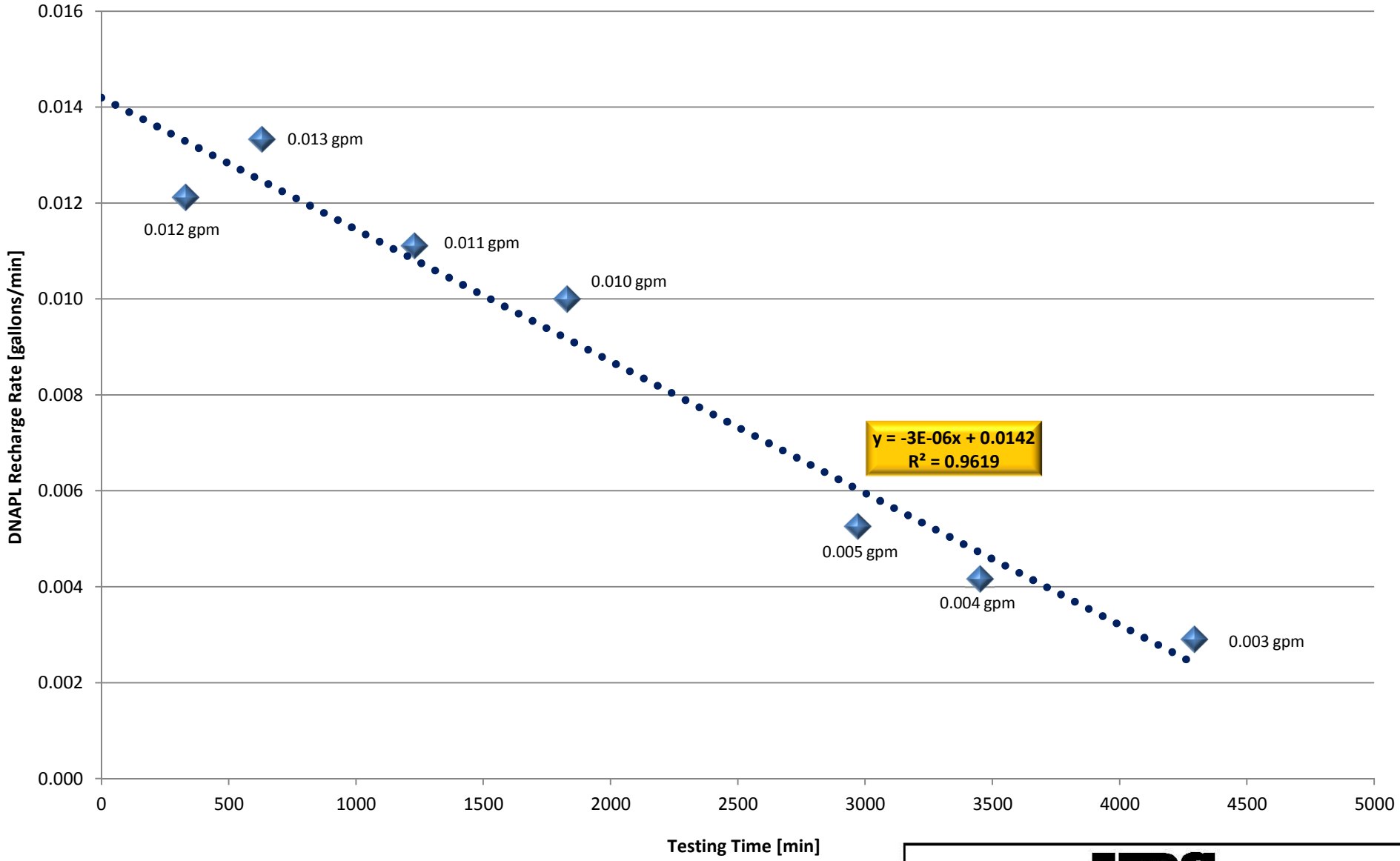
DETREX CORPORATION

ASHTABULA, OHIO

RADIUS OF VACUUM INFLUENCE
LONG TERM TEST (PROCEDURE #2)
RW-17

DRAWN BY:	CHECKED BY:	PROJECT No:	DATE:	FIGURE No:
AMH	MLS	13816274	03/20/13	3.9

K:\Projects\D\Detrex\13816274\DWGs\Figures\DNAPL recovery Vac Maps\Fig 3.9 RW-17 Long Term induced Vac.dwg User: anton_heitger Mar 25, 2013 – 5:07pm



DNAPL Rate (gallons/min)

Linear (DNAPL Rate (gallons/min))

URS

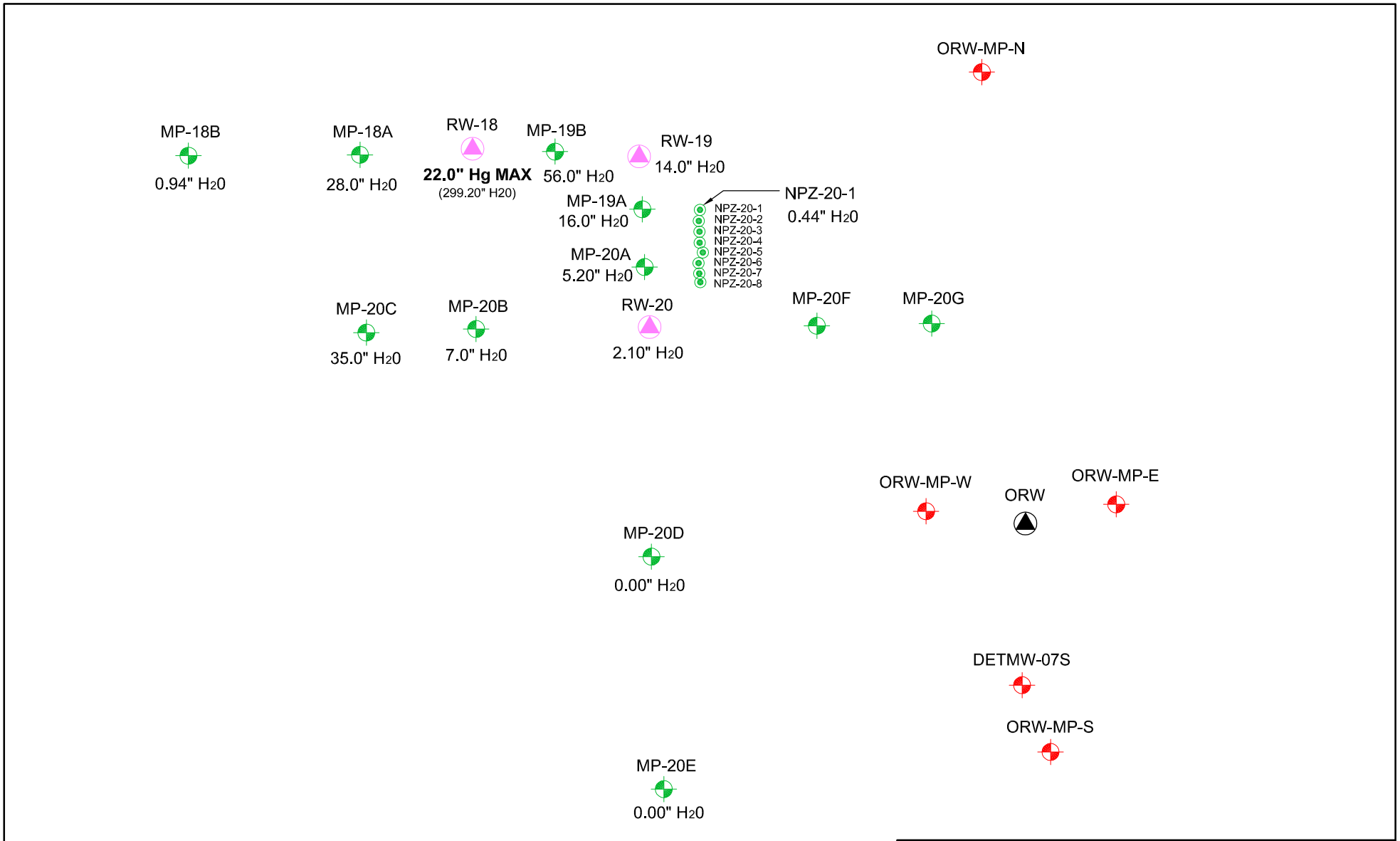
DETREX CORPORATION

ASHTABULA, OHIO

LONG TERM DNAPL RECOVERY TEST (RW-17) - DNAPL DECLINE CURVE

DRAWN BY:	CHECKED BY:	PROJECT No:	DATE:	FIGURE No:
DRG	MLS	13816274	04/12/13	3.10

K:\Projects\D\Detrex\13816274\DWGs\Figures\Figure 3.10 – DNAPL decline curve.dwg User:anton_heitger Apr 12, 2013 – 12:37pm



LEGEND

- EXISTING RECOVERY WELL
- NEW RECOVERY WELL
- EXISTING MONITORING WELL / PIEZOMETER
- NEW RECOVERY WELL MONITORING POINT
- NEW NESTED PIEZOMETER

22.0" Hg MAX — MAXIMUM VACUUM INDUCED WITHIN RECOVERY WELL

(299.20" H20) — MAXIMUM VACUUM IN INCHES OF WATER

5.0" H20 — VACUUM INFLUENCE AT MONITORING POINT IN INCHES OF WATER

0 10 20

SCALE 1" = 20'

N

URS

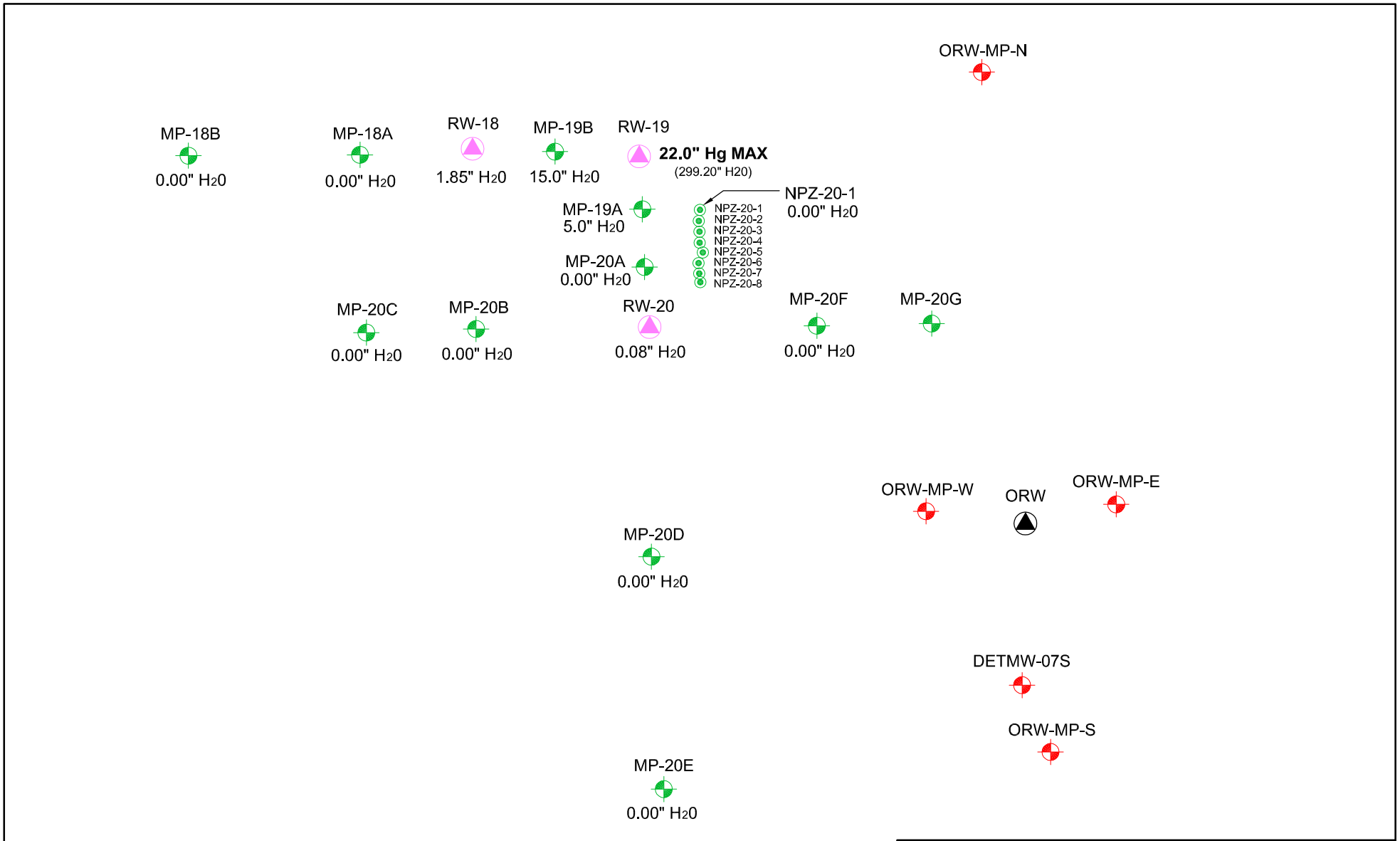
DETREX CORPORATION

ASHTABULA, OHIO

RADIUS OF VACUUM INFLUENCE PROCEDURE #3 SOUTHERN AREA (RW-18)

DRAWN BY:	CHECKED BY:	PROJECT No:	DATE:	FIGURE No:
AMH	MLS	13816274	01/28/13	3.11

K:\Projects\D\Detrex\13816274\DWGs\Figures\DNAPL recovery Vac Maps\Fig 3.11 RW-18 Procedure 3 induced Vac.dwg User: anton_heitger Mar 19, 2013 – 3:44pm



LEGEND

- EXISTING RECOVERY WELL
- NEW RECOVERY WELL
- EXISTING MONITORING WELL / PIEZOMETER
- NEW RECOVERY WELL MONITORING POINT
- NEW NESTED PIEZOMETER

22.0" Hg MAX — MAXIMUM VACUUM INDUCED WITHIN RECOVERY WELL

(299.20" H20) — MAXIMUM VACUUM IN INCHES OF WATER

5.0" H20 — VACUUM INFLUENCE AT MONITORING POINT IN INCHES OF WATER

0 10 20

SCALE 1" = 20'

N

URS

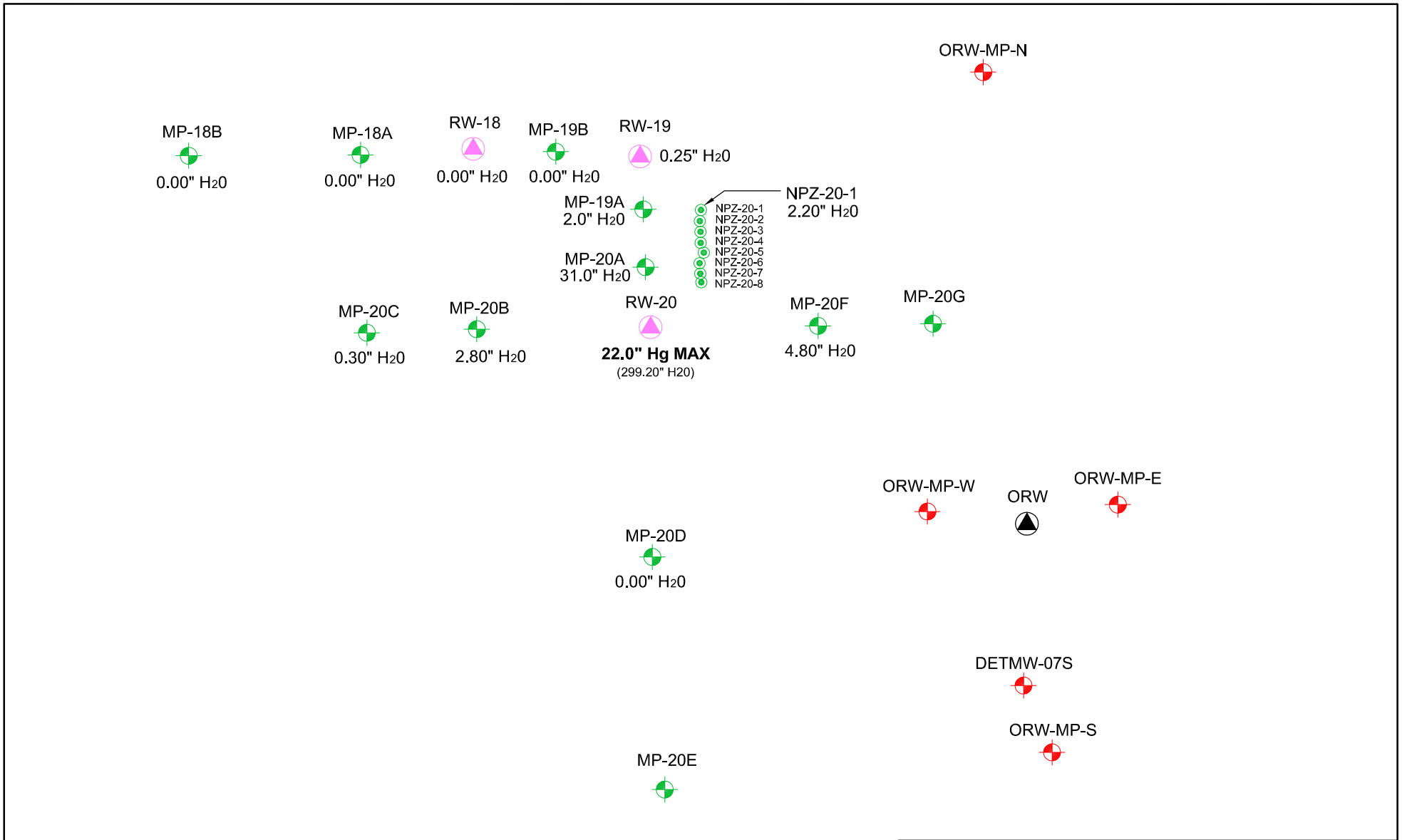
DETREX CORPORATION

ASHTABULA, OHIO

RADIUS OF VACUUM INFLUENCE PROCEDURE #3 SOUTHERN AREA (RW-19)

DRAWN BY:	CHECKED BY:	PROJECT No:	DATE:	FIGURE No:
AMH	MLS	13816274	01/28/13	3.12

K:\Projects\D\Detrex\13816274\DWGs\Figures\DNAPL recovery Vac Maps\Fig 3.12 RW-19 Procedure 3 induced Vac.dwg User: anton_heitger Mar 19, 2013 - 3:45pm



LEGEND

- EXISTING RECOVERY WELL
- NEW RECOVERY WELL
- EXISTING MONITORING WELL / PIEZOMETER
- NEW RECOVERY WELL MONITORING POINT
- NEW NESTED PIEZOMETER

22.0" Hg MAX	MAXIMUM VACUUM INDUCED WITHIN RECOVERY WELL
(299.20" H20)	MAXIMUM VACUUM IN INCHES OF WATER
5.0" H20	VACUUM INFLUENCE AT MONITORING POINT IN INCHES OF WATER

0 10 20

SCALE 1" = 20'

N

URS

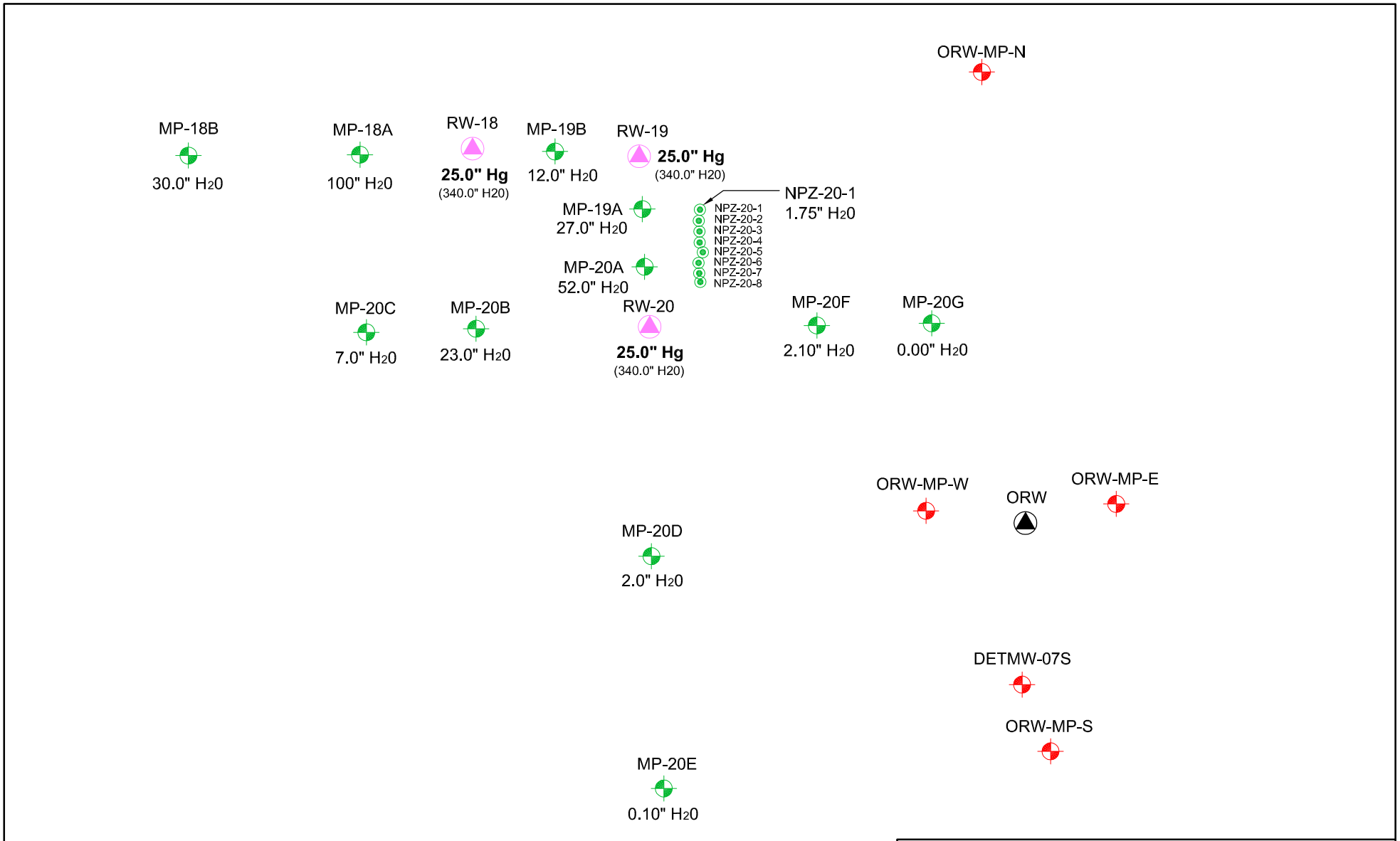
DETREX CORPORATION

ASHTABULA, OHIO

RADIUS OF VACUUM INFLUENCE PROCEDURE #3 SOUTHERN AREA (RW-20)

DRAWN BY:	CHECKED BY:	PROJECT No:	DATE:	FIGURE No:
AMH	MLS	13816274	01/28/13	3.13

K:\Projects\D\Detrex\13816274\DWGs\Figures\DNAPL recovery Vac Maps\Fig 3.13 RW-20 Procedure 3 induced Vac.dwg User: anton_heitger Mar 19, 2013 - 3:47pm



LEGEND

- EXISTING RECOVERY WELL
- NEW RECOVERY WELL
- EXISTING MONITORING WELL / PIEZOMETER
- NEW RECOVERY WELL MONITORING POINT
- NEW NESTED PIEZOMETER

25.0" Hg MAX	MAXIMUM VACUUM INDUCED WITHIN RECOVERY WELL
(340.0" H20)	MAXIMUM VACUUM IN INCHES OF WATER
5.0" H_2O	VACUUM INFLUENCE AT MONITORING POINT IN INCHES OF WATER

0 10 20

SCALE 1" = 20'

N

URS

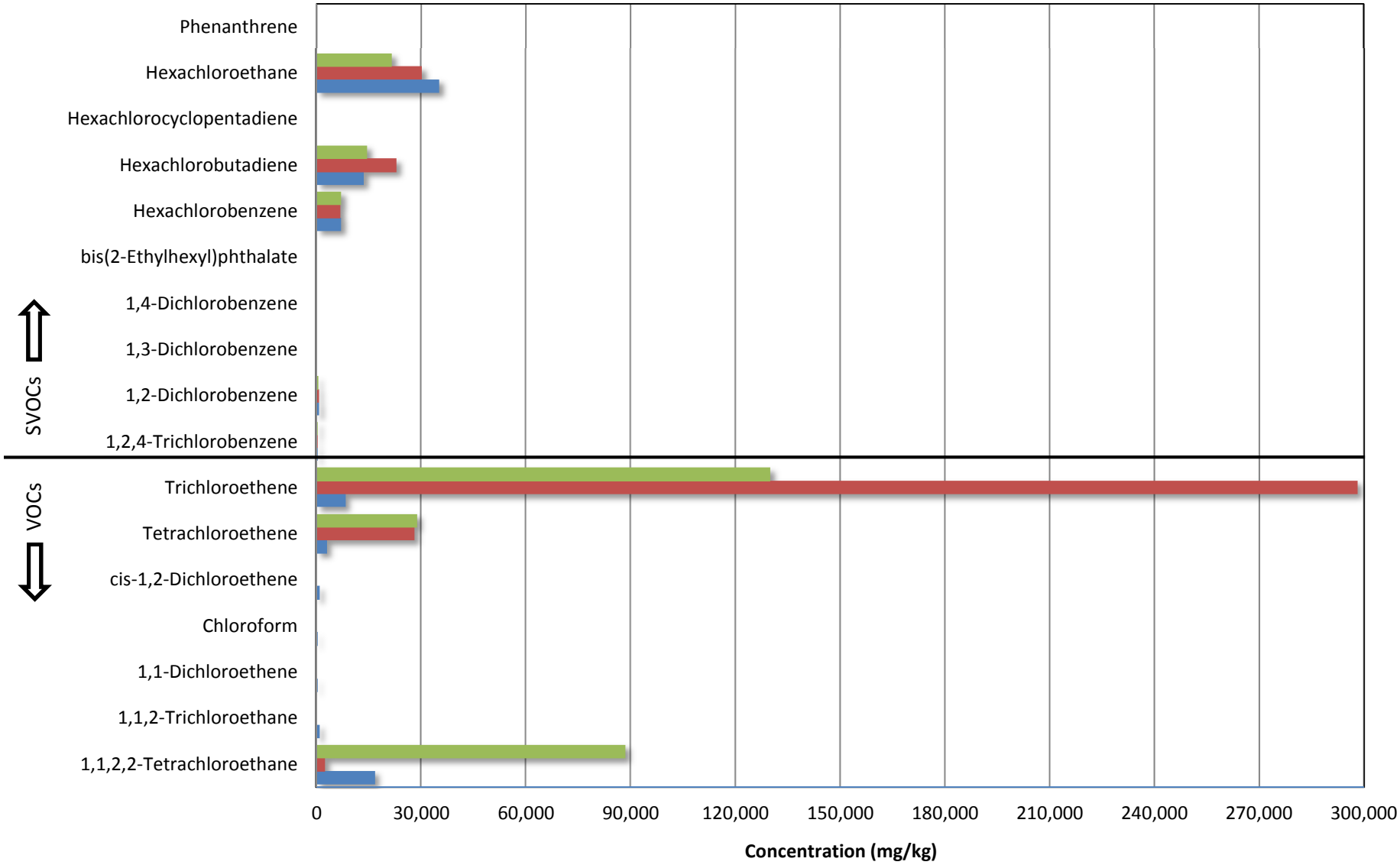
DETREX CORPORATION

ASHTABULA, OHIO

RADIUS OF VACUUM INFLUENCE
PROCEDURE #4 SOUTHERN AREA

DRAWN BY:	CHECKED BY:	PROJECT No:	DATE:	FIGURE No:
AMH	MLS	13816274	01/28/13	3.14

K:\Projects\D\Detrex\13816274\DWGs\Figures\DNAPL recovery Vac Maps\Fig 3.14 RW-18,19,20 Procedure 4 induced Vac.dwg User: anton_heitger Mar 19, 2013 - 3:4



MW-13-2 DETMW-06S RW-17

URS

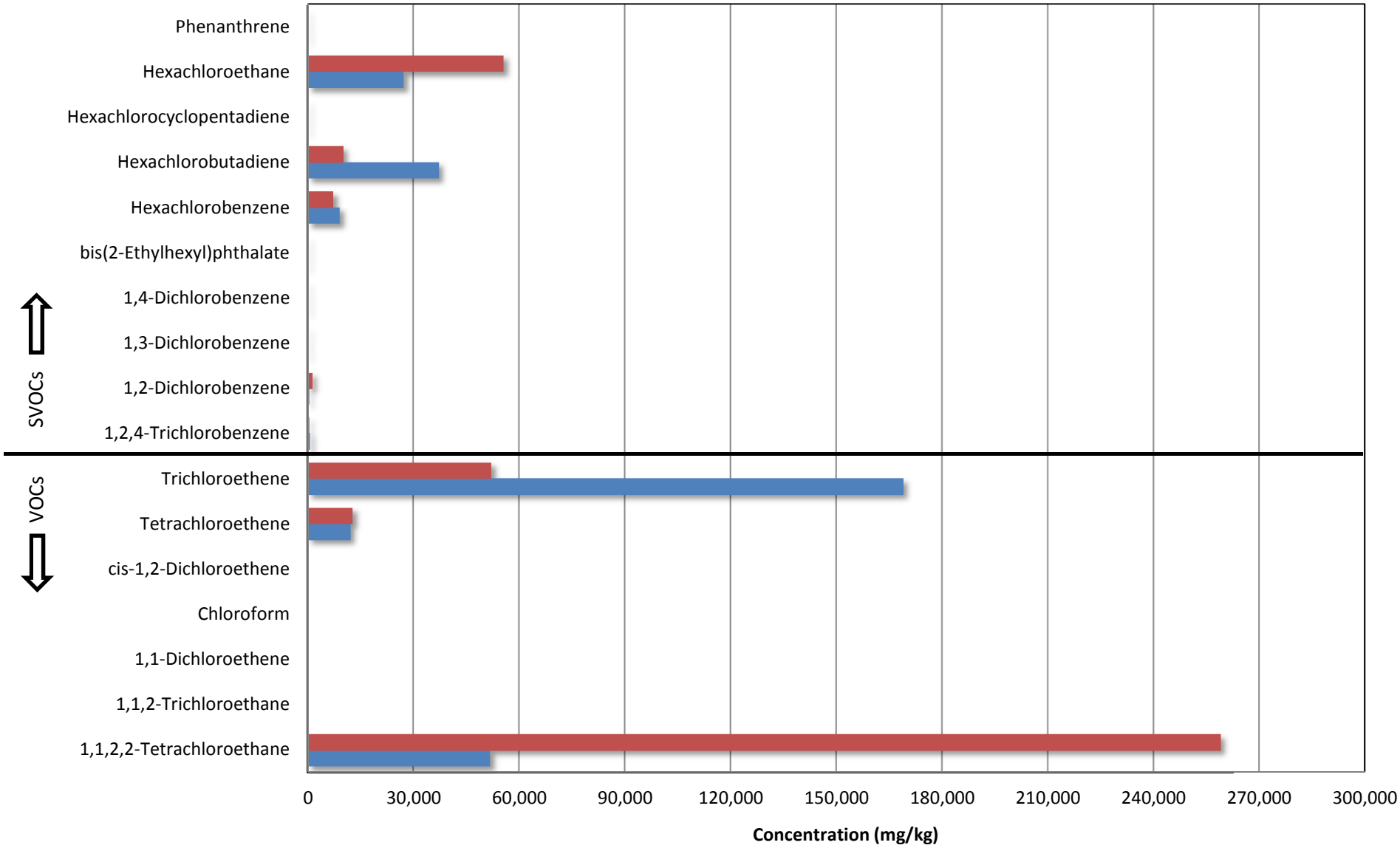
DETREX CORPORATION

ASHTABULA, OHIO

DNAPL SAMPLES FROM NORTH PERIMETER OF FORMER LAGOON AREA

DRAWN BY:	CHECKED BY:	PROJECT No:	DATE:	FIGURE No:
AMH	MLS	13816274	04/12/13	3.15

K:\Projects\D\Detrex\13816274\DWGs\Figures\Figure 3.15 – DNAPL samples north.dwg User: anton_heitger Apr 12, 2013 – 12:37pm



URS

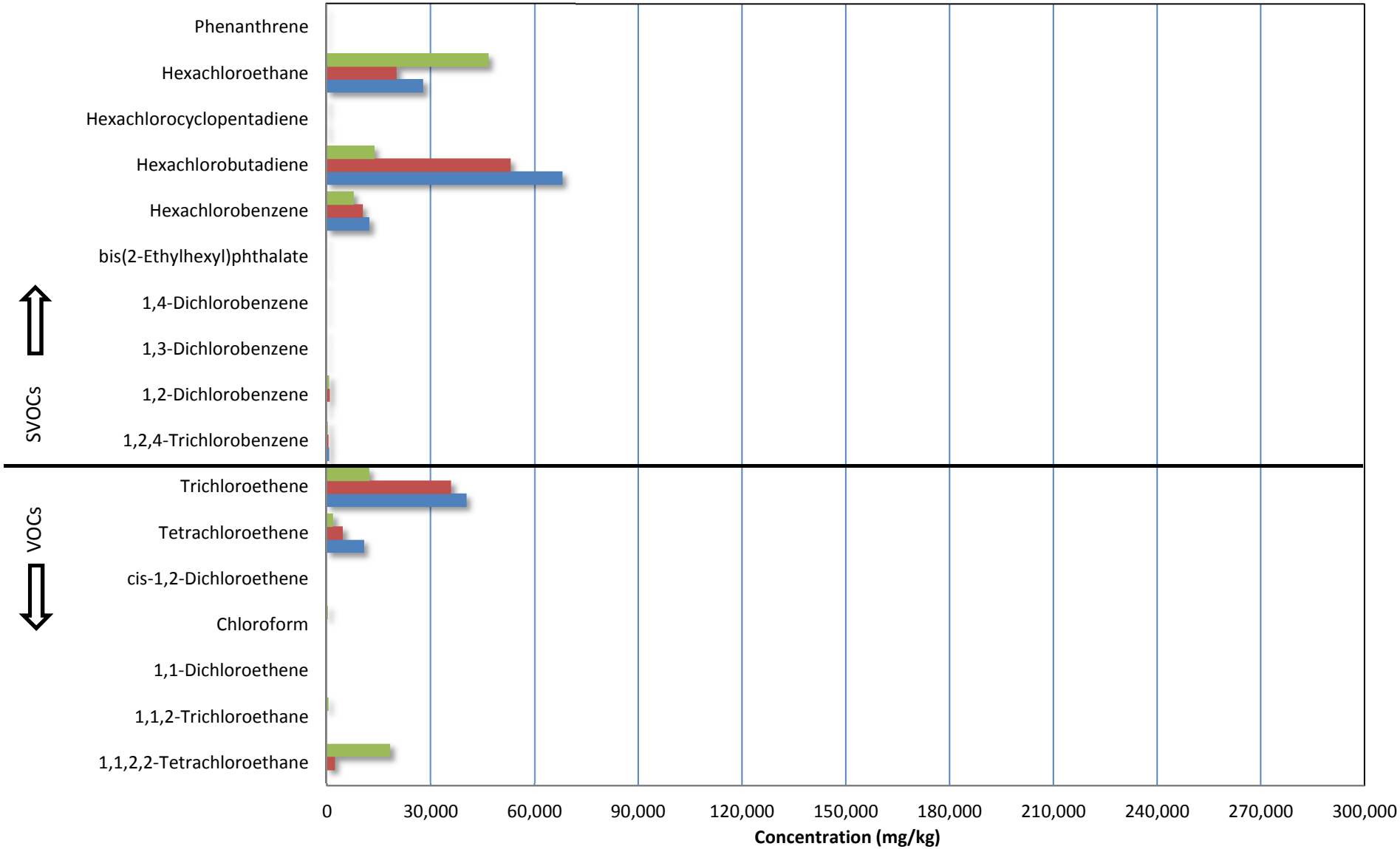
DETREX CORPORATION

ASHTABULA, OHIO

DNAPL SAMPLES FROM MIDDLE OF FORMER LAGOON AREA

DRAWN BY:	CHECKED BY:	PROJECT No:	DATE:	FIGURE No:
AMH	MLS	13816274	04/12/13	3.16

K:\Projects\D\Detrex\13816274\DWGs\Figures\Figure 3.16 - DNAPL samples MIDDLE.dwg User: anton_heitger Apr 12, 2013 - 12:39pm



RW-19 DETMW-09S DETMW-10S

URS

DETREX CORPORATION

ASHTABULA, OHIO

DNAPL SAMPLES FROM SOUTH PERIMETER OF FORMER LAGOON AREA

DRAWN BY:	CHECKED BY:	PROJECT No:	DATE:	FIGURE No:
AMH	MLS	13816274	04/12/13	3.17

K:\Projects\D\Detrex\13816274\DWGs\Figures\Figure 3.17 - DNAPL samples SOUTH.dwg User: anton_heitger Apr 12, 2013 - 12:39pm

TABLES

Table 2.1
Existing On-Site Well Inventory
Detrex Corporation, Ashtabula, Ohio
October 24, 2012

Well ID	State Plane (NAD 83) Northing [Ft]	State Plane (NAD 83) Easting [Ft]	Top of Casing Elevation [Ft-msl]	Water Level [Ft]	Groundwater Elevation [Ft]	DNAPL Level [Ft]	DNAPL Elevation [Ft]	Silt Level [Ft]	Silt Elevation [Ft]	Bottom of Well Casing [Ft]	Bottom of Well Casing Elevation [Ft]	Screened Interval [Ft-bgs]	Sand Pack Interval [Ft-bgs]	Well Size [Inch]	Well Material	Protective Casing	Well Pad Condition / Type
DPT-3/0209	817,023.30	2,439,847.40	640.44	6.15	634.29	13.85	626.59	14.15	626.29	14.15	626.29	5' - 15'	3' - 15'	1	PVC	None	No Well Pad
DPT-7/0209	817,301.08	2,439,928.92	637.89	3.40	634.49	ND	ND	ND	ND	17.35	620.54	15' - 25'	13' - 25'	1	PVC	None	No Well Pad
DPT-10/0209	817,201.29	2,439,711.88	639.76	5.25	634.51	ND	ND	9.90	629.86	9.90	629.86	5' - 15'	3' - 15'	1	PVC	None	No Well Pad
DETDP-02	817,033.94	2,440,371.47	636.97	2.35	634.62	ND	ND	ND	ND	22.00	614.97	NA	NA	2	PVC	None	No Well Pad
DETDP-03	NA	NA	NA	3.15	NA	ND	ND	ND	ND	24.75	NA	NA	NA	2	PVC	None	No Well Pad
DETDP-04	NA	NA	NA	3.40	NA	ND	ND	ND	ND	22.60	NA	NA	NA	2	PVC	None	No Well Pad
DETDP-05	NA	NA	NA	4.90	NA	ND	ND	ND	ND	25.30	NA	NA	NA	2	PVC	None	No Well Pad
MW-1-REC	817,281.88	2,439,868.12	637.26	3.30	633.96	20.65	616.61	ND	ND	21.90	615.36	10' - 25'	NA	2	Stainless	Steel	Concrete / Fair
MW-13-2	817,272.27	2,439,736.17	637.50	4.80	632.70	20.75	616.75	23.70	613.80	23.70	613.80	10' - 20'	NA	2	Stainless	Steel	Concrete / Fair
MW-14-3	817,186.31	2,439,886.16	639.66	4.80	634.86	20.40	619.26	24.55	615.11	24.55	615.11	10' - 23'	NA	2	Stainless	Steel	Concrete / Fair
DETMW-05S	817,287.86	2,439,961.06	639.20	4.20	635.00	17.00	622.20	ND	ND	22.20	617.00	9' - 19'	7.5'-20'	2	Stainless	Steel	Concrete / Fair
DETMW-06S	817,199.52	2,440,287.51	638.35	3.30	635.05	15.90	622.45	19.90	618.45	19.90	618.45	7.5' - 17.5'	5.5' - 17.5'	2	Stainless	Steel	Concrete / Fair
DETMW-07S	816,996.34	2,440,008.92	638.10	5.45	632.65	10.45	627.65	12.65	625.45	12.65	625.45	9.5' - 19.5'	7.5'-20'	2	Stainless	Steel	Concrete / Fair
DETMW-08S	817,119.64	2,439,800.79	638.15	3.75	634.40	19.50	618.65	22.00	616.15	22.00	616.15	9.5' - 19.5'	8'-20'	2	Stainless	Steel	Concrete / Fair
DETMW-09S	816,780.24	2,439,940.99	640.14	5.05	635.09	18.85	621.29	ND	ND	22.20	617.94	7' - 17'	5' - 17.5'	2	Stainless	Steel	Concrete / Fair
DETMW-10S	816,880.21	2,439,959.63	639.95	5.20	634.75	19.25	620.70	20.00	619.95	20.00	619.95	7' - 17'	5' - 17.5'	2	Stainless	Steel	Concrete / Fair
GP-15	817,122.26	2,439,955.41	639.21	3.60	635.61	16.80	622.41	ND	ND	19.90	619.31	10' - 20'	8'-20'	1	PVC	None	No Well Pad
GP-26	817,018.09	2,439,744.40	636.34	damaged	NA	NA	NA	NA	NA	NA	NA	NA	NA	1	PVC	None	No Well Pad
MP-13A	817,264.25	2,439,750.24	638.36	4.35	634.01	ND	ND	17.00	621.36	17.40	620.96	~5' - 15'	NA	1	Stainless	Steel	Concrete / Fair
MP-13B	817,248.11	2,439,759.96	638.60	4.70	633.90	ND	ND	16.70	621.90	16.70	621.90	~5' - 15'	NA	1	Stainless	Steel	Concrete / Fair
MP-14A	817,175.94	2,439,858.08	639.09	plugged	NA	NA	NA	NA	NA	NA	NA	NA	NA	1	Stainless	Steel	Concrete / Fair
MP-14B	817,162.06	2,439,867.53	639.20	4.05	635.15	ND	ND	15.60	623.60	15.70	623.50	~3' - 13'	NA	1	Stainless	Steel	Concrete / Fair
MP-15A	817,279.37	2,439,895.80	637.76	3.95	633.81	16.80	620.96	ND	ND	23.70	614.06	18' - 22'	17'-23'	1	PVC	None	No Well Pad
MP-15B	817,284.64	2,439,911.23	637.77	7.40	630.37	10.15	627.62	ND	ND	24.00	613.77	18' - 22'	17'-23'	1	PVC	None	No Well Pad
MP-15C	817,283.31	2,439,921.61	638.22	6.30	631.92	13.70	624.52	24.00	614.22	24.00	614.22	18' - 22'	17'-23'	1	PVC	None	No Well Pad
MP-15D	817,303.13	2,439,899.33	637.32	3.00	634.32	20.15	617.17	23.00	614.32	23.00	614.32	18' - 22'	17'-23'	1	PVC	None	No Well Pad
MP-16A	817,275.90	2,439,895.59	637.90	7.20	630.70	13.10	624.80	23.10	614.80	23.10	614.80	18' - 22'	17'-23'	1	PVC	None	No Well Pad
MP-16B	817,270.83	2,439,909.22	637.62	4.20	633.42	16.55	621.07	23.70	613.92	23.80	613.82	18' - 22'	17'-23'	1	PVC	None	No Well Pad
MP-16C	817,270.51	2,439,919.40	638.15	5.55	632.60	16.40	621.75	ND	ND	24.00	614.15	18' - 22'	17'-23'	1	PVC	None	No Well Pad
MP-17A	817,277.10	2,439,937.83	639.07	4.65	634.42	23.00	616.07	ND	ND	25.95	613.12	19' - 23'	18'-24'	1	PVC	None	No Well Pad
MP-17B	817,282.16	2,439,938.56	638.87	4.00	634.87	19.30	619.57	ND	ND	25.90	612.97	19' - 23'	18'-24'	1	PVC	None	No Well Pad
MP-18A	817,042.74	2,439,950.76	638.14	3.35	634.79	16.65	621.49	19.80	618.34	19.80	618.34	14' - 18'	12'-18'	1	PVC	None	No Well Pad
MP-18B	817,042.82	2,439,935.68	638.33	5.65	632.68	10.95	627.38	ND	ND	20.55	617.78	14' - 18'	12'-18'	1	PVC	None	No Well Pad
MP-19A	817,038.07	2,439,975.56	638.47	3.80	634.67	12.00	626.47	ND	ND	18.45	620.02	12' - 16'	10'-16'	1	PVC	None	No Well Pad
MP-19B	817,043.21	2,439,967.91	638.57	3.75	634.82	15.30	623.27	18.35	620.22	18.35	620.22	12' - 16'	10'-16'	1	PVC	None	No Well Pad
MP-20A	817,033.02	2,439,975.71	638.53	3.55	634.98	17.00	621.53	ND	ND	18.45	620.08	12' - 16'	10'-16'	1	PVC	None	No Well Pad
MP-20B	817,027.61	2,439,960.96	637.97	3.65	634.32	13.60	624.37	ND	ND	18.30	619.67	12' - 16'	10'-16'	1	PVC	None	No Well Pad
MP-20C	817,027.27	2,439,951.30	637.84	3.20	634.64	ND	ND	17.50	620.34	17.60	620.24	12' - 16'	10'-16'	1	PVC	None	No Well Pad
MP-20D	817,007.58	2,439,976.35	638.17	6.45	631.72	9.60	628.57	ND	ND	18.40	619.77	12' - 16'	10'-16'	1	PVC	None	No Well Pad

Notes:
ND - Not Detected
NA - Not Available
Groundwater and DNAPL measurements reported were collected on March 14, 2013.

Table 2.1
Existing On-Site Well Inventory
Detrex Corporation, Ashtabula, Ohio
October 24, 2012

Well ID	State Plane (NAD 83) Northing [ft]	State Plane (NAD 83) Easting [ft]	Top of Casing Elevation [ft-msl]	Water Level [Ft]	Groundwater Elevation [Ft]	DNAPL Level [Ft]	DNAPL Elevation [Ft]	Silt Level [Ft]	Silt Elevation [Ft]	Bottom of Well Casing [Ft]	Bottom of Well Casing Elevation [Ft]	Screened Interval [Ft-bgs]	Sand Pack Interval [Ft-bgs]	Well Size [Inch]	Well Material	Protective Casing	Well Pad Condition / Type
MP-20E	816,987.21	2,439,977.44	637.70	2.90	634.80	12.25	625.45	ND	ND	18.50	619.20	12' - 16'	10'-16'	1	PVC	None	No Well Pad
MP-20F	817,027.98	2,439,990.91	638.47	5.80	632.67	9.25	629.22	18.55	619.92	18.55	619.92	12' - 16'	10'-16'	1	PVC	None	No Well Pad
MP-20G	817,028.08	2,440,000.96	638.59	4.10	634.49	14.05	624.54	ND	ND	18.60	619.99	12' - 16'	10'-16'	1	PVC	None	No Well Pad
NPZ-17-1	817,266.37	2,439,931.93	638.66	7.95	630.71	20.65	618.01	ND	ND	20.65	618.01	17' - 18'	16' - 18'	1	PVC	None	No Well Pad
NPZ-17-2	817,266.50	2,439,932.90	638.68	7.50	631.18	21.45	617.23	21.45	617.23	21.45	617.23	18' - 19'	17' - 19'	1	PVC	None	No Well Pad
NPZ-17-3	817,266.38	2,439,933.88	638.66	4.55	634.11	22.60	616.06	ND	ND	22.60	616.06	19' - 20'	18' - 20'	1	PVC	None	No Well Pad
NPZ-17-4	817,266.10	2,439,934.82	638.66	4.70	633.96	23.40	615.26	ND	ND	23.40	615.26	20' - 21'	29' - 21'	1	PVC	None	No Well Pad
NPZ-17-5	817,265.99	2,439,935.79	638.60	3.85	634.75	24.45	614.15	ND	ND	24.45	614.15	21' - 22'	20' - 22'	1	PVC	None	No Well Pad
NPZ-17-6	817,266.08	2,439,936.67	638.65	4.20	634.45	25.40	613.25	ND	ND	25.40	613.25	22' - 23'	21' - 23'	1	PVC	None	No Well Pad
NPZ-17-7	817,265.86	2,439,937.72	638.58	3.80	634.78	26.50	612.08	ND	ND	26.50	612.08	23' - 24'	22' - 24'	1	PVC	None	No Well Pad
NPZ-17-8	817,266.73	2,439,931.05	638.69	3.90	634.79	19.50	619.19	ND	ND	19.50	619.19	16' - 17'	15' - 17'	1	PVC	None	No Well Pad
NPZ-17-9	817,266.67	2,439,930.15	638.64	6.75	631.89	18.35	620.29	ND	ND	18.35	620.29	15' - 16'	14' - 16'	1	PVC	None	No Well Pad
NPZ-20-1	817,031.72	2,439,980.66	638.58	3.85	634.73	20.35	618.23	ND	ND	20.35	618.23	17' - 18'	16'-18'	1	PVC	None	No Well Pad
NPZ-20-2	817,032.48	2,439,980.57	638.51	3.70	634.81	19.80	618.71	ND	ND	19.80	618.71	16' - 17'	15'-17'	1	PVC	None	No Well Pad
NPZ-20-3	817,033.39	2,439,980.51	638.54	3.75	634.79	18.80	619.74	ND	ND	18.80	619.74	15' - 16'	14'-16'	1	PVC	None	No Well Pad
NPZ-20-4	817,034.33	2,439,980.88	638.52	3.75	634.77	17.95	620.57	ND	ND	17.95	620.57	14' - 15'	13'-15'	1	PVC	None	No Well Pad
NPZ-20-5	817,035.18	2,439,980.61	638.57	3.80	634.77	16.80	621.77	ND	ND	16.80	621.77	13' - 14'	12'-14'	1	PVC	None	No Well Pad
NPZ-20-6	817,036.15	2,439,980.59	638.55	3.70	634.85	15.90	622.65	ND	ND	15.90	622.65	12' - 13'	11'-13'	1	PVC	None	No Well Pad
NPZ-20-7	817,037.09	2,439,980.53	638.57	3.70	634.87	14.70	623.87	ND	ND	14.70	623.87	11' - 12'	10'-12'	1	PVC	None	No Well Pad
NPZ-20-8	817,038.07	2,439,980.63	638.55	3.50	635.05	13.60	624.95	ND	ND	13.60	624.95	10 - 11'	9'-11'	1	PVC	None	No Well Pad
ORW-1	817,010.53	2,440,009.21	637.89	3.25	634.64	13.50	624.39	26.30	611.59	26.45	611.44	~9' - 24'	NA	6	PVC	None	No Well Pad
ORW-1-MP-N	817,050.16	2,440,005.38	637.93	3.00	634.93	15.30	622.63	22.00	615.93	22.00	615.93	~8' - 23'	NA	2	PVC	None	No Well Pad
ORW-1-MP-W	817,011.58	2,440,000.55	637.93	3.25	634.68	13.45	624.48	25.10	612.83	25.10	612.83	~9' - 24'	NA	2	PVC	None	No Well Pad
ORW-1-MP-E	817,012.23	2,440,017.22	638.00	3.35	634.65	14.20	623.80	23.70	614.30	24.10	613.90	~8' - 23'	NA	2	PVC	None	No Well Pad
ORW-1-MP-S	816,990.47	2,440,011.37	637.67	3.30	634.37	12.90	624.77	ND	ND	25.50	612.17	~9' - 24'	NA	2	PVC	None	No Well Pad
RW-15	817,285.03	2,439,896.65	637.83	3.65	634.18	ND	ND	25.60	612.23	26.00	611.83	18' - 22'	17'-23'	6	Stainless	None	No Well Pad
RW-16	817,271.00	2,439,894.22	637.51	3.30	634.21	22.55	614.96	25.90	611.61	26.00	611.51	18' - 22'	17'-23'	6	Stainless	None	No Well Pad
RW-17	817,271.87	2,439,935.84	637.47	2.95	634.52	21.45	616.02	24.30	613.17	26.00	611.47	19' - 23'	18'-24'	6	Stainless	None	No Well Pad
RW-18	817,043.43	2,439,960.66	637.97	3.20	634.77	ND	ND	21.90	616.07	21.95	616.02	14' - 18'	12'-19'	6	Stainless	None	No Well Pad
RW-19	817,042.76	2,439,975.29	638.38	3.45	634.93	15.45	622.93	19.90	618.48	20.00	618.38	12' - 16'	10'-17'	6	Stainless	None	No Well Pad
RW-20	817,027.78	2,439,976.21	638.14	3.40	634.74	ND	ND	19.90	618.24	20.00	618.14	12' - 16'	10'-17'	6	Stainless	None	No Well Pad
UNK-1	816,896.58	2,439,973.01	638.51	2.45	636.06	ND	ND	13.00	625.51	13.00	625.51	NA	NA	1	PVC	None	No Well Pad

Notes:
ND - Not Detected
NA - Not Available
Groundwater and DNAPL measurements reported were collected on March 14, 2013.

Table 2.2
Well Gauging Table
Detrex Corporation, Ashtabula, Ohio

				10/24/2012				11/14/2012				11/20/2012			
Well ID	State Plane (NAD 83) Northing [feet]	State Plane (NAD 83) Easting [feet]	Top of Casing Elevation [feet-msl]	Depth to Water (feet)[1]	Depth to DNAPL (feet)[1]	Depth to Silt (feet)[1]	Well Depth (feet)[1]	Depth to Water (feet)	Depth to DNAPL (feet)	Depth to Silt (feet)	Well Depth (feet)	Depth to Water (feet)	Depth to DNAPL (feet)	Depth to Silt (feet)	Well Depth (feet)
MW-1-REC	817,281.88	2,439,868.12	637.26	4.00	6.00		26.50								
MW-13-2	817,272.27	2,439,736.17	637.50	5.18			23.70								
MW-14-3	817,186.31	2,439,886.16	639.66	7.90			24.54	7.90	24.50	24.50	24.60				
DETMW-05S	817,287.86	2,439,961.06	639.20	7.41			22.08	7.41	14.00	22.10	22.22				
DETMW-06S	817,199.52	2,440,287.51	638.35	6.77			19.81								
DETMW-07S	816,996.34	2,440,008.92	638.10	7.28			12.00	7.28	12.00	12.00	12.73				
DETMW-08S	817,119.64	2,439,800.79	638.15	4.86			21.10	4.86	21.10	21.10	21.85				
DETMW-09	816,780.24	2,439,940.99	640.14	7.38			20.20								
DETMW-10	816,880.21	2,439,959.63	639.95	14.47			20.08								
DETDP-01	817,151.86	2,440,336.29	N/A[2]	unable to locate											
DETDP-02	817,033.94	2,440,371.47	636.97	unable to locate											
DETDP-03	816,999.87	2,440,302.03	N/A	unable to locate											
DETDP-04	816,845.51	2,439,832.06	N/A	unable to locate											
DETDP-05	816,966.20	2,439,511.34	N/A	unable to locate											
DETDP-06	817,283.24	2,439,511.84	N/A	unable to locate											
DPT-3/0209	817,201.29	2,439,711.88	639.76	8.02			14.18								
DPT-6/0209	816,991.92	2,440,439.36	634.87	unable to locate				unable to locate							
DPT-7/0209	817,023.30	2,439,847.40	640.44	7.79		15.80	16.15	7.79	16.10	16.10	17.35				
DPT-10/0209	817,301.08	2,439,928.92	637.89	5.59			10.06								
RW-15	817,285.03	2,439,896.65	637.83	4.30	25.20	25.20	26.00	4.30	20.00	24.20	26.00	4.62	24.55	25.90	26.00
RW-16	817,271.00	2,439,894.22	637.51	4.45	24.30	24.30	26.00	4.45	24.30	24.30	26.00	4.25	25.20	25.80	26.00
RW-17	817,271.87	2,439,935.84	637.47	4.05	ND[3]	22.70	26.00	4.05	22.70	22.70	26.00	4.10	23.60	25.80	26.00
RW-18	817,043.43	2,439,960.66	637.97				21.95	4.85	ND	18.70	21.95	5.70	ND	ND	21.95
RW-19	817,042.76	2,439,975.29	638.38				20.00	6.80	ND	17.70	20.00	6.70	18.90	ND	20.00
RW-20	817,027.78	2,439,976.21	638.14				20.00	6.00	ND	19.40	20.00	6.15	ND	ND	20.00
MP-13A	817,264.25	2,439,750.24	638.36	5.71	ND		17.72								
MP-13B	817,248.11	2,439,759.96	638.60	6.29	ND		16.97								
MP-14A	817,175.94	2,439,858.08	639.09	plugged at 3.55-ft				plugged at 3.55-ft				plugged at 3.55-ft			
MP-14B	817,162.06	2,439,867.53	639.20	7.08	ND		15.70								
MP-15A	817,279.37	2,439,895.80	637.76	4.06	20.00		20.11	3.40	17.10	17.10	23.75	4.50	17.90	23.60	23.75
MP-15B	817,284.64	2,439,911.23	637.77	3.21	23.50		24.03	3.00	16.90	ND	24.00	5.65	10.55	ND	24.00
MP-15C	817,283.31	2,439,921.61	638.22	3.80	ND		22.94	4.60	19.80	19.80	24.12	6.45	14.50	ND	24.12
MP-15D	817,303.13	2,439,899.33	637.32	4.32	ND		17.00	4.32	17.00	17.00	23.95				23.95
MP-16A	817,275.90	2,439,895.59	637.90	7.67	12.20	15.20	15.20	7.68	14.10	14.10	23.65	5.90	18.00	23.40	23.65
MP-16B	817,270.83	2,439,909.22	637.62	5.56	19.20	19.20	19.40	5.25	15.20	15.20	23.90	4.60	17.10		23.90
MP-16C	817,270.51	2,439,919.40	638.15	4.98	19.80		20.15	4.60	19.80	19.80	24.00	4.60	17.00		24.00
MP-17A	817,277.10	2,439,937.83	639.07	4.69	ND		19.20	4.69	19.20	19.20	25.97	6.65	20.85		25.97
MP-17B	817,282.16	2,439,938.56	638.87	3.25	ND		25.65	3.25	25.60	25.60	25.94	6.90	14.90		25.94
MP-18A	817,042.74	2,439,950.76	638.14					5.82	ND	ND	20.50	5.95	ND		20.50
MP-18B	817,042.82	2,439,935.68	638.33					6.04	ND	ND	20.60	7.30	ND		20.60
MP-19A	817,038.07	2,439,975.56	638.47	5.89			17.83	6.65	17.40	17.40	18.48	7.70	11.20		18.48
MP-19B	817,043.21	2,439,967.91	638.57					7.14	ND	ND	18.65	7.73	13.30		18.65
MP-20A	817,033.02	2,439,975.71	638.53	6.52			17.98	6.77	ND	18.00	18.48	6.50	ND	ND	18.48
MP-20B	817,027.61	2,439,960.96	637.97					7.10	ND	ND	18.35	5.80	15.30		18.35
MP-20C	817,027.27	2,439,951.30	637.84					6.86	ND	ND	18.40	5.65	ND	ND	18.40
MP-20D	817,007.58	2,439,976.35	638.17					8.22	12.70	17.20	18.42				18.42
MP-20E	816,987.21	2,439,977.44	637.70					4.86	15.60	17.80	18.54				18.54
MP-20F	817,027.98	2,439,990.91	638.47					6.42	14.00	17.30	18.65	8.65	10.50		18.65
MP-20G	817,028.08	2,440,000.96	638.59					7.02	16.50	17.90	18.67				18.67
GP-15	817,122.26	2,439,955.41	639.21	14.40	14.00		19.30	14.40	19.30	19.30	20.20				
GP-26	817,018.09	2,439,744.40	636.34	2.45	10.50		13.48								
UNK-1	816,896.58	2,439,973.01	638.51	3.62	ND		13.03								
ORW-1	817,010.53	2,440,009.21	637.89	7.10			26.30	7.10	9.20	23.30	25.50				
ORW-1-MP-N	817,050.16	2,440,005.38	637.93	5.86			25.50	7.20	21.10	13.20	22.80				
ORW-1-MP-W	817,011.58	2,440,000.55	637.93	6.59			24.10	6.68	24.20	24.20	25.10				
ORW-1-MP-E	816,990.47	2,440,011.37	637.67	6.68			24.20	6.59	11.00	24.10	24.35				
ORW-1-MP-S	816,990.47	2,440,011.37	637.67	7.20			13.20	5.86	10.50	ND	25.10				
NPZ-17-1	817,266.37	2,439,931.93	638.66	6.40	17.20		20.65	6.91	17.20	ND	20.66				
NPZ-17-2	817,266.50	2,439,932.90	638.68	2.66	19.05		19.06	2.66	16.80	19.00	21.50				
NPZ-17-3	817,266.38	2,439,933.88	638.66	4.11	ND		18.56	4.11	ND	18.50	22.62				
NPZ-17-4	817,266.10	2,439,934.82	638.66	4.46	ND		22.02	4.46	ND	22.00	23.43				
NPZ-17-5	817,265.99	2,439,935.79	638.60	5.25	ND		24.08	5.25	ND	24.10	24.50				
NPZ-17-6	817,266.08	2,439,936.67	638.65	5.25	ND		24.60	5.25	ND	24.60	25.45				
NPZ-17-7	817,265.86	2,439,937.72	638.58	6.95	ND		26.55	6.95	20.50	20.50	26.62				
NPZ-17-8	817,266.73	2,439,931.05	638.69	14.70	18.20		19.52	14.70	18.20	ND	19.54				
NPZ-17-9	817,266.67	2,439,930.15	638.64	13.79	17.80		18.40	13.79	17.20	ND	18.40				
NPZ-20-1	817,031.72	2,439,980.66	638.58	14.50	ND		20.40	6.68	ND	ND	20.40				
NPZ-20-2	817,032.48	2,439,980.57	638.51	6.52	ND		19.81	8.32	ND	ND	19.80				
NPZ-20-3	817,033.39	2,439,980.51	638.54	6.68	ND		18.82	7.45	ND	ND	18.82				
NPZ-20-4	817,034.33	2,439,980.88	638.52	6.48	ND		17.98	7.40	ND	ND	17.98				
NPZ-20-5	817,035.18	2,439,980.61	638.57	12.37	ND		16.88	6.86	ND	ND	16.85				
NPZ-20-6	817,036.15	2,439,980.59	638.55	7.98	ND		15.65	6.95	ND	ND	15.92				
NPZ-20-7	817,037.09	2,439,980.53	638.57	8.00	ND		14.73	7.13	ND	ND	14.73				
NPZ-20-8	817,038.07	2,439,980.63	638.55	8.05	ND		13.65	7.12	ND	ND	13.65				

NOTE:
1. Measurements Collected From the North Side of the Top of the Well Casing.
2. N/A - Indicates Not Available
3. ND - Indicates Parameter was Not Detected
- Indicates Well or a Parameter was Not Gauged

Table 2.2
Well Gauging Table
Detrex Corporation, Ashtabula, Ohio

				12/6/2012				12/7/2012				1/23/2013			
Well ID	State Plane (NAD 83) Northing [feet]	State Plane (NAD 83) Easting [feet]	Top of Casing Elevation [feet-msl]	Depth to Water (feet)	Depth to DNAPL (feet)	Depth to Silt (feet)	Well Depth (feet)	Depth to Water (feet)	Depth to DNAPL (feet)	Depth to Silt (feet)	Well Depth (feet)	Depth to Water (feet)	Depth to DNAPL (feet)	Depth to Silt (feet)	Well Depth (feet)
MW-1-REC	817,281.88	2,439,868.12	637.26												
MW-13-2	817,272.27	2,439,736.17	637.50												
MW-14-3	817,186.31	2,439,886.16	639.66												
DETMW-05S	817,287.86	2,439,961.06	639.20									5.00	16.15		
DETMW-06S	817,199.52	2,440,287.51	638.35												
DETMW-07S	816,996.34	2,440,008.92	638.10												
DETMW-08S	817,119.64	2,439,800.79	638.15												
DETMW-09	816,780.24	2,439,940.99	640.14												
DETMW-10	816,880.21	2,439,959.63	639.95												
DETDP-01	817,151.86	2,440,336.29	N/A[2]												
DETDP-02	817,033.94	2,440,371.47	636.97												
DETDP-03	816,999.87	2,440,302.03	N/A												
DETDP-04	816,845.51	2,439,832.06	N/A												
DETDP-05	816,966.20	2,439,511.34	N/A												
DETDP-06	817,283.24	2,439,511.84	N/A												
DPT-3/0209	817,201.29	2,439,711.88	639.76												
DPT-6/0209	816,991.92	2,440,439.36	634.87									unable to locate			
DPT-7/0209	817,023.30	2,439,847.40	640.44												
DPT-10/0209	817,301.08	2,439,928.92	637.89												
RW-15	817,285.03	2,439,896.65	637.83	5.60	25.70	25.80	26.00	4.30	ND	25.80	26.00	4.15	23.90	25.80	26.00
RW-16	817,271.00	2,439,894.22	637.51	4.20	24.10	25.80	26.00	4.45	ND	ND	26.00	3.70	25.55	25.90	26.00
RW-17	817,271.87	2,439,935.84	637.47	3.90	25.00	25.80	26.00	4.05	ND	ND	26.00	3.30	24.35	25.80	26.00
RW-18	817,043.43	2,439,960.66	637.97	5.50	ND	ND	21.95								
RW-19	817,042.76	2,439,975.29	638.38	6.40	19.00	ND	20.00								
RW-20	817,027.78	2,439,976.21	638.14	5.80	ND	ND	20.00								
MP-13A	817,264.25	2,439,750.24	638.36												
MP-13B	817,248.11	2,439,759.96	638.60												
MP-14A	817,175.94	2,439,858.08	639.09									plugged at 3.55-ft			
MP-14B	817,162.06	2,439,867.53	639.20												
MP-15A	817,279.37	2,439,895.80	637.76	4.40	17.90		23.75	3.40		17.10	23.75	4.25	17.30		23.75
MP-15B	817,284.64	2,439,911.23	637.77	7.70	10.55		24.00	3.00	16.90	ND	24.00	7.55	10.40		24.00
MP-15C	817,283.31	2,439,921.61	638.22	6.80	14.60		24.10	4.60		19.80		6.45	14.00		24.10
MP-15D	817,303.13	2,439,899.33	637.32	4.00	ND		23.95					3.45	ND		23.95
MP-16A	817,275.90	2,439,895.59	637.90	6.30	16.75		23.65	7.68		14.10	23.65	7.55	13.70		23.65
MP-16B	817,270.83	2,439,909.22	637.62	4.50	17.30		23.90	5.25		15.20	23.90	5.35	15.15		23.90
MP-16C	817,270.51	2,439,919.40	638.15	4.90	17.80		24.00	4.60		19.80	24.00	5.45	16.40		24.00
MP-17A	817,277.10	2,439,937.83	639.07	5.80	20.70		25.95					6.15	19.45		25.95
MP-17B	817,282.16	2,439,938.56	638.87	5.80	16.60		25.95					4.70	18.50		25.95
MP-18A	817,042.74	2,439,950.76	638.14												
MP-18B	817,042.82	2,439,935.68	638.33												
MP-19A	817,038.07	2,439,975.56	638.47												
MP-19B	817,043.21	2,439,967.91	638.57												
MP-20A	817,033.02	2,439,975.71	638.53												
MP-20B	817,027.61	2,439,960.96	637.97												
MP-20C	817,027.27	2,439,951.30	637.84												
MP-20D	817,007.58	2,439,976.35	638.17												
MP-20E	816,987.21	2,439,977.44	637.70												
MP-20F	817,027.98	2,439,990.91	638.47												
MP-20G	817,028.08	2,440,000.96	638.59												
GP-15	817,122.26	2,439,955.41	639.21												
GP-26	817,018.09	2,439,744.40	636.34												
UNK-1	816,896.58	2,439,973.01	638.51												
ORW-1	817,010.53	2,440,009.21	637.89												
ORW-1-MP-N	817,050.16	2,440,005.38	637.93												
ORW-1-MP-W	817,011.58	2,440,000.55	637.93												
ORW-1-MP-E	816,990.47	2,440,011.37	637.67												
ORW-1-MP-S	816,990.47	2,440,011.37	637.67												
NPZ-17-1	817,266.37	2,439,931.93	638.66									7.70	11.05		
NPZ-17-2	817,266.50	2,439,932.90	638.68									7.25	12.65		
NPZ-17-3	817,266.38	2,439,933.88	638.66									4.85	20.80		
NPZ-17-4	817,266.10	2,439,934.82	638.66									5.10	21.65		
NPZ-17-5	817,265.99	2,439,935.79	638.60									3.55	20.40		
NPZ-17-6	817,266.08	2,439,936.67	638.65									3.95	19.60		
NPZ-17-7	817,265.86	2,439,937.72	638.58									4.40	ND		
NPZ-17-8	817,266.73	2,439,931.05	638.69									4.15	17.50		
NPZ-17-9	817,266.67	2,439,930.15	638.64									7.10	12.55		
NPZ-20-1	817,031.72	2,439,980.66	638.58												
NPZ-20-2	817,032.48	2,439,980.57	638.51												
NPZ-20-3	817,033.39	2,439,980.51	638.54												
NPZ-20-4	817,034.33	2,439,980.88	638.52												
NPZ-20-5	817,035.18	2,439,980.61	638.57												
NPZ-20-6	817,036.15	2,439,980.59	638.55												
NPZ-20-7	817,037.09	2,439,980.53	638.57												
NPZ-20-8	817,038.07	2,439,980.63	638.55												

NOTE:
1. Measurements Collected From the North Side of the Top of the Well Casing.
2. N/A - Indicates Not Available
3. ND - Indicates Parameter was Not Detected
- Indicates Well or a Parameter was Not Gauged

Table 2.2
Well Gauging Table
Detrex Corporation, Ashtabula, Ohio

				1/29/2013				1/31/2013				2/5/2013			
Well ID	State Plane (NAD 83) Northing [feet]	State Plane (NAD 83) Easting [feet]	Top of Casing Elevation [feet-msl]	Depth to Water (feet)	Depth to DNAPL (feet)	Depth to Silt (feet)	Well Depth (feet)	Depth to Water (feet)	Depth to DNAPL (feet)	Depth to Silt (feet)	Well Depth (feet)	Depth to Water (feet)	Depth to DNAPL (feet)	Depth to Silt (feet)	Well Depth (feet)
MW-1-REC	817,281.88	2,439,868.12	637.26									3.90	20.70	ND	
MW-13-2	817,272.27	2,439,736.17	637.50									5.00	20.65	23.80	23.80
MW-14-3	817,186.31	2,439,886.16	639.66									5.10	19.95	ND	
DETMW-05S	817,287.86	2,439,961.06	639.20									4.60	16.55	ND	
DETMW-06S	817,199.52	2,440,287.51	638.35									3.85	15.60	ND	
DETMW-07S	816,996.34	2,440,008.92	638.10									5.50	10.55	ND	
DETMW-08S	817,119.64	2,439,800.79	638.15									4.15	18.90	ND	
DETMW-09	816,780.24	2,439,940.99	640.14									5.05	18.55	20.20	20.20
DETMW-10	816,880.21	2,439,959.63	639.95									5.30	18.90	ND	20.00
DETDP-01	817,151.86	2,440,336.29	N/A[2]									unable to locate			
DETDP-02	817,033.94	2,440,371.47	636.97									unable to locate			
DETDP-03	816,999.87	2,440,302.03	N/A									unable to locate			
DETDP-04	816,845.51	2,439,832.06	N/A									unable to locate			
DETDP-05	816,966.20	2,439,511.34	N/A									unable to locate			
DETDP-06	817,283.24	2,439,511.84	N/A									unable to locate			
DPT-3/0209	817,201.29	2,439,711.88	639.76									6.85	13.80	14.10	14.10
DPT-6/0209	816,991.92	2,440,439.36	634.87									unable to locate			
DPT-7/0209	817,023.30	2,439,847.40	640.44									3.50	ND	16.20	17.35
DPT-10/0209	817,301.08	2,439,928.92	637.89									5.25	ND	9.95	9.95
RW-15	817,285.03	2,439,896.65	637.83									4.60	23.60	25.60	26.00
RW-16	817,271.00	2,439,894.22	637.51									4.30	24.25	25.90	26.00
RW-17	817,271.87	2,439,935.84	637.47									4.20	24.90	24.30	26.00
RW-18	817,043.43	2,439,960.66	637.97					3.90	ND			3.85	ND	21.80	21.95
RW-19	817,042.76	2,439,975.29	638.38					4.35	17.30			4.30	17.05	ND	20.00
RW-20	817,027.78	2,439,976.21	638.14					3.95	19.80			4.00	19.80	19.80	20.00
MP-13A	817,264.25	2,439,750.24	638.36									4.30	ND	17.45	
MP-13B	817,248.11	2,439,759.96	638.60									4.70	ND	16.80	
MP-14A	817,175.94	2,439,858.08	639.09									plugged at 3.55-ft			
MP-14B	817,162.06	2,439,867.53	639.20									4.60	15.70	15.70	
MP-15A	817,279.37	2,439,895.80	637.76									4.75	17.70	ND	
MP-15B	817,284.64	2,439,911.23	637.77									7.80	10.65	ND	
MP-15C	817,283.31	2,439,921.61	638.22									6.85	14.35		
MP-15D	817,303.13	2,439,899.33	637.32									3.70	ND	20.30	
MP-16A	817,275.90	2,439,895.59	637.90									7.75	13.70	ND	
MP-16B	817,270.83	2,439,909.22	637.62									5.30	16.30	ND	
MP-16C	817,270.51	2,439,919.40	638.15									4.15	18.05	ND	
MP-17A	817,277.10	2,439,937.83	639.07									5.90	23.35	ND	
MP-17B	817,282.16	2,439,938.56	638.87									4.35	20.75	ND	
MP-18A	817,042.74	2,439,950.76	638.14									4.10	17.50	ND	
MP-18B	817,042.82	2,439,935.68	638.33									6.10	11.40	ND	
MP-19A	817,038.07	2,439,975.56	638.47									6.15	9.55	ND	
MP-19B	817,043.21	2,439,967.91	638.57									6.40	12.25	ND	
MP-20A	817,033.02	2,439,975.71	638.53									4.30	17.70	ND	
MP-20B	817,027.61	2,439,960.96	637.97									4.15	14.15	ND	
MP-20C	817,027.27	2,439,951.30	637.84									3.80	18.00	ND	
MP-20D	817,007.58	2,439,976.35	638.17									6.55	9.60	ND	
MP-20E	816,987.21	2,439,977.44	637.70									2.95	12.90	ND	
MP-20F	817,027.98	2,439,990.91	638.47									6.20	9.50	ND	
MP-20G	817,028.08	2,440,000.96	638.59									4.40	14.45	ND	
GP-15	817,122.26	2,439,955.41	639.21									4.70	15.95	ND	
GP-26	817,018.09	2,439,744.40	636.34									unable to locate (PVC broken)			
UNK-1	816,896.58	2,439,973.01	638.51									2.50	ND	13.00	
ORW-1	817,010.53	2,440,009.21	637.89									5.80	13.20	ND	
ORW-1-MP-N	817,050.16	2,440,005.38	637.93									3.60	ND	14.35	
ORW-1-MP-W	817,011.58	2,440,000.55	637.93									4.15	13.50	ND	
ORW-1-MP-E	816,990.47	2,440,011.37	637.67									3.50	14.60	ND	
ORW-1-MP-S	816,990.47	2,440,011.37	637.67									3.40	13.10	ND	
NPZ-17-1	817,266.37	2,439,931.93	638.66	7.70	11.90							5.80	12.00	ND	
NPZ-17-2	817,266.50	2,439,932.90	638.68	9.25	14.40							6.05	14.25	ND	
NPZ-17-3	817,266.38	2,439,933.88	638.66	6.40	22.10							6.40	19.00	ND	
NPZ-17-4	817,266.10	2,439,934.82	638.66	6.80	22.80							6.50	21.30	ND	
NPZ-17-5	817,265.99	2,439,935.79	638.60	5.60	22.30							5.65	21.95	ND	
NPZ-17-6	817,266.08	2,439,936.67	638.65	5.80	21.50							6.50	22.00	ND	
NPZ-17-7	817,265.86	2,439,937.72	638.58	5.00	ND							6.70	ND	ND	26.50
NPZ-17-8	817,266.73	2,439,931.05	638.69	4.40	17.00							4.65	18.20	ND	19.50
NPZ-17-9	817,266.67	2,439,930.15	638.64	7.40	12.40							7.45	12.90	ND	18.35
NPZ-20-1	817,031.72	2,439,980.66	638.58					4.60	ND			4.40	ND	ND	20.40
NPZ-20-2	817,032.48	2,439,980.57	638.51					4.65	ND			4.30	ND	ND	19.80
NPZ-20-3	817,033.39	2,439,980.51	638.54					4.65	ND			4.35	ND	ND	18.80
NPZ-20-4	817,034.33	2,439,980.88	638.52					4.75	ND			4.35	ND	ND	17.95
NPZ-20-5	817,035.18	2,439,980.61	638.57					4.70	ND			4.50	ND	ND	16.85
NPZ-20-6	817,036.15	2,439,980.59	638.55					4.70	ND			4.50	ND	ND	15.90
NPZ-20-7	817,037.09	2,439,980.53	638.57					4.90	ND			4.55	ND	ND	14.70
NPZ-20-8	817,038.07	2,439,980.63	638.55					4.50	12.60			4.45	13.60	ND	13.65

NOTE:
1. Measurements Collected From the North Side of the Top of the Well Casing.
2. N/A - Indicates Not Available
3. ND - Indicates Parameter was Not Detected
- Indicates Well or a Parameter was Not Gauged

Table 2.2
Well Gauging Table
Detrex Corporation, Ashtabula, Ohio

				2/11/2013				2/18/2013				2/25/2013			
Well ID	**State Plane (NAD 83) Northing [feet]**	**State Plane (NAD 83) Easting [feet]**	**Top of Casing Elevation [feet-msl]**	**Depth to Water (feet)**	**Depth to DNAPL (feet)**	**Depth to Silt (feet)**	**Well Depth (feet)**	**Depth to Water (feet)**	**Depth to DNAPL (feet)**	**Depth to Silt (feet)**	**Well Depth (feet)**	**Depth to Water (feet)**	**Depth to DNAPL (feet)**	**Depth to Silt (feet)**	**Well Depth (feet)**
MW-1-REC	817,281.88	2,439,868.12	637.26	3.35	20.80	ND		3.45	20.80	ND		3.45	20.80	ND	
MW-13-2	817,272.27	2,439,736.17	637.50	4.35	20.80	ND		4.85	20.60	ND		4.90	20.90	ND	
MW-14-3	817,186.31	2,439,886.16	639.66	4.55	20.25	ND		4.90	20.25	ND		5.25	20.30	ND	
DETMW-05S	817,287.86	2,439,961.06	639.20	4.10	16.60	ND		4.40	16.60	ND		4.40	16.70	ND	
DETMW-06S	817,199.52	2,440,287.51	638.35	3.10	15.70	ND		3.50	15.65	ND		3.40	15.80	ND	
DETMW-07S	816,996.34	2,440,008.92	638.10	5.20	10.25	ND		5.50	10.50	ND		5.45	10.50	ND	
DETMW-08S	817,119.64	2,439,800.79	638.15	3.70	19.00	ND		4.00	19.05	ND		3.95	19.10	ND	
DETMW-09	816,780.24	2,439,940.99	640.14	4.80	18.80	ND		5.10	18.50	20.20	20.20	5.15	19.35	20.20	20.20
DETMW-10	816,880.21	2,439,959.63	639.95	5.05	18.40	ND	20.00	5.40	18.80	19.90	20.00	5.35	18.75	ND	
DETDP-01	817,151.86	2,440,336.29	N/A[2]	unable to locate				Unable to Locate				Unable to Locate			
DETDP-02	817,033.94	2,440,371.47	636.97	2.20	22.00	ND	22.00	2.50	ND	22.00	22.00	2.40	ND	22.00	22.00
DETDP-03	816,999.87	2,440,302.03	N/A	unable to locate				3.35	ND	24.75	24.75	3.45	ND	24.70	24.70
DETDP-04	816,845.51	2,439,832.06	N/A	3.10	ND	ND	22.60	3.55	ND	22.40	22.60	3.55	ND	22.50	22.50
DETDP-05	816,966.20	2,439,511.34	N/A	4.75	ND	ND	25.30	5.10	ND	ND		4.85	ND	ND	25.30
DETDP-06	817,283.24	2,439,511.84	N/A	unable to locate				Unable to Locate				Unable to Locate			
DPT-3/0209	817,201.29	2,439,711.88	639.76	6.05	13.90	14.20	14.20	6.45	13.85	14.10		6.40	13.85	14.15	14.15
DPT-6/0209	816,991.92	2,440,439.36	634.87	unable to locate				Unable to Locate				Unable to Locate			
DPT-7/0209	817,023.30	2,439,847.40	640.44	3.35	16.00	ND		3.60	15.30	ND		3.30	16.25	ND	
DPT-10/0209	817,301.08	2,439,928.92	637.89	5.00	ND	9.90	9.90	5.40	ND	ND		5.40	ND	ND	9.90
RW-15	817,285.03	2,439,896.65	637.83	3.90	ND	25.40	26.00	3.60	ND	25.60	26.00	3.80	23.40	25.50	25.50
RW-16	817,271.00	2,439,894.22	637.51	3.50	24.00	ND	26.00	3.50	23.45	ND	26.00	3.45	23.10	26.00	26.00
RW-17	817,271.87	2,439,935.84	637.47	3.20	23.50	24.10	26.00	3.05	23.00	24.20	26.00	3.00	22.25	24.15	24.15
RW-18	817,043.43	2,439,960.66	637.97	3.65	ND	21.90	21.95	3.55	ND	21.90	21.95	3.40	ND	21.90	21.95
RW-19	817,042.76	2,439,975.29	638.38	4.05	16.00	ND	20.00	3.95	16.20	19.80	20.00	3.80	15.80	19.90	20.00
RW-20	817,027.78	2,439,976.21	638.14	3.60	ND	19.90	20.00	3.80	ND	19.60	20.00	3.65	18.40	19.90	20.00
MP-13A	817,264.25	2,439,750.24	638.36	4.20	ND	17.45	17.45	5.25	ND	17.40	17.40	5.05	ND	17.40	17.40
MP-13B	817,248.11	2,439,759.96	638.60	4.75	ND	16.80	16.80	5.20	ND	16.75	16.75	4.95	ND	16.70	16.70
MP-14A	817,175.94	2,439,858.08	639.09	plugged at 3.55-ft				plugged at 3.55-ft				plugged at 3.55-ft			
MP-14B	817,162.06	2,439,867.53	639.20	4.00		15.75	15.75	4.40	ND	15.60	15.60	4.50	ND	15.70	15.70
MP-15A	817,279.37	2,439,895.80	637.76	4.20	17.15	ND		4.00	16.95	ND		3.95	16.80	ND	
MP-15B	817,284.64	2,439,911.23	637.77	7.35	10.15	ND		7.40	10.20	ND		7.45	10.25	ND	
MP-15C	817,283.31	2,439,921.61	638.22	24.00	13.85	ND		6.40	13.90	ND		6.40	13.80	ND	
MP-15D	817,303.13	2,439,899.33	637.32	3.10	20.30	20.30		3.20	ND	20.30	20.30	3.15	20.15	20.30	20.30
MP-16A	817,275.90	2,439,895.59	637.90	7.30	13.30	ND		7.25	13.20	ND		7.15	13.10	ND	
MP-16B	817,270.83	2,439,909.22	637.62	4.90	16.40	ND		4.55	16.45	ND		4.40	16.50	ND	
MP-16C	817,270.51	2,439,919.40	638.15	5.80	16.70	ND		5.70	16.60	ND		5.65	16.50	ND	
MP-17A	817,277.10	2,439,937.83	639.07	4.85	23.25	ND		4.80	23.15	ND		4.70	23.15	ND	
MP-17B	817,282.16	2,439,938.56	638.87	4.00	19.95	ND		4.00	19.80	ND		4.10	19.40	ND	
MP-18A	817,042.74	2,439,950.76	638.14	3.95	17.40	ND		3.80	17.25	ND		3.70	17.00	ND	
MP-18B	817,042.82	2,439,935.68	638.33	6.00	11.35	ND		5.90	11.25	ND		5.90	11.20	ND	
MP-19A	817,038.07	2,439,975.56	638.47	5.95	9.35	ND		6.00	9.40	ND		5.65	9.50	ND	
MP-19B	817,043.21	2,439,967.91	638.57	6.20	12.60	ND		5.40	15.30	ND		4.90	13.95	ND	
MP-20A	817,033.02	2,439,975.71	638.53	3.75	17.65	ND		4.20	17.50	ND		4.00	17.40	ND	
MP-20B	817,027.61	2,439,960.96	637.97	4.00	14.00	ND		3.95	13.90	ND		3.85	13.85	ND	
MP-20C	817,027.27	2,439,951.30	637.84	13.65	18.00	ND		3.60	ND	17.95	18.15	3.45	ND	ND	17.70
MP-20D	817,007.58	2,439,976.35	638.17	6.40	19.45	ND		6.75	9.80	ND		6.60	9.60	ND	
MP-20E	816,987.21	2,439,977.44	637.70	2.85	12.70	ND		3.05	12.75	ND		3.05	12.55	ND	
MP-20F	817,027.98	2,439,990.91	638.47	6.00	19.30	ND		6.10	9.45	ND		6.00	9.35	ND	
MP-20G	817,028.08	2,440,000.96	638.59	4.20	14.25	ND		4.20	14.30	ND		4.13	14.15	ND	
GP-15	817,122.26	2,439,955.41	639.21	4.25	16.40	ND		4.40	16.05	ND		4.30	16.20	ND	
GP-26	817,018.09	2,439,744.40	636.34	unable to locate (PVC broken)				unable to locate (PVC broken)				unable to locate (PVC broken)			
UNK-1	816,896.58	2,439,973.01	638.51	2.50	ND	ND	13.00	2.60	ND	ND		2.55	ND	13.00	13.00
ORW-1	817,010.53	2,440,009.21	637.89	3.45	13.35	ND		3.70	13.40	ND		3.45	13.50	ND	
ORW-1-MP-N	817,050.16	2,440,005.38	637.93	3.15	ND	14.55		3.45	14.80	ND		3.35	ND	14.50	14.50
ORW-1-MP-W	817,011.58	2,440,000.55	637.93	3.30	13.10	ND		3.50	13.40	ND		3.45	13.40	ND	
ORW-1-MP-E	816,990.47	2,440,011.37	637.67	3.05	14.15	ND		3.60	14.00	ND		3.40	14.15	ND	
ORW-1-MP-S	816,990.47	2,440,011.37	637.67	3.25	12.90	ND		3.40	13.00	ND		3.30	12.95	ND	
NPZ-17-1	817,266.37	2,439,931.93	638.66	8.20	11.45	ND		8.10	11.30	ND		8.00	11.25	ND	
NPZ-17-2	817,266.50	2,439,932.90	638.68	7.60	12.80	ND		7.55	12.70	ND		7.55	12.65	ND	
NPZ-17-3	817,266.38	2,439,933.88	638.66	5.70	19.50	ND		5.35	19.10	ND		5.10	18.90	ND	
NPZ-17-4	817,266.10	2,439,934.82	638.66	5.40	21.10	ND		5.15	20.90	ND		5.00	20.85	ND	
NPZ-17-5	817,265.99	2,439,935.79	638.60	4.10	20.40	ND		3.90	20.20	ND		3.85	20.10	ND	
NPZ-17-6	817,266.08	2,439,936.67	638.65	4.45	19.95	ND		4.30	19.80	ND		4.25	19.65	ND	
NPZ-17-7	817,265.86	2,439,937.72	638.58	4.50	ND	ND	26.50	3.95	ND	ND	26.50	3.90	ND	ND	26.50
NPZ-17-8	817,266.73	2,439,931.05	638.69	3.90	18.20	ND		3.95	18.30	ND		3.95	18.25	ND	
NPZ-17-9	817,266.67	2,439,930.15	638.64	7.10	12.60	ND		7.20	12.65	ND		7.10	12.55	ND	
NPZ-20-1	817,031.72	2,439,980.66	638.58	4.25	ND	ND	20.35	4.10	ND	ND	20.35	4.00	ND	ND	20.35
NPZ-20-2	817,032.48	2,439,980.57	638.51	4.35	ND	ND	19.80	4.00	ND	ND	19.80	3.95	ND	ND	19.80
NPZ-20-3	817,033.39	2,439,980.51	638.54	4.50	ND	ND	18.80	4.10	ND	ND	18.80	4.10	ND	ND	18.80
NPZ-20-4	817,034.33	2,439,980.88	638.52	4.30	ND	ND	17.95	4.10	ND	ND	17.95	3.95	ND	ND	17.95
NPZ-20-5	817,035.18	2,439,980.61	638.57	4.35	ND	ND	18.80	4.15	ND	ND	16.80	4.00	ND	ND	16.80
NPZ-20-6	817,036.15	2,439,980.59	638.55	4.45	ND	ND	15.90	4.20	ND	ND	15.90	4.05	ND	ND	15.90
NPZ-20-7	817,037.09	2,439,980.53	638.57	4.20	ND	ND	14.70	4.25	ND	ND	14.70	4.15	ND	ND	14.70
NPZ-20-8	817,038.07	2,439,980.63	638.55	4.00	13.60	ND	13.65	4.20	13.55	ND	13.60	4.10	13.55	ND	13.65

NOTE:
1. Measurements Collected From the North Side of the Top of the Well Casing.
2. N/A - Indicates Not Available
3. ND - Indicates Parameter was Not Detected
- Indicates Well or a Parameter was Not Gauged

Table 2.2
Well Gauging Table
Detrex Corporation, Ashtabula, Ohio

				3/14/2013			
Well ID	**State Plane (NAD 83) Northing [feet]**	**State Plane (NAD 83) Easting [feet]**	**Top of Casing Elevation [feet-msl]**	**Depth to Water (feet)**	**Depth to DNAPL (feet)**	**Depth to Silt (feet)**	**Well Depth (feet)**
MW-1-REC	817,281.88	2,439,868.12	637.26	3.30	20.65	ND	21.90
MW-13-2	817,272.27	2,439,736.17	637.50	4.80	20.75	23.70	23.70
MW-14-3	817,186.31	2,439,886.16	639.66	4.80	20.40	24.55	24.55
DETMW-05S	817,287.86	2,439,961.06	639.20	4.20	17.00	ND	22.20
DETMW-06S	817,199.52	2,440,287.51	638.35	3.30	15.90	19.90	19.90
DETMW-07S	816,996.34	2,440,008.92	638.10	5.45	10.45	12.65	12.65
DETMW-08S	817,119.64	2,439,800.79	638.15	3.75	19.50	22.00	22.00
DETMW-09	816,780.24	2,439,940.99	640.14	5.05	18.85	ND	20.20
DETMW-10	816,880.21	2,439,959.63	639.95	5.20	19.25	20.00	20.00
DETDP-01	817,151.86	2,440,336.29	N/A[2]	Unable to Locate			
DETDP-02	817,033.94	2,440,371.47	636.97	2.35	ND	ND	22.00
DETDP-03	816,999.87	2,440,302.03	N/A	3.15	ND	ND	24.75
DETDP-04	816,845.51	2,439,832.06	N/A	3.40	ND	ND	22.60
DETDP-05	816,966.20	2,439,511.34	N/A	4.90	ND	ND	25.30
DETDP-06	817,283.24	2,439,511.84	N/A	Unable to Locate			
DPT-3/0209	817,201.29	2,439,711.88	639.76	6.15	13.85	14.15	14.15
DPT-6/0209	816,991.92	2,440,439.36	634.87	Unable to Locate			
DPT-7/0209	817,023.30	2,439,847.40	640.44	3.40	ND	ND	17.35
DPT-10/0209	817,301.08	2,439,928.92	637.89	5.25	ND	9.90	9.90
RW-15	817,285.03	2,439,896.65	637.83	3.65	ND	25.60	26.00
RW-16	817,271.00	2,439,894.22	637.51	3.30	22.55	25.90	26.00
RW-17	817,271.87	2,439,935.84	637.47	2.95	21.45	24.30	26.00
RW-18	817,043.43	2,439,960.66	637.97	3.20	ND	21.90	21.95
RW-19	817,042.76	2,439,975.29	638.38	3.45	15.45	19.90	20.00
RW-20	817,027.78	2,439,976.21	638.14	3.40	ND	19.90	20.00
MP-13A	817,264.25	2,439,750.24	638.36	4.35	ND	17.00	17.40
MP-13B	817,248.11	2,439,759.96	638.60	4.70	ND	16.70	16.70
MP-14A	817,175.94	2,439,858.08	639.09	plugged at 3.55-ft			
MP-14B	817,162.06	2,439,867.53	639.20	4.05	ND	15.60	15.70
MP-15A	817,279.37	2,439,895.80	637.76	3.95	16.80	ND	23.70
MP-15B	817,284.64	2,439,911.23	637.77	7.40	10.15	ND	24.00
MP-15C	817,283.31	2,439,921.61	638.22	6.30	13.70	24.00	24.00
MP-15D	817,303.13	2,439,899.33	637.32	3.00	20.15	23.00	23.00
MP-16A	817,275.90	2,439,895.59	637.90	7.20	13.10	23.10	23.10
MP-16B	817,270.83	2,439,909.22	637.62	4.20	16.55	23.70	23.80
MP-16C	817,270.51	2,439,919.40	638.15	5.55	16.40	ND	24.00
MP-17A	817,277.10	2,439,937.83	639.07	4.65	23.00	ND	25.95
MP-17B	817,282.16	2,439,938.56	638.87	4.00	19.30	ND	25.90
MP-18A	817,042.74	2,439,950.76	638.14	3.35	16.65	19.80	19.80
MP-18B	817,042.82	2,439,935.68	638.33	5.65	10.95	ND	20.55
MP-19A	817,038.07	2,439,975.56	638.47	3.80	12.00	ND	18.45
MP-19B	817,043.21	2,439,967.91	638.57	3.75	15.30	18.35	18.35
MP-20A	817,033.02	2,439,975.71	638.53	3.55	17.00	ND	18.45
MP-20B	817,027.61	2,439,960.96	637.97	3.65	13.60	ND	18.30
MP-20C	817,027.27	2,439,951.30	637.84	3.20	ND	17.50	17.60
MP-20D	817,007.58	2,439,976.35	638.17	6.45	9.60	ND	18.40
MP-20E	816,987.21	2,439,977.44	637.70	2.90	12.25	ND	18.50
MP-20F	817,027.98	2,439,990.91	638.47	5.80	9.25	18.55	18.55
MP-20G	817,028.08	2,440,000.96	638.59	4.10	14.05	ND	18.60
GP-15	817,122.26	2,439,955.41	639.21	3.60	16.80	ND	19.90
GP-26	817,018.09	2,439,744.40	636.34	unable to locate (PVC broken)			
UNK-1	816,896.58	2,439,973.01	638.51	2.45	ND	13.00	13.00
ORW-1	817,010.53	2,440,009.21	637.89	3.25	13.50	26.30	26.45
ORW-1-MP-N	817,050.16	2,440,005.38	637.93	3.00	15.30	22.00	22.00
ORW-1-MP-W	817,011.58	2,440,000.55	637.93	3.25	13.45	25.10	25.10
ORW-1-MP-E	816,990.47	2,440,011.37	637.67	3.35	14.20	23.70	24.10
ORW-1-MP-S	816,990.47	2,440,011.37	637.67	3.30	12.90	ND	25.50
NPZ-17-1	817,266.37	2,439,931.93	638.66	7.95	11.15	ND	20.65
NPZ-17-2	817,266.50	2,439,932.90	638.68	7.50	12.65	21.45	21.45
NPZ-17-3	817,266.38	2,439,933.88	638.66	4.55	18.25	ND	22.60
NPZ-17-4	817,266.10	2,439,934.82	638.66	4.70	20.50	ND	23.40
NPZ-17-5	817,265.99	2,439,935.79	638.60	3.85	20.05	ND	24.45
NPZ-17-6	817,266.08	2,439,936.67	638.65	4.20	19.50	ND	25.40
NPZ-17-7	817,265.86	2,439,937.72	638.58	3.80	ND	ND	26.50
NPZ-17-8	817,266.73	2,439,931.05	638.69	3.90	18.45	ND	19.50
NPZ-17-9	817,266.67	2,439,930.15	638.64	6.75	12.35	ND	18.35
NPZ-20-1	817,031.72	2,439,980.66	638.58	3.85	ND	ND	20.35
NPZ-20-2	817,032.48	2,439,980.57	638.51	3.70	ND	ND	19.80
NPZ-20-3	817,033.39	2,439,980.51	638.54	3.75	ND	ND	18.80
NPZ-20-4	817,034.33	2,439,980.88	638.52	3.75	ND	ND	17.95
NPZ-20-5	817,035.18	2,439,980.61	638.57	3.80	ND	ND	16.80
NPZ-20-6	817,036.15	2,439,980.59	638.55	3.70	ND	ND	15.90
NPZ-20-7	817,037.09	2,439,980.53	638.57	3.70	ND	ND	14.70
NPZ-20-8	817,038.07	2,439,980.63	638.55	3.50	13.55	ND	13.60

NOTE:
1. Measurements Collected From the North Side of the Top of the Well Casing.
2. N/A - Indicates Not Available
3. ND - Indicates Parameter was Not Detected
- Indicates Well or a Parameter was Not Gauged

Table 2.3
Well Development Log
Detrex Corporation
Ashtabula, Ohio

Date: 11/12/2012 to 11/14/2012

Recovery Well Number	Well Diameter Inches	DEPTH to WATER	DEPTH to DNAPL	DEPTH to SILT	Surge Purge Cycles	DEPTH to Bottom	Comments
RW-15	6	4.30	20.0	24.2	5	26.00	Very slow recharge
RW-16	6	4.45	NM	24.3	5	26.00	DNAPL in silt, DNAPL continuous after purge, slow recharge
RW-17	6	4.05	NM	22.7	5	26.00	DNAPL in silt,DNAPL continuous after purge, slow recharge
RW-18	6	4.85	NM	18.7	5	21.95	Very slow recharge
RW-19	6	6.80	NM	17.7	5	20.00	Very slow recharge
RW-20	6	6.00	NM	19.4	5	20.00	Very slow recharge

Monitoring Point Number	Well Diameter Inches	DEPTH to WATER	DEPTH to DNAPL	DEPTH to SILT	Surge Purge Cycles	DEPTH to Bottom	Comments
MP-15A	1	3.40	NM	17.1	5	23.75	DNAPL in silt, DNAPL continuous after purge
MP-15B	1	3.00	16.9	NM	3	24.00	DNAPL continuous after purge
MP-15C	1	4.60	NM	19.8	4	24.12	DNAPL in silt, DNAPL continuous after purge
MP-15D	1	4.32	NM	17.0	5	23.95	Silting continuous after purge
MP-16A	1	7.68	NM	14.1	4	23.65	DNAPL in silt, DNAPL continuous after purge
MP-16B	1	5.25	NM	15.2	4	23.90	DNAPL in silt
MP-16C	1	4.60	NM	19.8	3	24.00	DNAPL in silt
MP-17A	1	4.69	NM	19.2	3	25.97	DNAPL in silt, DNAPL continuous after purge
MP-17B	1	3.25	NM	25.6	3	25.94	DNAPL in silt, DNAPL continuous after purge
MP-18A	1	5.82	NM	NM	3	20.50	
MP-18B	1	6.04	NM	NM	3	20.60	
MP-19A	1	6.65	NM	17.4	5	18.48	DNAPL in silt, DNAPL continuous after purge
MP-19B	1	7.14	NM	NM	3	18.65	
MP-20A	1	6.77	NM	18.0	3	18.48	
MP-20B	1	7.10	NM	NM	3	18.35	
MP-20C	1	6.86	NM	NM	3	18.40	
MP-20D	1	8.22	12.7	17.2	3	18.42	
MP-20E	1	4.86	15.6	17.8	3	18.54	
MP-20F	1	6.42	14.0	17.3	3	18.65	
MP-20G	1	7.02	16.5	17.9	3	18.67	

Nested Piezometer Number	Well Diameter Inches	DEPTH to WATER	DEPTH to DNAPL	DEPTH to SILT	Surge Purge Cycles	DEPTH to Bottom	Comments
NPZ-17-1	1	6.91	17.2	NM	3	20.66	
NPZ-17-2	1	2.66	16.8	19.0	3	21.50	
NPZ-17-3	1	4.11	NM	18.5	3	22.62	
NPZ-17-4	1	4.46	NM	22.0	3	23.43	
NPZ-17-5	1	5.25	NM	24.1	3	24.50	
NPZ-17-6	1	5.25	NM	24.6	3	25.45	
NPZ-17-7	1	6.95	NM	20.5	3	26.62	DNAPL in silt
NPZ-17-8	1	14.70	18.2	NM	3	19.54	
NPZ-17-9	1	13.79	17.2	NM	3	18.40	
NPZ-20-1	1	6.68	NM	NM	3	20.40	
NPZ-20-2	1	8.32	NM	NM	3	19.80	
NPZ-20-3	1	7.45	NM	NM	3	18.82	
NPZ-20-4	1	7.40	NM	NM	3	17.98	
NPZ-20-5	1	6.86	NM	NM	3	16.85	
NPZ-20-6	1	6.95	NM	15.6	3	15.92	
NPZ-20-7	1	7.13	NM	NM	3	14.73	
NPZ-20-8	1	7.12	NM	NM	3	13.65	

NM=None Measured
Surged each well from the initial volume then surge/purge each following cycle by adding potable water to above sand pack

Table 2.3
Well Development Log
Detrex Corporation
Ashtabula, Ohio

Date: 11/12/2012 to 11/14/2012

DETMW Well Number	Well Diameter Inches	DEPTH to WATER	DEPTH to DNAPL	DEPTH to SILT	Surge Purge Cycles	DEPTH to Bottom	Comments
DETMW-3S	2	7.90	NM	24.5	3	24.60	DNAPL in silt
DETMW-05S	2	7.41	14.0	22.1	3	22.22	DNAPL in silt, DNAPL continuous after purge
DETMW-07S	2	7.28	NM	12.0	3	12.73	DNAPL in silt, DNAPL continuous after purge
DETMW-08S	2	4.86	NM	21.1	3	21.85	DNAPL in silt

Recovery/ Monitoring Number	Well Diameter Inches	DEPTH to WATER	DEPTH to DNAPL	DEPTH to SILT	Surge Purge Cycles	DEPTH to Bottom	Comments
ORW-1	6	7.10	9.2	23.3	3	25.50	DNAPL continuous after purge
ORW-1-MP-N	2	7.20	21.1	13.2	3	22.80	DNAPL continuous after purge
ORW-1-MP-W	2	6.68	NM	24.2	3	25.10	DNAPL in silt, DNAPL continuous after purge
ORW-1-MP-E	2	6.59	11.0	24.1	3	24.35	DNAPL continuous after purge
ORW-1-MP-S	2	5.86	10.5	NM	3	25.10	DNAPL continuous after purge

DPT Well Number	Well Diameter Inches	DEPTH to WATER	DEPTH to DNAPL	DEPTH to SILT	Surge Purge Cycles	DEPTH to Bottom	Comments
DPT-7/0209	1	7.79	NM	16.1	3	17.35	DNAPL in silt, DNAPL continuous after purge

Geoprobe Well Number	Well Diameter Inches	DEPTH to WATER	DEPTH to DNAPL	DEPTH to SILT	Surge Purge Cycles	DEPTH to Bottom	Comments
GP-15	1	14.40	NM	19.30	3	20.20	DNAPL in silt

NM=None Measured
Surged each well from the initial volume then surge/purge each following cycle by adding potable water to above sand pack

Table 3.1
DNAPL Recoverability Testing Summary (Procedure One - Groundwater Only Removal)
Detrex Corporation
Ashtabula, Ohio

	Well ID	Depth to Bottom of Sump (TOC-ft)	Depth to pump intake (TOC-ft)	Initial Volume of DNAPL within Well Casing	Initial Volume of Groundwater within Well Casing	Test Duration (min)	Pumping Rate (mL/minute)	Total Fluids Recovered	DNAPL Recovered	Groundwater Recovered	DNAPL Recharge	Groundwater Recharge	Maximum Influence and Location	Comments
Northern Area	RW-15	26.00	22.50	9,255 mL (2.445 Gal.)	124,947 mL (33.008 Gal.)	420	-275 for first 1 min. - 200 for next 29 min. - 300 for next 15 min. - 250 for next 210 min. - 275 for the next 60 min. - 250 for the remaining 105 min.	97,325 mL (25.711 Gal.)	N/A	**97,325 mL** **(25.711 Gal.)** (water column pumped to 15.65 ft below intial level = 96,564 mL (25.510 Gal.) calculated recoverable volume within casing)	- 0.00 ft over 75 min. - 0.60 ft over the next 925 min (15.42 hrs) -0.10 ft over the next 1885 min (31.42 hrs) - down 0.20 ft over the next 1013 min (16.88 hrs) - 0.50 ft total recovery over 3898 min. (64.97 hrs)	- 0.70 ft over 75 min. - 8.7 ft over the next 925 min (15.42 hrs) - 3.7 ft over the next 1885 min (31.42 hrs) - 0.2 feet over the last 1013 min (16.88 hrs). - 13.3 ft total recovery over 3898 min (64.97 hrs)	-0.15 ft water level drop in RW-16 (14.25 ft from RW-15) - no change in DNAPL level	- 0.1 ft DNAPL level drawdown during test - 15.65 ft water level drawdown - large pump with 1/2" tubing failed after 30 minutes, used small pump and 1/4" tubing for remainder of test - **11/27/12:** Barometer reading at Initial 29.66 at Final 29.64, Cloudy 32-40°F
	RW-16	26.00	22.00	6,787 mL (1.793 Gal.)	122,170 mL (32.274 Gal.)	430	375 for entire test	151,875 mL (40.121 Gal.)	N/A	**151,875 mL** **(40.121 Gal.)** (water column pumped down to 13.8 ft below intial level = 85,419 mL (22.565 Gal.) calculated recoverable volume within casing)	- 0.00 ft over 1,022 min. (17.03 hrs)	- 1.1 ft over 60 min. - 11.3 ft over next 962 min. (16.03 hrs) - 12.4 ft total recovery over 1022 min. (17.03 hrs)	3.15 ft water level drop in MP-16A (5.0 ft from RW-16) - no change in DNAPL level	- 0.5 ft DNAPL level drawdown - 13.8 ft water level drawdown - 0.2 ft of sediment at bottom of well sump - **11/29/12:** Barometer reading at Initial 29.66 at Final 29.66, Partly cloudy 32-43°F
	RW-17	26.00	23.00	16,968 mL (4.482 Gal.)	118,777 mL (31.378 Gal.)	360	- 400 for first 5 min. - 300 for the remaining 355 min.	108,500 mL (28.663 Gal.)	N/A	**108,500 mL** **(28.663 Gal).** (water column pumped down to 13.2 ft below intial level = 81,447 mL (21.516 Gal.) calculated recoverable volume within casing)	- 0.00 ft over 120 min. - 0.70 ft over the next 925 min (15.42 hrs) - 0.30 ft drop over the next 1465 min (24.42 hrs) - 0.40 ft total recovery over 2510 min (41.83 hrs)	- 1.95 ft over 120 min. - 6.75 ft over the next 925 min (15.42 hrs) - 1.05 ft over the next 445 min (7.42 hrs) - 1.00 ft over the next 1020 min (17.00 hrs) - 10.75 ft total recovery over 2510 min (41.83 hrs)	- 1.50 ft water level drop in MP-17A (5.5 ft from RW-17) - no change in DNAPL level	- 0.75 ft rise in DNAPL level at end of test - 13.2 ft water level drawdown - **11/28/12:** Barometer reading at Initial 29.63 at Final 29.62, Cloudy, Light Snow 25-32°F
Southern Area	RW-18	21.95	20.00	N/A - No measurable DNAPL observed	101,500 mL (26.813 Gal)	270	- 350 for first 5 min. - 250 for remaining 265 min.	68,500 mL (18.096 Gal.)	N/A	**68,500 mL** **(18.096 Gal.)** (water column pumped to 8.20 ft below initial level = 50,596 mL (13.366 Gal.) calculated recoverable volume within casing)	N/A	- 0.10 feet over 15 minutes -6.6 feet over the next 1,035 min (17.25hrs) - 0.4 feet over the next 1353 min. (22.55 hrs.) - 7.1 feet over a total of 2403 min. (40.05hrs)	- 3.1 ft water level drop in MP-18A (10.0 ft from RW-18) - no DNAPL in MP-18A.	-8.20 ft water level drawdown - 1.7 ft water level drop also noted in MP-19B - **11/28/12:** Barometer reading at Initial 29.62 at Final 29.62, Cloudy, light snow 25-32°F
	RW-19	20.00	18.50	8,330 mL (2.201 Gal.)	74,351 mL (19.641 Gal.)	200	- 500 for first 5 min. -350 for the next 5 min. - 375 for remaining 190 min.	75,500 mL (19.945 Gal.)	N/A	**75,500 mL** **(19.945 Gal.)** (water column pumped to 11.0 ft below initial level = 27,149 mL (7.172 Gal.) calculated recoverable volume within casing)	- 0.10 ft over 20 min. - 0.30 ft over the next 965 min. (16.08 hrs.) - 0.40 ft total recovery over 985 min (16.42 hrs.)	- 0.15 ft over 20 min. - 4.20 ft over the next 965 min. (16.08 hrs.) - 4.45 ft total recovery over 985 min (16.42 hrs.)	- 0.25 ft water level drop and 0.25 ft DNAPL level drop in MP-19A (4.7 ft from RW-19)	- 11.0 ft water level drawdown - End test at 200 minutes due to DNAPL recovery within the water - **11/29/12**: Barometer reading at Initial 29.66 at Final 29.66, Cloudy, light snow 25-32°F
	RW-20	20.00	18.80	N/A - No measurable DNAPL observed	87,000 mL (22.983 Gal.)	240	- 350 for first 10 min. - 375 for remaining 230 min.	89,875 mL (23.742 Gal).	N/A	**89,875 mL** **(23.742 Gal.)** (water column pumped to 12.0 ft below initial level = 74,043 mL (19.560 Gal.) calculated recoverable volume within casing)	N/A	- 1.05 ft over 225 min. - 4.05 ft over the next 968 min. (16.13 hrs.) - 5.10 ft total recovery over 1193 min (19.88 hrs.)	- 1.10 ft water level drop in MP-20A (5.5 ft from RW-20) - No DNAPL in MP-20A	- 12.0 ft water level drawdown - DNAPL layer in RW Sump but not measurable - **11/29/12:** Barometer reading at Initial 29.66 at Final 29.66, Cloudy, light snow 25-32°F

Table 3.2
DNAPL Recoverability Testing Summary (Procedure one - DNAPL Only Removal)
Detrex Corporation
Ashtabula, Ohio

	Well ID	Depth to Bottom of Sump at TOC (ft)	Depth to pump intake (TOC) (ft)	Initial Volume of DNAPL within Well Casing	Initial Volume of Groundwater within Well Casing	Test Duration (min)	Pumping Rate (mL/minute)	Total Fluids Recovered	DNAPL Recovered	Groundwater Recovered	DNAPL Recharge	Groundwater Recharge	Maximum Influence and Location	Comments
Northern Area	RW-15	26.00	25.60	10,489 mL (2.771 Gal.)	106,745 mL (28.199 Gal.)	65	200	13,000 mL (3.434 Gal.)	**13,000 mL (3.434 Gal.)** (DNAPL column pumped to 1.70 ft below initial level = 10,489 mL (2.771 Gal.) calculated recoverable volume within casing)	N/A	0.10 feet over 225 minutes	0.40 feet over 225 minutes	0.15 ft DNAPL level rise and no Water Level change in MP-15A (5.75 ft from RW-15)	- 1.70 ft DNAPL level drawdown - 1.80 ft water level drawdown - Stopped test due at 65 minutes when pump began recovering water - **11/30/12:** Barometer reading at Initial 29.55 at Final 29.55, Cloudy 35-42°F
Northern Area	RW-16	26.00	25.80	8,025 mL (2.120 Gal.)	111,064 mL (29.340 Gal.)	45	- 200 for 40 min. - 175 for the last 5 min.	7,875 mL (2.080 Gal.)	**7,875 mL (2.080 Gal.)** (DNAPL column pumped to 1.35 ft below initial level = 8,330 mL (2.201 Gal.) calculated recoverable volume within casing)	N/A	0.20 feet over 20 minutes	0.10 feet over 20 minutes	0.05 ft DNAPL and Water level drop in MP-16A (5.0 ft from RW-16)	- 1.35 ft DNAPL level drawdown - 0.70 ft water level drawdown - Stopped test due at 65 minutes when pump began recovering water. - 0.2 ft of sediment at bottom of well sump - **11/30/12:** Barometer reading at Initial 29.55 at Final 29.55, Cloudy 35-42°F
Northern Area	RW-17	26.00	25.80	26,340 mL. (6.958 Gal.)	96,564 mL (25.510 Gal.)	250	- 200 for the first 35 min. -175 for 30 min. - 125 for 15 min. - 100 for 60 min. - 75 to 50 for the last 45 min.	30,250 mL (7.991 Gal.)	**30,250 mL (7.991 Gal.)** (DNAPL column pumped to 3.15 ft below initial level = 19,436 mL (5.134 Gal.) calculated recoverable volume within casing)	N/A	0.10 feet over 190 minutes	0.30 feet over 190 minutes	0.1 ft DNAPL level rise then 0.05 ft DNAPL level drop, and then same as initial DNAPL level measurement and 0.15 ft Water Level drop near end of test in MP-17A (5.5 ft from RW-17)	- 3.15 ft DNAPL level drawdown - 2.70 ft water level drawdown - Stopped test due at 250 minutes when pump began discharging air - 0.2 ft of sediment at bottom of well sump - **11/30/12:** Barometer reading at Initial 29.55 at Final 29.55, Cloudy 35-42°F
Southern Area	RW-18	21.95	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	- No DNAPL observed in RW-18
Southern Area	RW-19	20.00	19.80	11,723 mL (3.097 Gal.)	35,170 mL (9.291 Gal)	60	- 200 mL/min for the first 5 min. - 175 mL/min for the remaining 55 min.	10,625 mL (2.807 Gal.)	**12,375 (2.807 Gal.)** (DNAPL column pumped 1.65 ft to below initial level = 10,181 mL (2.690 Gal.) calculated recoverable volume within casing)	N/A	0.80 feet **drop** over 210 minutes (RW-20 water pumping at same time may have caused interference)	0.70 feet **drop** over 210 minutes (RW-20 water pumping at same time may have caused interference)	- 0.40 ft water level drop in MP-19A (4.7 ft from RW-19) - no change in DNAPL level	- 1.65 ft DNAPL level drawdown -1.70 ft water level drawdown - Stopped test due at 60 minutes when pump began recovering water - **11/30/12:** Barometer reading at Initial 29.55 at Final 29.55, Cloudy 35-42°F
Southern Area	RW-20	20.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	- Not enough DNAPL to recover in RW-20

Table 3.3
DNAPL Recoverability Testing Summary (Procedure Two - Dual Pumps and Applied Vacuum)
Detrex Corporation
Ashtabula, Ohio

	Well ID	Depth to Bottom of Sump (TOC-ft)	Depth to Water pump intake (TOC-ft)	Depth to DNAPL pump intake (TOC-ft)	Initial Volume of DNAPL within Well Casing	Initial Volume of Groundwater within Well Casing	Test Duration (min)	Water Pumping Rate (mL/minute)	DNAPL Pumping Rate (mL/minute)	Vacuum Steps (inches of Hg)	Max Air Flow (CFM)	Total Fluids Recovered	DNAPL Recovered	DNAPL/Water Emulsion Recovered	Groundwater Recovered	DNAPL Recharge	Groundwater Recharge	Maximum Influence and Location	Comments
Northern Area	RW-15	26.00	19.50	25.40	1,851 mL (0.489 Gallons)	124,021 mL (32.763 Gal.)	600	- 0 for first 15 min. - 100 for 195 min. - 200 for 360 min. - 0 for last 30 min.	0 for entire test	- 0" for first 150 min. - 6.0 for 30 min. - 5.8" for 150 min - 10.5" for 150 min. - 15.2" for 90 min. - 19.5" for the last 30 min.	0	93,000 mL (24.568 Gal.)	**0 mL** (DNAPL column was lowered 0.4 ft below initial level = 1,851 mL (0.489 Gal.) calculated recoverable volume within casing)	N/A	**93,000 mL (24.568 Gal.)** (water column pumped to 5.65 ft below initial level = 34,862 mL (9.210 Gal.) calculated recoverable volume within casing)	0.75 feet over 19 days (25.35' at end of test and 24.6' initial level of test procedure 3)	4.65 feet over 19 days (8.80' at end of test and 4.15' initial level of test procedure 3)	22.0 inches of water in MP-15D (18.5 ft from RW-15) at 19.6" Hg of vacuum in RW-15	- 0.4 ft DNAPL level rise throughout test (max = 15.2" Hg at 570 min. into test) - 0.35 ft DNAPL rise (from initial level) at end of test - 5.65 ft water level drawdown (max) at 10.5" Hg at 450 min into test - 3.2 ft water level drawdown at end of test **- Ended test due to no discharge of water from pump (pump running but fighting vacuum)** - initial DNAPL level 25.7 ft below TOC, depth to pump intake set to 25.4 ft, end DNAPL level at 25.35 ft (resulted in 0 recovery of DNAPL) - 12/7/12: Barometer reading at Initial 29.40 at Final 29.37, cloudy to rain, 38-48°F
	RW-16	26.00	19.50	25.40	12,340 mL (3.260 Gallons)	123,713 mL (32.682 Gal.)	270	- 0 for first 30 min. - 400 for 60 min. - 350 for 60 min. - 150 for 30 min. - 175 for 40 min. - 0 for the last 50 min	- 0 for first 90 min. - 16.7 for 30 min. - 0 for remaining 150 min. (pump running but no discharge)	- 0" for first 30 min. - 5.8" for 120 min - 10.2" for 30 min. - 10.0" for 60 min. - 0" for the last 30 min.	0	69,000 mL (18.228 Gal.)	**500 mL (0.132 Gal.)** (DNAPL column pumped down 0.1 feet below initial level = 617 mL (0.163 Gal.) calculated recoverable volume within casing)	N/A	**68,500 mL (18.096 Gal.)** (water column pumped to 4.60 ft below initial level = 28,383 mL (7.498 Gal.) calculated recoverable volume within casing)	0.30 feet over 7 days (24.10' at end of test and 23.80' initial level of test procedure 3)	2.4 feet over 7 days (6.3' at end of test and 3.9' initial level of test procedure 3)	30.0 inches of water in MP-15A (8.75 ft from RW-16) at 10.0" and 10.2" Hg of vacuum in RW-16	- 0.1 ft initial DNAPL level rise at start of DNAPL pump - 0.1 ft DNAPL level drawdown at end of test - 4.6 ft water level drawdown (max= 5.8" Hg 150 min into test) - 2.35 ft water level drawdown at end of test - DNAPL pump only recovered 500 mL after 30 minutes of pumping and 0 mL during the last 150 minutes of the test (pumped entire time, no discharge) **- Ended test due to no discharge of water from pump (pump running but fighting vacuum)** -12/11/12: Barometer reading at Initial 29.35 at Final 29.35, light snow 30-35°F
	RW-17	26.00	18.60	25.70	10,489 mL (2.771 Gallons)	127,724 mL (33.741 Gal.)	360	- 1000 for 15 min. - 475 for 15 min. - 300 for 20 min. - 425 for 10 min. - 350 for 75 min. - 325 for 15 min. - 300 for 30 min. - 250 for 30 min. - 50 for 30 min. - 30 for 30 min. - 10 for 30 min. - 0 for the last 60 min	- 0 for the first 135 min. - 100 for 45 min. - 50 for 60 min. - 30 for 30 min. - 20 for 60 min. - 10 for the last 30 min.	- 5.8" for first 20 min - 6.0" for 150 min. - 10.0" for 130 min. - 14.0" for the last 60 min.	0	87,100 mL (23.009 Gal.)	**9,900 mL (2.615 Gal.)** (DNAPL column pumped to 0.85 ft below initial level = 5,245 mL (1.386 Gal.) calculated recoverable volume within casing)	N/A	**77,200 mL (20.394 Gal)** (water column pumped to 11.3 ft below initial level = 92,553 mL (24.450 Gal.) calculated recoverable volume within casing)	0.25 feet over 780 min. (13 hrs.) and additional 0.60 feet over 7 days (24.9' after 13 hr. recharge and 24.3' initial level of test procedure 3)	3.80 feet over 780 min. (13 hrs.) and additional 4.25 feet over 7 days (4.0' after 13 hr. recharge and 8.25' initial level of test procedure 3)	6.5 inches of water in MP-17B (10.7 ft from RW-17) at 10.0" Hg of vacuum in RW-17	- 0.1 ft DNAPL level rise (from initial level) at 6" of Hg 120 min. into test - 0.85 ft DNAPL level drawdown max at end of test - 11.3 ft water level drawdown (max = 10.0" Hg at 240 min into test) - 8.45 ft water level drawdown at end of test - Vacuum applied 30 minutes into test - Started DNAPL pump 135 minutes after water pump / test was started **- Stopped test at 360 minutes when DNAPL pump rate dropped to 10 mL/min due to fighting vacuum (water pump running but no discharge due to fighting vacuum).** - **12/13/12**: Barometer reading at Initial 29.70 at Final 29.60, Cloudy 30-45°F - **12/14/12**: 0.2 ft of sediment observed at bottom of well sump
Southern Area	RW-18	21.95	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	- Not Tested due to no observed DNAPL within well and also pump malfunction
	RW-19	20.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	- Not Tested due to pump malfunction
	RW-20	20.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	- Not Tested due to minimal DNAPL within well and also pump malfunction

Table 3.4
DNAPL Recoverability Testing Summary (Procedure Three - Total Fluids and Applied Vacuum)
Detrex Corporation
Ashtabula, Ohio

	Well ID	Depth to Bottom of Sump (TOC-ft)	Depth to pump intake (TOC-ft)	Initial Volume of DNAPL within Well Casing (mL)	Initial Volume of Groundwater within Well Casing (mL)	Test Duration (min)	Pumping Rate (mL/minute)	Vacuum Steps (inches of Hg)	Maximum Air Flow (CFM)	Total Fluids Recovered (mL)	DNAPL Recovered (mL)	DNAPL/Water Emulsion Recovered (mL)	Groundwater Recovered (mL)	DNAPL Recharge	Groundwater Recharge	Maximum Influence and Location	Comments
Northern Area	RW-15	26.00	25.20	8,638 mL (2.282 Gal.)	126,181 mL (33.334 Gal.)	420	- 150 for first 20 min. - 600 for 10 min. - 400 for 120 min. - 225 for 30 min. - 250 for 30 min - 200 for 60 min. - 100 for 120 min. - 25 for the last 30 min.	- 0" for first 30 min. - 6.0" for 120 min. - 10.2" for 120 min. - 14.2" for 120 min. - 18.0" for the last 30 min.	0	107,884 mL (28.500 Gal.)	**7,571 mL (2.00 Gal.)** (DNAPL column pumped to 0.65 ft initial level = 4,011 mL (1.060 Gal.) calculated recoverable volume within casing)	**5,678 mL (1.500 Gal.)**	**94,635 mL (25.00 Gal)** (water column pumped to 7.15 ft below initial level = 44,117 mL (11.654 Gal.) calculated recoverable volume within casing)	0.35 ft over 805 min (13.42 hrs)	1.8 ft over 805 min (13.42 hrs)	4.5 inches of water in MP-15A (5.75 ft from RW-15) at 14.2" Hg of vacuum in RW-15	- 0.65 ft DNAPL level drawdown throughout test - 7.15 ft water level drawdown (max) at 6.0" Hg, 150 min into test - 2.45 ft water level drawdown at end of test - **Ended test due to low flow water/DNAPL from peristaltic pump** - check valve added to peristaltic pump intake to keep fluids in tubing under vacuum - DNAPL, Emulsion, and Water Recovered calculated using graduated buckets after test - **12/26/12:** Barometer reading at Initial 29.16 at Final 29.14, cloudy to snow, 35-32°F
	RW-16	26.00	25.00	13,574 mL (3.586 Gal.)	122,787 mL (32.437 Gal)	360	- 600 for first 10 min. - 475 for 20 min. - 400 for 30 min. - 450 for 60 min. - 400 for 30 min - 300 for 30 min. - 275 for 30 min. - 250 for 30 min. - 275 for 30 min. - 175 for 30 min. - 300 for the last 60 min.	- 0" for first 20 min. - 6.2" for 130 min. - 10.0" for 120 min. - 14.0" for 30 min. - 0" for the last 60 min.	0	119,241 mL (31.500 Gal.)	**11,356 mL (3.00 Gal.)** (DNAPL column pumped to 1.4 ft below initial level = 8,638 mL (2.282 Gal.) calculated recoverable volume within casing)	**9,464 mL (2.500 Gal.)**	**98,421 mL (26.00 Gal)** (water column pumped to 5.6 ft below initial level = 34,553 mL (9.128 Gal.) calculated recoverable volume within casing)	0.30 ft over 840 min (14.0 hrs)	3.8 ft over 840 min (14.0 hrs)	37.0 inches of water in MP-15A (8.75 ft from RW-16) at 14.0" Hg of vacuum in RW-16	- 1.4 ft DNAPL level drawdown throughout test - 5.6 ft water level drawdown (max) at 6.2" Hg, 150 min into test - 4.4 ft water level drawdown at end of test - **Ended test due to no recovery of water/DNAPL from peristaltic pump at 14.0" Hg vacuum (pulling air into pump from discharge tubing).** - DNAPL, Emulsion, and Water Recovered calculated using graduated buckets after test - **12/18/12:** Barometer reading at Initial 29.72 at Final 29.79, rain to cloudy, 36-40°F
	RW-16 (test 2)	26.00	25.10	6,787 mL (1.793 Gal.)	125,872 mL (33.252 Gal.)	210	- 500 for first 30 min. - 350 for 60 min. - 225 for 30 min. - 250 for 30 min. - 5 for 20 min. - 0 for the last 40 min.	- 0" for first 30 min. - 10.0" for 60 min. - 14.0" for 60 min. - 19.0" for 20 min. - 0" for the last 40 min.	0	51,340 mL (13.563 Gal.)	**3,194 mL (0.844 Gal.)** (DNAPL column pumped to 0.3 ft below initial level = 1,851 mL (0.489 Gal.) calculated recoverable volume within casing)	**828 mL (0.219 Gal.)**	**47,318 mL (12.500 Gal)** (water column pumped to 1.7 ft below initial level = 10,489 mL (2.771 Gal.) calculated recoverable volume within casing)	0.30 ft over 840 min (14.0 hrs)	1.7 ft over 840 min (14.0 hrs)	19.0 inches of water in MP-16A (5.0 ft from RW-16) at 10.0" Hg and 14.0" Hg of vacuum in RW-16	- 0.3 ft DNAPL level drawdown throughout test - 1.7 ft water level drawdown (max) at 0" Hg, 30 min into test - 2.0 ft water level rise from intial water level at end of test - **No recovery of water/DNAPL from peristaltic pump at 19.0" Hg vacuum (stalled and stopped discharging fluids). Ran test additional 40 minutes without vacuum to appempt to pump fluids but 0 recovery.** - DNAPL, Emulsion, and Water Recovered calculated using graduated buckets after test - **12/19/12:** Barometer reading at Initial 29.97 at Final 30.05, Cloudy, 37-41°F
	RW-17	26.00	25.20	10,489 mL (2.771 Gal.)	125,255 mL (33.089 Gal.)	435	- 2000 for first 5 min. - 550 for 105 min. - 525 for 10 min. - 400 for 15 min. - 375 for 15 min - 350 for 45 min. - 375 for 15 min. - 350 for 30 min. - 200 for 30 min. - 225 for 60 min. - 5 for 60 min. - 0 for the last 45 min.	- 0" for first 120 min. - 6.2" for 120 min. - 9.6" for 90 min. - 14.0" for 30 min. - 13.8" for 60 min. - 0" for the last 15min.	0	105,991 mL (28.00 Gal.)	**17,034 mL (4.500 Gal.)** (DNAPL column pumped to 0.95 ft below initial level = 5,862 mL (1.549 Gal.) calculated recoverable volume within casing)	**1,893 mL (0.500 Gal.)**	**87,064 mL (23.00 Gal)** (water column pumped to 10.2 ft below initial level = 62,936 mL (16.626 Gal.) calculated recoverable volume within casing)	0.50 ft over 1080 min (18.0 hrs)	8.55 ft over 1080 min (18.0 hrs)	3.8 inches of water in MP-16C at 13.8" Hg of vacuum in RW-17	- 0.95 ft DNAPL level drawdown throughout test - 10.2 ft water level drawdown (max) at 13.8" Hg, 420 min into test - 8.0 ft water level drawdown at end of test - check valve added to peristaltic pump intake to keep fluids in tubing under vacuum - **No recovery of water/DNAPL from peristaltic pump after one hour of 14.0" Hg vacuum (stalled and stopped discharging fluids). Ran test additional 15 minutes without vacuum to appempt to pump fluids but 0 recovery.** - DNAPL, Emulsion, and Water Recovered calculated using graduated buckets after test - **12/20/12**: Barometer reading at Initial 28.92 at Final 28.88, Cloudy to rain, 35-45°F

Table 3.4
DNAPL Recoverability Testing Summary (Procedure Three - Total Fluids and Applied Vacuum)
Detrex Corporation
Ashtabula, Ohio

	Well ID	Depth to Bottom of Sump (TOC-ft)	Depth to pump intake (TOC-ft)	Initial Volume of DNAPL within Well Casing (mL)	Initial Volume of Groundwater within Well Casing (mL)	Test Duration (min)	Pumping Rate (mL/minute)	Vacuum Steps (inches of Hg)	Maximum Air Flow (CFM)	Total Fluids Recovered (mL)	DNAPL Recovered (mL)	DNAPL/Water Emulsion Recovered (mL)	Groundwater Recovered (mL)	DNAPL Recharge	Groundwater Recharge	Maximum Influence and Location	Comments
Southern Area	RW-18	21.95	18.50	N/A (No Measurable DNAPL)	109,213 mL (28.851 Gal.)	565	- 900 for first 25 min. - 650 for 45 min. - 525 for 15 min. - 500 for 45 min. - 450 for 60 min - 350 for 30 min. - 250 for 60 min. - 275 for 30 min. - 225 for 15 min. - 175 for 45 min. - 200 for 90 min. - 175 for 60 min. - 200 for 30 min. - 100 for the last 15 min.	- 0.25" for first 25 min. - 0.5" for 15 min. - 0.75" for 30 min. - 6.0 for 120 min. - 10.0" for 120 min. - 14.0" for 120 min. - 18.0" for 120 min. - 22.0" for the last 15 min.	0	204,412 mL (54.00 Gal.)	**0**	**0**	**204,412 mL (54.00 Gal)** (water column pumped to 10.4 ft below initial level = 64,170 mL (16.952 Gal.) calculated recoverable volume within casing)	N/A (No Measurable DNAPL)	0.00 ft over 890 min (14.8 hrs)	56 inches of water in MP-19B (7.25 ft from RW-18) at 22.0" Hg of vacuum in RW-18	- 10.4 ft water level drawdown (max) at 10.0" Hg, 280 min into test - 2.1 ft water level drawdown at end of test - noted turbid water at discharge after vacuum was increased to 14.0" Hg - check valve added to peristaltic pump intake to keep fluids in tubing under vacuum - DNAPL, Emulsion, and Water Recovered calculated using graduated buckets after test - **1/2/13**: Barometer reading at Initial 29.50 at Final 29.50, Cloudy to light snow, 18-23°F - **1/3/13:** noted 0.20 ft sediment at bottom of well sump following test
	RW-19 (attempt 1)	20.00	18.5	16,660 mL (4.401 Gal.)	75,894 mL (20.049 Gal.)	75	- 150 for first 30 min. - 600 for the last 45 min	0.0" entire test attempt	0	5,678 mL * (1.500 Gal.)	**5,678 mL (1.500 Gal.)**	Not Reported (*DNAPL recovery only quantity reported)	Not Reported (*DNAPL recovery only quantity reported)	0.65 ft over 1335 min (22.25 hrs)	0.70 ft over 1335 min (22.25 hrs)	N/A - No Vacuum Applied	- 5.1 ft water level drawdown at end of test attempt 1 - 0.85 ft DNAPL level drawdown at end of test attempt 1 - check valve added to peristaltic pump intake to keep fluids in tubing under vacuum - **End Test due to Vacuum blower Failure**
	RW-19 (attempt 2	20.00	18.5	15426 mL (4.075 Gal)	49,979 mL (13.203 Gal.)	60	- 150 for first 30 min. - 500 for the last 30 min	0.0" entire test attempt	0	5,678 mL* (1.500 Gal.)	**5,678 mL (1.500 Gal.)**	Not Reported (*DNAPL recovery only quantity reported)	Not Reported (*DNAPL recovery only quantity reported)	1.10 ft over 1370 min (22.83 hrs)	3.30 ft over 1370 min (22.83 hrs)	N/A - No Vacuum Applied	- 3.7 ft water level drawdown at end of test attempt 2 - 0.7 ft DNAPL level drawdown at end of test attempt 2 - check valve added to peristaltic pump intake to keep fluids in tubing under vacuum **- End Test due to Vacuum blower Failure**
	RW-19 (Test)	20.00	18.5	17,894 mL (4.727 Gal.)	45,043 mL (11.899 Gal.)	610	- 150 for first 20 min. - 500 for 20 min. - 450 for 30 min. - 400 for 30 min. - 350 for 60 min - 100 for 15 min. - 125 for 105 min. - 50 for 90 min. - 40 for 90 min. - 20 for the last 150 min.	- 0.0" for first 40 min. - 6.0 for 120 min. - 10.0" for 120 min. - 14.0" for 120 min. - 18.0" for 150 min. - 22.0" for the last 60 min.	0	89,904 mL (23.750 Gal.)	**9,464 (2.500 Gal.)** (DNAPL column pumped to 1.1 ft below initial level = 6,787 mL (1.793 Gal.) calculated recoverable volume within casing)	946 mL (0.250 Gal.)	**79,494 mL (21.00 Gal)** (water column pumped to 7.15 ft below initial level = 44,117 mL (11.654 Gal.) calculated recoverable volume within casing)	0.10 ft over 900 min (15.0hrs)	0.80 ft over 900 min (15.0hrs)	15.0 inches of water in MP-19B (7.5 ft from RW-19) at 22.0" Hg of vacuum in RW-19	'- 7.15 ft water level drawdown (max) at 10.0" Hg, 280 min into test - 1.1 ft DNAPL level drawdown at end of test - check valve added to peristaltic pump intake to keep fluids in tubing under vacuum - 2 attempts of test prior to this test aborted due to vacuum blower failure - **1/10/13**: noted total 0.10 ft sediment at bottom of well sump following test (no change)
	RW-20	20.00	18.5	617 mL (0.163 Gal.)	91,936 mL (24.287 Gal.)	525	- 900 for first 15 min. - 600 for 15 min. - 550 for 30 min. - 500 for 75 min. - 275 for 30 min. - 250 for 30 min. - 225 for 60 min. - 10 for 60 min. - 20 for 30 min. - 50 for 30 min. - 80 for 15 min. - 90 for 15 min. - 100 for 30 min. - 150 for 60 min. - 10 for 15 min.	- 0.0" for first 45 min. - 6.0 for 90 min. - 10.0" for 120 min. - 14.0" for 120 min. - 18.0" for 120 min. - 22.0" for the last 30 min.	0	121,133 mL (32.00 Gal)	0	0	**121,133 mL (32.00 Gal.)** (water column pumped to 10.95 ft below initial level = 67,564 mL (17.849 Gal.) calculated recoverable volume within casing)	1.6 ft over 900 min. (15.0 hrs)	N/A (DNAPL lower than pump intake 0.1' above the bottom of the well sump)	31 inches of water in MP-20A (5.5 ft from RW-20) at 18.0" Hg of vacuum in RW-20	- 10.95 ft water level drawdown (max) at 10.0" Hg, 255 min into test - 1.1 ft water level drawdown at end of test - **Test ended due to intermittent flow (5 to 0 mL/min)** - check valve added to peristaltic pump intake to keep fluids in tubing under vacuum - DNAPL, Emulsion, and Water Recovered calculated using graduated buckets after test - **1/4/13:** Barometer reading at Initial 29.40 at Final 29.34, Cloudy, windy, light snow, 28-33°F - **1/7/13:** noted additional 0.20 ft sediment at bottom of well sump following test

Table 3.5
DNAPL Recoverability Testing Summary (Procedure Four - Recovery Well Groups / Initial Applied Vacuum)
Detrex Corporation
Ashtabula, Ohio

	Well ID	Depth to Bottom of Sump (TOC-ft)	Initial Volume of DNAPL within Well Casing	Initial Volume of Groundwater within Well Casing	Test Duration (min)	Pumping Rate (mL/minute)	Vacuum (inches of Hg)	Maximum Air Flow (CFM)	Total Fluids Recovered	DNAPL Recovered	DNAPL/Water Emulsion Recovered	Groundwater Recovered	DNAPL Recharge	Groundwater Recharge	Maximum Influence and Location	Comments
Northern Area	RW-15 (1/15/13)	26.00	6,787 mL (1.793 Gal.)	130,809 mL (34.556 Gal.)	300	Variable	No applied vacuum	0.0	**77,601 mL (20.5 Gal.)**	**1,893 mL (0.50 Gal.)**	N/A	**75,708 mL (20.0 Gal.)**	0.0 ft over 1020 min (17.0 hrs) after stop purging	8.5 ft over 1110 min (18.5 hrs) after stop purging	N/A	- Prior to applying vacuum, pumped water level down 11.8 ft from initial level - **1/15/13:** Barometer reading at Initial 30.42" at Final 30.33", clear 27-31°F
	RW-15 (1/16/13)	26.00	3,702 mL (0.978 Gal.)	116,617 mL (30.807 Gal.)	270	Variable	- 25.0" for 160 min. (RW-15, RW-16 and RW-17 applied simultaneously)	0.0	**105,991 mL (28.0 Gal.)**	0.0	N/A	**105,991 mL (28.0 Gal.)**	0.5 ft drop over 1545 min (25.75 hrs) after stop applied vacuum	2.2 ft over 1545 min (25.75 hrs) after stop applied vacuum	102 inches of water in MP-15A (5.75 ft from RW-15) at 25.0" Hg of vacuum	- Prior to applying vacuum, pumped water level down 16.2 ft from initial level and DNAPL 0.2 ft from initial level - at end of test DNAPL level increased 1.0 ft from start of vacuum level - at end of test water level increased 14.3 ft from start of vacuum level - **1/16/13:** Barometer reading at Initial 29.95" at Final 29.89", cloudy to clear 28-34°F **1/17/13**: 0.5 feet of sediment noted in bottom of sump
	RW-16 (1/15/13)	26.00	13,574 mL (3.586 Gal.)	125,872 mL (33.252 Gal.)	300	Variable	No applied vacuum	0.0	**94,638 mL (25.0 Gal.)**	**18,930 mL (5.0 Gal.)**	N/A	**75,708 mL (20.0 Gal.)**	0.0 ft over 1020 min (17.0 hrs) after stop purging	10.0 ft over 1020 min (17.0 hrs) after stop purging	N/A - No Vacuum Induced (water evacuation only)	- Prior to applying vacuum, pumped water level down 11.6 ft from initial level - **1/15/13**: Barometer reading at Initial 30.42" at Final 30.33", clear 27-31°F
	RW-16 (1/16/13)	26.00	1,234 mL (0.326 Gal.)	128,341 mL (33.904 Gal.)	270	Variable	- 25.0" for 160 min. (RW-15, RW-16 and RW-17 applied simultaneously)	0.0	**113,562 mL (30.0 Gal.)**	0.0	N/A	**113,562 mL (30.0 Gal.) (prior to applying vacuum)**	0.2 ft over 1545 min (25.75 hrs) after stop applied vacuum	0.6 feet drop over 1545 min. (25.75 hrs) after stop applied vacuum	100 inches of water in MP-16A (5.0 ft from RW-16) at 25.0" Hg of vacuum	- Prior to applying vacuum, pumped water level down 18.8 ft from initial level, did not purge DNAPL - at end of test DNAPL level increased 0.4 ft from start of vacuum level - at end of test water level increased 17.6 ft from start of vacuum level - **1/16/13:** Barometer reading at Initial 29.95" at Final 29.89", cloudy to clear 28-34°F - **1/17/13**: 0.3 feet of sediment noted in bottom of sump
	RW-17 (1/16/13)	26.00	15,426 mL (4.075 Gal.)	122,787 mL (32.437 Gal.)	270	Variable	- 25.0" for 160 min. (RW-15, RW-16 and RW-17 applied simultaneously)	0.0	**156,337 mL (41.3 Gal.)**	**18,927 mL (5.0 Gal) prior to Vacuum 1/16/13** **31,419 mL (8.3 Gal.) post vacuum 1/17/13**	N/A	**105,991 mL (28.0 Gal.)**	0.8 feet drop over 1545 min. (25.75 hrs) after stop applied vacuum	1.1 ft over 1545 min (25.75 hrs) after stop applied vacuum	20.0 inches of water in MP-17A (5.50 ft from RW-17) at 25.0" Hg of vacuum	'- Prior to applying vacuum, pumped water level down 18.7 ft from initial level and DNAPL 1.8 feet from initial level - prior to applying vacuum, DNAPL level in RW-17 increased 1.7 feet in 30 minutes (0.1' below initial level) - at end of test DNAPL level increased 1.3 ft from start of vacuum level - at end of test water level increased 12.9 ft from start of vacuum level - **1/16/13:** Barometer reading at Initial 29.95" at Final 29.89", cloudy to clear 28-34°F - **1/17/13**: 0.4 feet of sediment noted in bottom of sump

Table 3.5
DNAPL Recoverability Testing Summary (Procedure Four - Recovery Well Groups / Initial Applied Vacuum)
Detrex Corporation
Ashtabula, Ohio

	Well ID	Depth to Bottom of Sump (TOC-ft)	Initial Volume of DNAPL within Well Casing	Initial Volume of Groundwater within Well Casing	Test Duration (min)	Pumping Rate (mL/minute)	Vacuum (inches of Hg)	Maximum Air Flow (CFM)	Total Fluids Recovered	DNAPL Recovered	DNAPL/Water Emulsion Recovered	Groundwater Recovered	DNAPL Recharge	Groundwater Recharge	Maximum Influence and Location	Comments
Southern Area	RW-18 (1/14/13)	21.95	N/A (No Measurable or Observed DNAPL)	110,757 mL (29.259 Gal.)	475	Variable	- 25.0" for 120 min. (RW-18, RW-19 and RW-20 applied simultaneously)	0.0	**83,279 mL (22.0 Gal.) (prior to applying vacuum)**	**0 mL (0.0 Gal.)**	N/A	**83,279 mL (22.0 Gal.) (prior to applying vacuum)**	N/A - No Measurable or Observed DNAPL	0.65 ft water level drop after 1040 min (17.33 hrs) 1.10 ft after 2435 min (40.58 hrs) after stop applied vacuum	100 inches of water in MP-18A (10.0 ft from RW-18) at 20.0" and 25.0" Hg of vacuum	- Prior to applying vacuum, pumped Water level down 11.6 ft from initial level - at end of test water level increased 10.20 ft from start of vacuum level '- **1/14/13**: Barometer reading at Initial 30.29" at Final 30.41", cloudy 30-28°F - **1/15/13**: 0.05 feet of sediment noted in bottom of sump
	RW-19 (1/14/13)	20.00	28,383 mL (7.498 Gal.)	79,596 mL (21.027 Gal.)	475	Variable	- 25.0" for 120 min. (RW-18, RW-19 and RW-20 applied simultaneously)	0.0	**105,992 mL (28.0 Gal.) (prior to applying vacuum)**	**15,142 mL (4.0 Gal.) (prior to applying vacuum)**	N/A	90,850 mL (24.0 Gal.) (prior to applying vacuum)	0.0 ft after 1040 min (17.33 hrs) 0.1 ft after 2435 min (40.58 hrs) after stop applied vacuum	4.4 ft after 1040 min (17.33 hrs) 8.4 ft after 2435 min (40.58 hrs) after stop applied vacuum	27.0" inches of water in MP-19A (4.70 ft from RW-19) at 25.0" Hg of vacuum	- Prior to applying vacuum, pumped DNAPL level down 2.2 ft from initial level and water level down 12.6 ft from initial level - at end of test DNAPL level increased 0.6 ft from start of vacuum level - at end of test water level increased 3.9 ft from start of vacuum level - **1/14/13:** Barometer reading at Initial 30.29" at Final 30.41", cloudy 30-28°F **- 1/15/13**: 0.10 feet of sediment noted in bottom of sump
	RW-20 (1/14/13)	20.00	1,234 mL (0.326 Gal.)	97,489 mL (25.754 Gal.)	475	Variable	- 25.0" for 120 min. (RW-18, RW-19 and RW-20 applied simultaneously)	0.0	**71,923 mL (19.0 Gal.) (prior to applying vacuum)**	**0 mL (0.0 Gal.)**	N/A	71,923 mL (19.0 Gal.) (prior to applying vacuum)	0.2 ft drop after 1040 min (17.33 hrs) 0.2 ft after 2435 min (40.58 hrs) after stop applied vacuum	2.4 ft drop in water level after 1040 min. (17.33 hrs) 2.0 ft drop after 2435 min. (40.58 hrs) after stop applied vacuum	52.0" inches of water in MP-20A (5.50 ft from RW-20) at 25.0" Hg of vacuum	- Prior to applying vacuum, pumped water level down 11.6 ft from initial level, DNAPL not recoverable (0.2 ft in bottom of sump) - 0.1 ft DNAPL level increase near end of applied vacuum, then dropped 0.2 ft from end of test. (No DNAPL recovered) - 2.4 feet drop from end of test water level (2.3 ft below TOC) 1040 min after test and up 0.4 feet to 4.3 feet below TOC at 2435 min after end of test. - **1/14/13**: Barometer reading at Initial 30.29" at Final 30.41", cloudy 30-28°F -**1/15/13**: 0.10 feet of sediment noted in bottom of sump

Table 3.6
DNAPL Physical Characterization Data Summary
Detrex Corporation
Ashtabula, Ohio

	Sample / Chemical ID	Density (gm/ml)	Viscosity (centipoise)	Surface Tension Air/Water (dynes/cm)	Interfacial Tension Water/DNAPL (dynes/cm)	Surface Tension Air/NAPL (dynes/cm)	Temperature of Measurements
Samples	GP-15	1.6416	5.5	56.6	14.9	39.3	60°F
	DETMW-06S	1.5604	1.6	63.1	19.7	35.1	60°F
	DETMW-08S	1.5972	3	60.3	21.7	36.1	60°F
	DETMW-09S	1.5654	2.5	55.4	18.6	37.4	60°F
	DETMW-10S	1.5595	2.2	64.5	19.7	36.7	60°F
	MW-13-2	1.6128	3.7	60.6	19.7	36.7	60°F
	RW-17	1.6254	4.3	57.2	14.7	37.7	60°F
	RW-19	1.6213	3.8	54.3	11.9	39.9	60°F
Reference Chemicals [1]	Trichloroethene	1.466 [2]	0.610 at 60°F [3]	N/A	34.5 at 75.2°F [3]	29.3 [3]	68°F
	Tetrachloroethene	1.624 [2]	0.929 at 60°F [3]	N/A	44.4 at 75.2°F [3]	31.3 at 68°F [3]	59°F
	1,1,2,2 - Tetrachloroethane	1.595 [3]	1.939 at 60°F [3]	N/A	N/A	37.85 [3]	68°F
	Hexachlorobenzene	2.044 [2]	Solid at 59°F and one atmosphere [3]				75.2°F
	Hexachlorobutadiene	1.675 [3]	2.446 at 100°F [3]	N/A	N/A	N/A	60°F
	Hexachloroethane	2.091 [2]	Solid at 59°F and one atmosphere [3]				68°F

Notes:
1 - Reference chemicals provided were primary compounds identified by chemical characterization analysis by Precision Analytical (Table 3.7)
2 - Physical Properties identified in "Chemical Engineers Handbook" 5th Edition, Robert H. Perry and Cecil H. Chilton, McGraw-Hill Book Company, 1973
3 - Physical Properties identified in CAMEO Chemicals Online Tool - Emergency Response Division of National Oceanic and Atmospheric Administration, 2013

Table 3.7
DNAPL Analytical Data Summary
Detrex Corporation
Ashtabula, Ohio

		Northern Perimeter of Former Lagoon Area						Middle of Former Lagoon Area				Southern Perimeter of Former Lagoon Area					
	Parameter, mg/kg	**RW-17 (2/25/13) Concentrations**	**RW-17 (2/25/13) Percentage of Detections**	**DETMW-06S (2/28/13) Concentrations**	**DETMW-06S (2/25/13) Percentage of Detections**	**MW-13-2 (2/28/13) Concentrations**	**MW-13-2 (2/25/13) Percentage of Detections**	**GP-15 (2/28/13) Concentrations**	**GP-15 (2/25/13) Percentage of Detections**	**DETMW-08S (2/28/13) Concentrations**	**DETMW-08S (2/25/13) Percentage of Detections**	**RW-19 (2/25/13) Concentrations**	**RW-19 (2/25/13) Percentage of Detections**	**DETMW-09S (2/28/13) Concentrations**	**DETMW-09S (2/25/13) Percentage of Detections**	**DETMW-10S (2/28/13) Concentrations**	**DETMW-10S (2/25/13) Percentage of Detections**
VOCs	1,1,2,2-Tetrachloroethane	**16,800**	19.09%	**2,550**	0.65%	**88,500**	30.30%	**259,000**	64.96%	**51,700**	16.81%	**18,300**	17.76%	**2,430**	1.89%	1,560 U	0.00%
	1,1,2-Trichloroethane	**931**	1.06%	1,400 U	0.00%	1,930 U	0.00%	1,950 U	0.00%	1,520 U	0.00%	**509**	0.49%	1,400 U	0.00%	1,560 U	0.00%
	1,1-Dichloroethene	**263**	0.30%	1,400 U	0.00%	1,930 U	0.00%	1,950 U	0.00%	1,520 U	0.00%	343 U	0.00%	1,400 U	0.00%	1,560 U	0.00%
	Chloroform	**366**	0.42%	1,400 U	0.00%	1,930 U	0.00%	1,950 U	0.00%	1,520 U	0.00%	**415**	0.40%	1,400 U	0.00%	1,560 U	0.00%
	cis-1,2-Dichloroethene	**882**	1.00%	1,400 U	0.00%	1,930 U	0.00%	1,950 U	0.00%	1,520 U	0.00%	343 U	0.00%	1,400 U	0.00%	1,560 U	0.00%
	Tetrachloroethene	**2,950**	3.35%	**28,100**	7.21%	**28,900**	9.90%	**12,700**	3.19%	**12,100**	3.94%	**1,940**	1.88%	**4,720**	3.68%	**10,700**	6.68%
	Trichloroethene	**8,330**	9.47%	**298,000**	**76.42%**	**130,000**	**44.51%**	**52,100**	**13.07%**	**169,000**	**54.96%**	**12,200**	**11.84%**	**35,800**	**27.90%**	**40,200**	25.10%
SVOCs	1,2,4-Trichlorobenzene	**451**	0.51%	**360**	0.09%	**468**	0.16%	**345**	0.09%	**623**	0.20%	**387**	0.38%	**626**	0.49%	**700**	0.44%
	1,2-Dichlorobenzene	**767**	0.87%	**704**	0.18%	**559**	0.19%	**1,250**	0.31%	**336**	0.11%	**834**	0.81%	**882**	0.69%	**275**	0.17%
	1,3-Dichlorobenzene	**10.3**	0.01%	**10.6**	0.00%	**12.2**	0.00%	**11.8**	0.00%	**13.7**	0.00%	**10.5**	0.01%	**14.7**	0.01%	**14.5**	0.01%
	1,4-Dichlorobenzene	**26.2**	0.03%	**17.8**	0.00%	**24.3**	0.01%	**38.1**	0.01%	**18.5**	0.01%	**23.9**	0.02%	**27.8**	0.02%	**19.3**	0.01%
	bis(2-Ethylhexyl)phthalate	**123**	0.14%	**88.4**	0.02%	**134**	0.05%	**51.0**	0.01%	**40.3**	0.01%	**54.3**	0.05%	**82.0**	0.06%	**29.6**	0.02%
	Hexachlorobenzene	**7,110**	8.08%	**6,930**	1.78%	**7,100**	2.43%	**7,260**	1.82%	**9,050**	2.94%	**7,760**	7.53%	**10,400**	8.10%	**12,400**	7.74%
	Hexachlorobutadiene	**13,600**	15.46%	**23,000**	5.90%	**14,600**	5.00%	**10,100**	2.53%	**37,200**	12.10%	**13,800**	13.39%	**52,900**	41.22%	**67,800**	**42.33%**
	Hexachlorocyclopentadiene	**176**	0.20%	5.0 U	0.00%	**163**	0.06%	**212**	0.05%	**195**	0.06%	**202**	0.20%	**193**	0.15%	**209**	0.13%
	Hexachloroethane	**35,200**	**40.01%**	**30,200**	7.74%	**21,600**	7.40%	**55,600**	13.95%	**27,200**	8.85%	**46,600**	45.21%	**20,200**	15.74%	**27,800**	17.36%
	Phenanthrene	5.0 U	0.00%	5.0 U	0.00%	5.0 U	0.00%	**10.0**	0.00%	**10.8**	0.00%	**31.8**	0.03%	**48**	0.04%	**15.0**	0.01%
	TOTAL VOC Concentration or %	30,522	34.69%	328,650	84.28%	247,400	84.71%	323,800	81.22%	232,800	75.71%	33,364	32.37%	42,950	33.47%	50,900	31.78%
	TOTAL SVOC Concentration or %	57,464	65.31%	61,311	15.72%	44,661	15.29%	74,878	18.78%	74,687	24.29%	69,704	67.63%	85,374	66.53%	109,262	68.22%
	TOTAL Concentration or %	87,986	100.00%	389,961	100.00%	292,061	100.00%	398,678	100.00%	307,487	100.00%	103,068	100.00%	128,324	100.00%	160,162	100.00%

U = The analyte was analyzed for, but was not detected. Value shown is the sample reporting limit.

Bold = The concentration above the reporting limit or the highest percentage of a compound at each location

Table 4.1
DNAPL Recoverability Testing Summary (Procedures 1 through 4)
Detrex Corporation
Ashtabula, Ohio

	Well ID	Procedure One - Peristaltic Pump (DNAPL or Groundwater Only)						Procedure Two - Dual Pumps / Applied Vacuum					Procedure Three - Total Fluids / Applied Vacuum						Procedure Four - Recovery Well Groups / Total Fluids Initial Applied Vacuum				
		DNAPL Recovered (Gallons)	Test Duration (Minutes)	DNAPL Recharge Rate (GPM) [test average]	Water Recovered (Gallons)	Test Duration (Minutes)	Total Fluids Recovered (Gallons)	DNAPL Recovered (Gallons)	DNAPL Recharge Rate (GPM) [test average]	Water Recovered (Gallons)	Total Fluids Recovered (Gallons)	Test Duration (Minutes)	DNAPL Recovered (Gallons)	DNAPL Recharge Rate (GPM) [test average]	DNAPL / Water Emulsion Recovered (Gallons)	Water Recovered (Gallons)	Total Fluids Recovered (Gallons)	Test Duration (Minutes)	DNAPL Recovered (Gallons)	DNAPL Recharge Rate (GPM) [test average]	Water Recovered (Gallons)	Total Fluids Recovered (Gallons)	Test Duration (Minutes)
North Area	RW-15	**3.43**	65	0.010	25.71	420	29.15	0.00	0.0006	24.57	24.57	600	2.00	0.006	1.50	25.00	28.50	420	0.50	0.010	48.00	48.50	570
North Area	RW-16	2.08	45	0.000	40.12	430	42.20	0.13	0.000	18.10	18.23	270	**0.844 to 3.00**	0.010 0.003	2.72	37.50	44.06	570	0.00	0.004	50.00	50.00	570
North Area	RW-17	7.99	250	0.002	28.66	360	36.65	2.62	0.005	20.39	23.01	360	4.50	0.008	0.49	23.00	27.99	435	**5.00 to 8.30**	0.020	28.00	41.30	570
South Area	RW-18	NT[1]	NT	NT	18.10	270	18.10	NT	NT	NT	NT	NT	0.00	N/A[2]	0.00	54.00	54.00	565	**0.00**	0.000	22.00	22.00	475
South Area	RW-19	3.27	60	0.003	19.95	200	23.22	NT	NT	NT	NT	NT	**5.50**	0.002	0.25	21.00	26.75	745	4.00	0.010	24.00	28.00	475
South Area	RW-20	NT	NT	NT	23.74	240	23.74	NT	NT	NT	NT	NT	0.00	N/A[2]	0.00	32.00	32.00	525	**0.00**	0.0004	19.00	19.00	475

NT[1] - Indicates Recovery Well was Not Tested
Bold - indicates highest DNAPL recovery rate for an individual recovery well based on all procedures
- Shading indicates highest DNAPL recovery rate for a given procedure based on all recovery wells
N/A[2] - Indicates Not Applicable

APPENDICES

APPENDIX A
PHOTOGRAPHS

PHOTOGRAPHIC LOG

Client Name: Detrex Corporation	Site Location: 1100 State Road, Ashtabula, Ohio	Project No. 13816274.11401

Photo No.	Date:
GP-50	10/10/12

Description:

Geoprobe boring GP-50

Photo No.	Date:
GP-51	10/10/12

Description:

Geoprobe boring GP-51

1

URS

PHOTOGRAPHIC LOG

Client Name: Detrex Corporation	Site Location: 1100 State Road, Ashtabula, Ohio	Project No. 13816274.11401

Photo No.	Date:	
GP-52	10/11/12	

Description:

Geoprobe boring
GP-52

Photo No.	Date:	
GP-53	10/11/12	

Description:

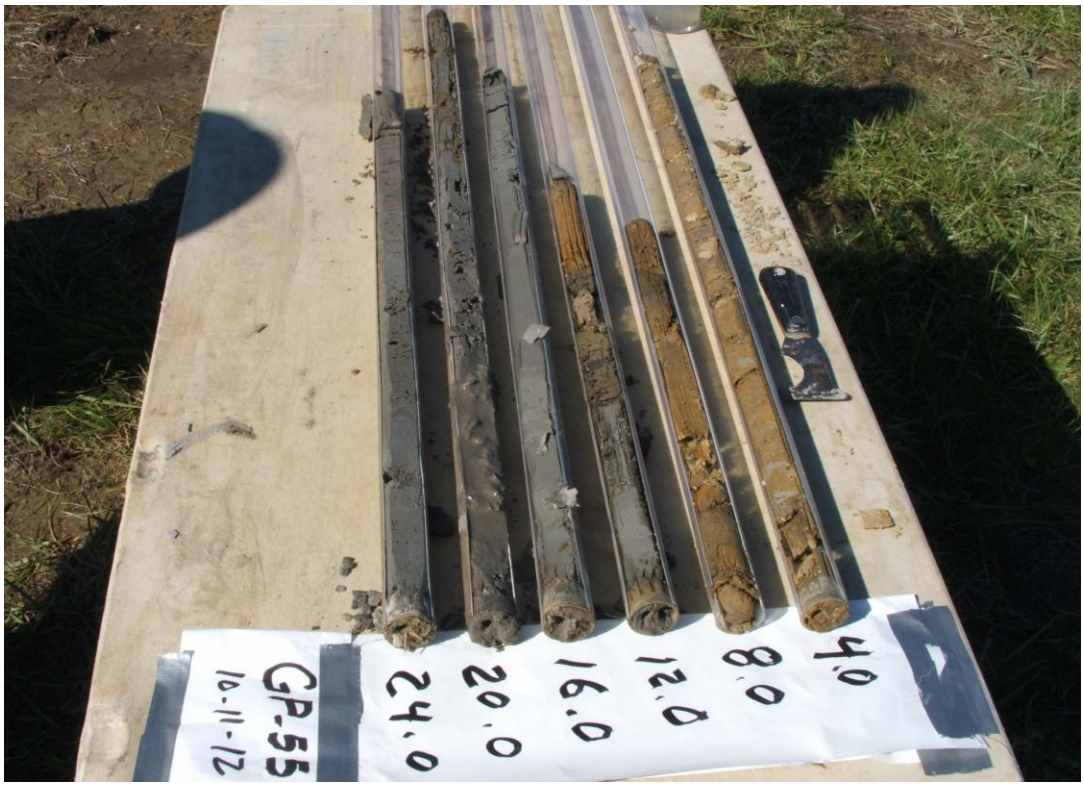
Geoprobe boring
GP-53

23

URS	PHOTOGRAPHIC LOG	
Client Name: **Detrex Corporation**	**Site Location:** 1100 State Road, Ashtabula, Ohio	**Project No.** 13816274.11401

4

Photo No. GP-54	**Date:** 10/11/12	
Description: Geoprobe boring GP-54		

Photo No. GP-55	**Date:** 10/11/12	
Description: Geoprobe boring GP-55		

5

URS	PHOTOGRAPHIC LOG	
Client Name: **Detrex Corporation**	**Site Location:** 1100 State Road, Ashtabula, Ohio	**Project No.** 13816274.11401

6

Photo No. GP-56	**Date:** 10/11/12
Description: Geoprobe boring GP-56	

Photo No. GP-57	**Date:** 10/11/12
Description: Geoprobe boring GP-57	

URS

PHOTOGRAPHIC LOG

Client Name: Detrex Corporation	Site Location: 1100 State Road, Ashtabula, Ohio	Project No. 13816274.11401

Photo No.	Date:
GP-58	10/11/12

Description:

Geoprobe boring GP-58

Photo No.	Date:
GP-59	10/11/12

Description:

Geoprobe boring GP-59

URS

PHOTOGRAPHIC LOG

Client Name: Detrex Corporation	Site Location: 1100 State Road, Ashtabula, Ohio	Project No. 13816274.11401

Photo No.	Date:
GP-60	10/12/12

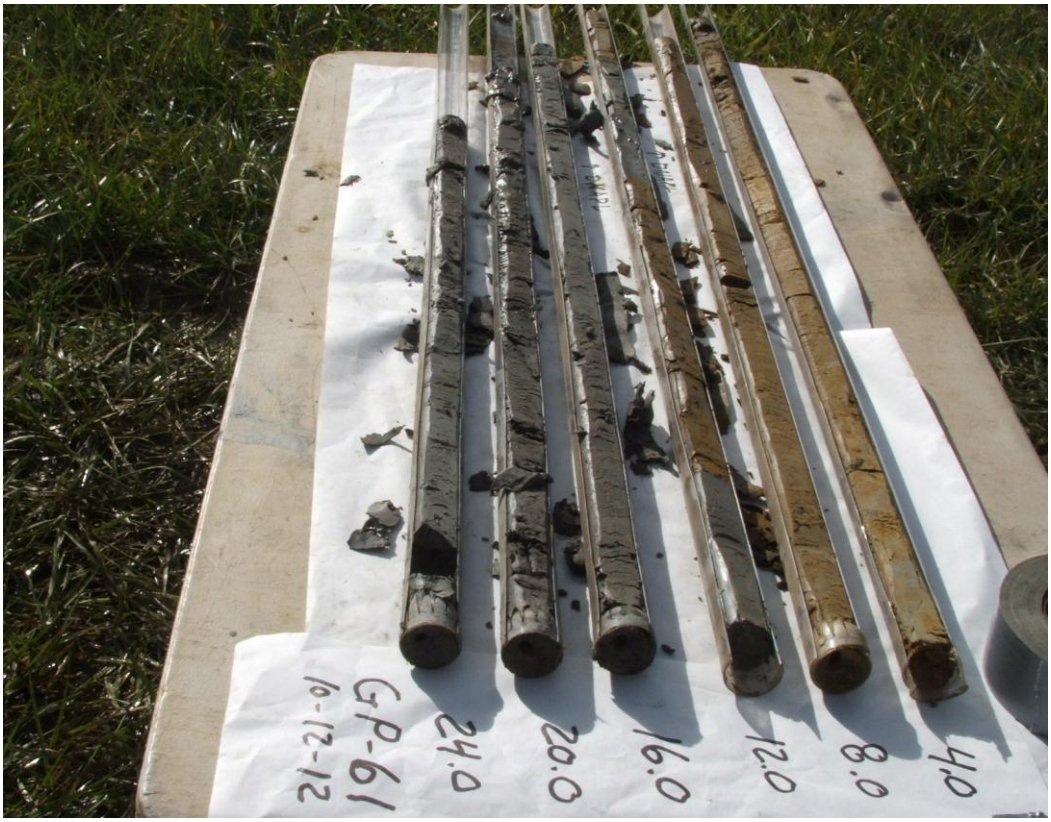
Description:

Geoprobe boring GP-60

Photo No.	Date:
GP-61	10/12/12

Description:

Geoprobe boring GP-61



URS

PHOTOGRAPHIC LOG

Client Name: Detrex Corporation	Site Location: 1100 State Road, Ashtabula, Ohio	Project No. 13816274.11401

Photo No.	Date:
GP-62	10/12/12

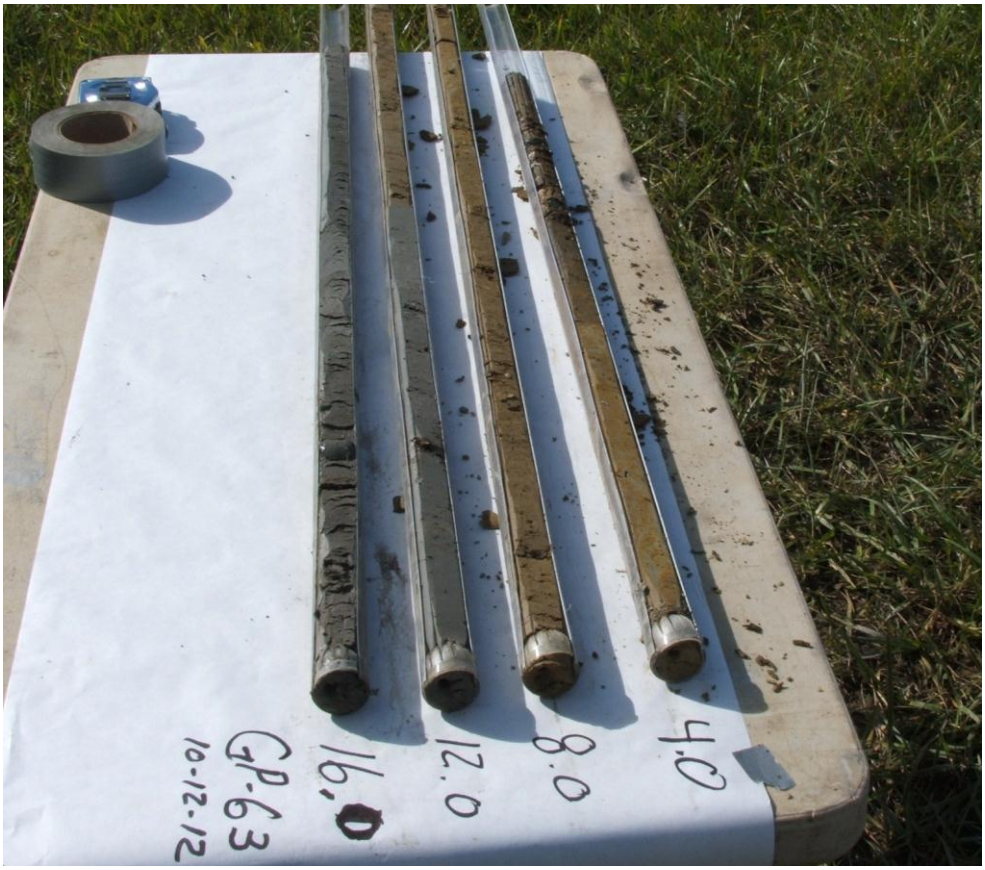
Description:

Geoprobe boring GP-62

Photo No.	Date:
GP-63	10/12/12

Description:

Geoprobe boring GP-63



URS

PHOTOGRAPHIC LOG

Client Name: Detrex Corporation	Site Location: 1100 State Road, Ashtabula, Ohio	Project No. 13816274.11401

Photo No.	Date:
GP-64	10/12/12

Description:

Geoprobe boring GP-64

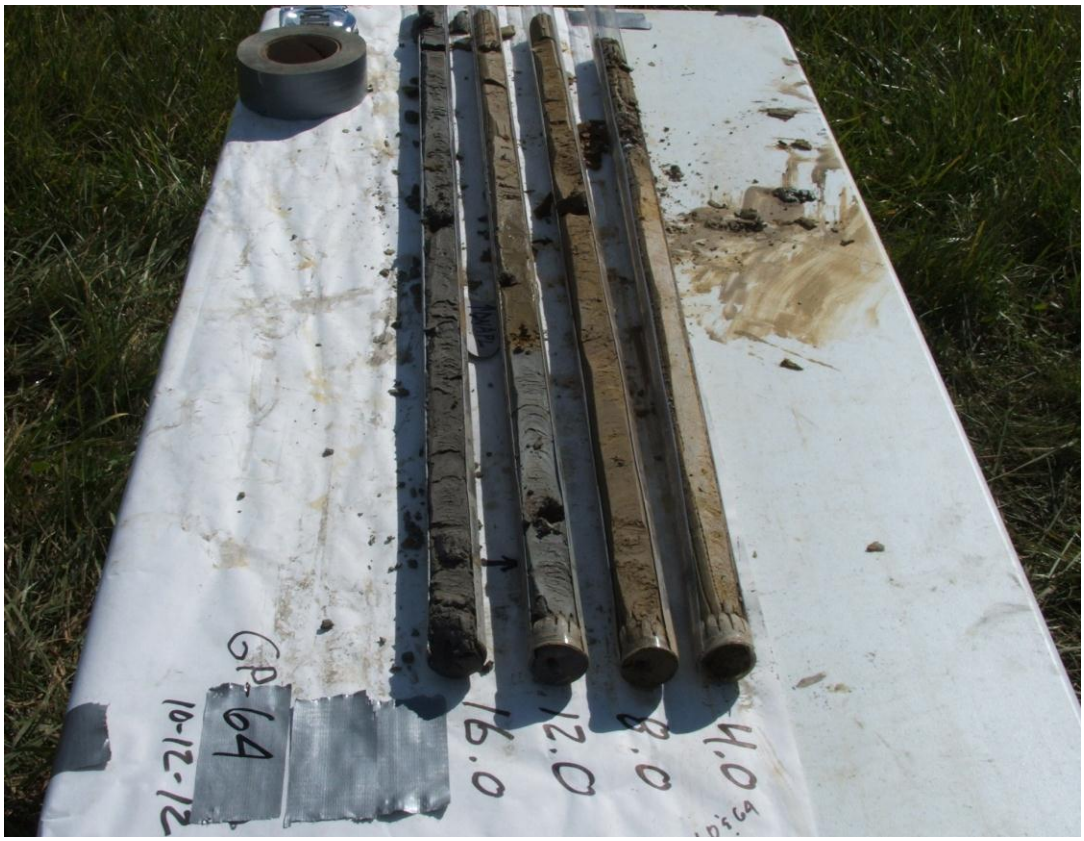
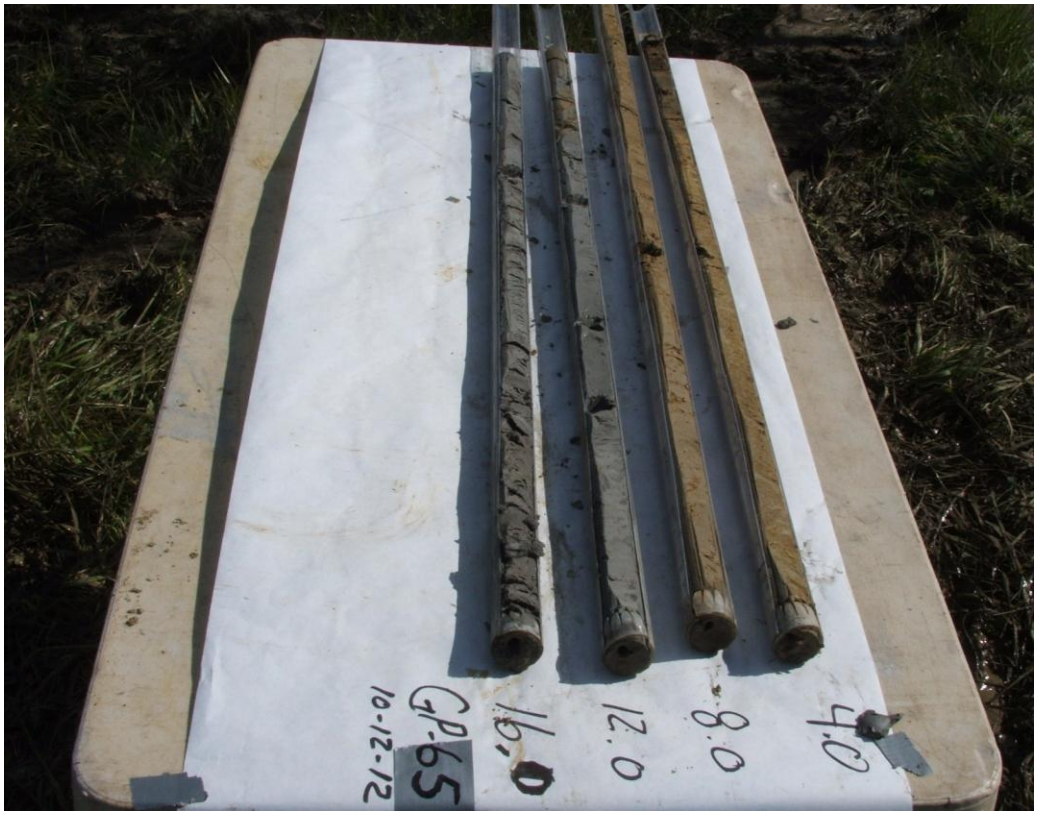


Photo No.	Date:
GP-65	10/12/12

Description:

Geoprobe boring GP-65



URS

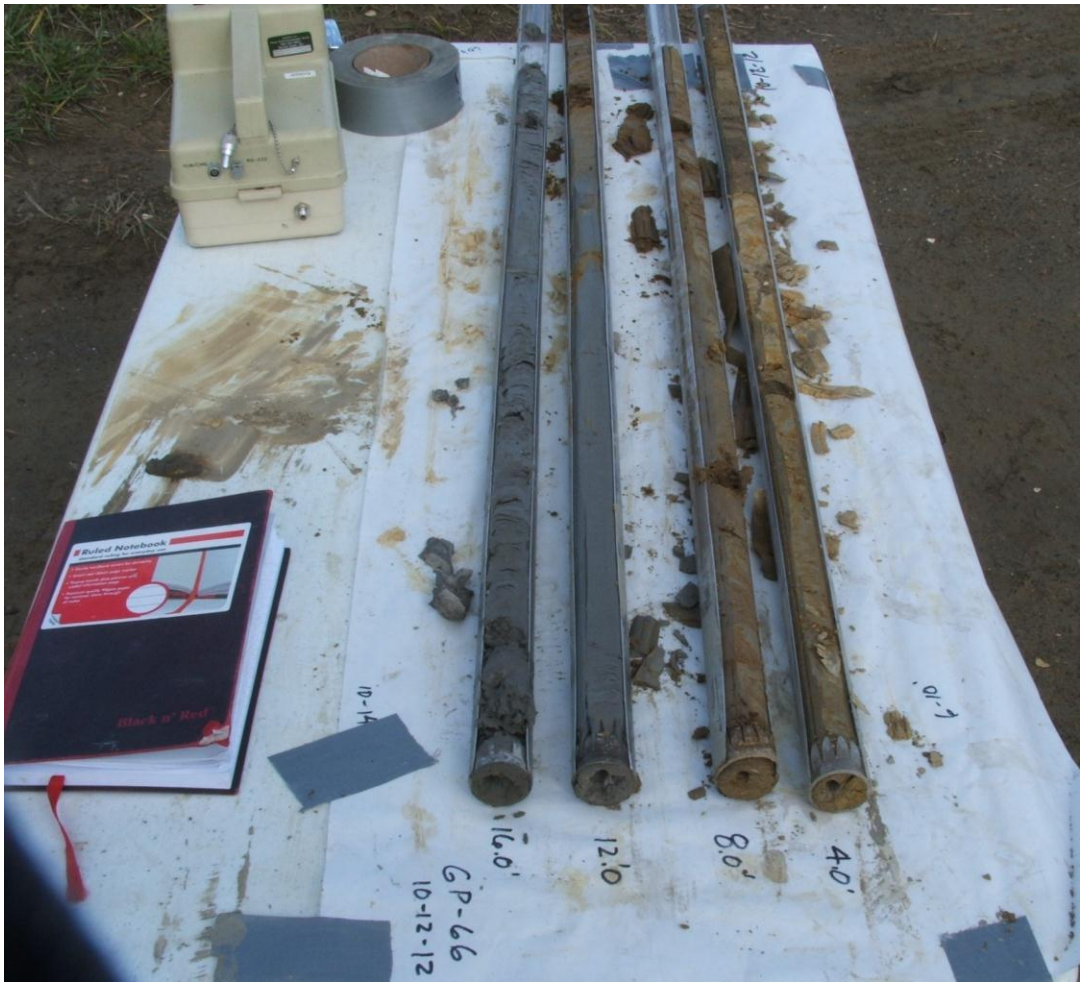
PHOTOGRAPHIC LOG

Client Name: Detrex Corporation	Site Location: 1100 State Road, Ashtabula, Ohio	Project No. 13816274.11401

Photo No.	Date:
GP-66	10/12/12

Description:

Geoprobe boring
GP-66



7

URS

PHOTOGRAPHIC LOG

Client Name: Detrex Corporation	Site Location: 1100 State Road, Ashtabula, Ohio	Project No. 13816274.11401

Photo No.	Date:
MP-15A	10/16/12

Description:

Monitoring Point MP-15A

Photo No.	Date:
MP-15B	10/16/12

Description:

Monitoring Point MP-15B

URS

PHOTOGRAPHIC LOG

Client Name: Detrex Corporation	Site Location: 1100 State Road, Ashtabula, Ohio	Project No. 13816274.11401

Photo No.	Date:
MP-15C	10/16/12

Description:

Monitoring Point MP-15C

Photo No.	Date:
MP-15D	10/17/12

Description:

Monitoring Point MP-15D

URS

PHOTOGRAPHIC LOG

Client Name: Detrex Corporation	Site Location: 1100 State Road, Ashtabula, Ohio	Project No. 13816274.11401

Photo No.	Date:
MP-16A	10/17/12

Description:

Monitoring Point MP-16A

Photo No.	Date:
MP-16B	10/17/12

Description:

Monitoring Point MP-16B

URS

PHOTOGRAPHIC LOG

Client Name: Detrex Corporation	Site Location: 1100 State Road, Ashtabula, Ohio	Project No. 13816274.11401

Photo No.	Date:
MP-16C	10/17/12

Description:

Monitoring Point MP-16C

Photo No.	Date:
MP-18A	10/19/12

Description:

Monitoring Point MP-18A

URS

PHOTOGRAPHIC LOG

Client Name: Detrex Corporation	Site Location: 1100 State Road, Ashtabula, Ohio	Project No. 13816274.11401

Photo No.	Date:	
MP-18B	10/19/12	

Description:

Monitoring Point MP-18B

Photo No.	Date:	
MP-19A	10/18/12	

Description:

Monitoring Point MP-19A

URS

PHOTOGRAPHIC LOG

Client Name: Detrex Corporation	Site Location: 1100 State Road, Ashtabula, Ohio	Project No. 13816274.11401

Photo No.	Date:	
MP-19B	10/18/12	
Description: Monitoring Point MP-19B		

Photo No.	Date:	
MP-20A	10/18/12	
Description: Monitoring Point MP-20A		

URS

PHOTOGRAPHIC LOG

Client Name: Detrex Corporation	Site Location: 1100 State Road, Ashtabula, Ohio	Project No. 13816274.11401

Photo No.	Date:
MP-20B	10/19/12

Description:

Monitoring Point MP-20B

Photo No.	Date:
MP-20C	10/19/12

Description:

Monitoring Point MP-20C

URS

PHOTOGRAPHIC LOG

Client Name: Detrex Corporation	Site Location: 1100 State Road, Ashtabula, Ohio	Project No. 13816274.11401

Photo No.	Date:
MP-20D	10/23/12

Description:

Monitoring Point MP-20D

Photo No.	Date:
MP-20E	10/23/12

Description:

Monitoring Point MP-20E

URS

PHOTOGRAPHIC LOG

Client Name: Detrex Corporation	Site Location: 1100 State Road, Ashtabula, Ohio	Project No. 13816274.11401

Photo No.	Date:
MP-20F	10/23/12

Description:

Monitoring Point MP-20F

Photo No.	Date:
MP-20G	10/24/12

Description:

Monitoring Point MP-20G

1

URS

PHOTOGRAPHIC LOG

Client Name: Detrex Corporation	Site Location: 1100 State Road, Ashtabula, Ohio	Project No. 13816274.11401

Photo No. P-1 | **Date:** 10/18/12

Description:

Geoprobe – Installing MP-19A

Photo No. P-2 | **Date:** 10/16/12

Description:

Sonic Rig – Installing RW20

URS

PHOTOGRAPHIC LOG

Client Name: Detrex Corporation	Site Location: 1100 State Road, Ashtabula, Ohio	Project No. 13816274.11401

Photo No. P-3

Date: 11/8/12

Description:

RW15,RW16,RW17
Northern Area

Photo No. P-4

Date: 11/8/12

Description:

RW18,RW19,RW20
Southern Area

URS

PHOTOGRAPHIC LOG

Client Name: Detrex Corporation	Site Location: 1100 State Road, Ashtabula, Ohio	Project No. 13816274.11401

Photo No.	Date:
P-5	2/5/13

Description:

DPE trailer

Photo No.	Date:
P-6	

Description:

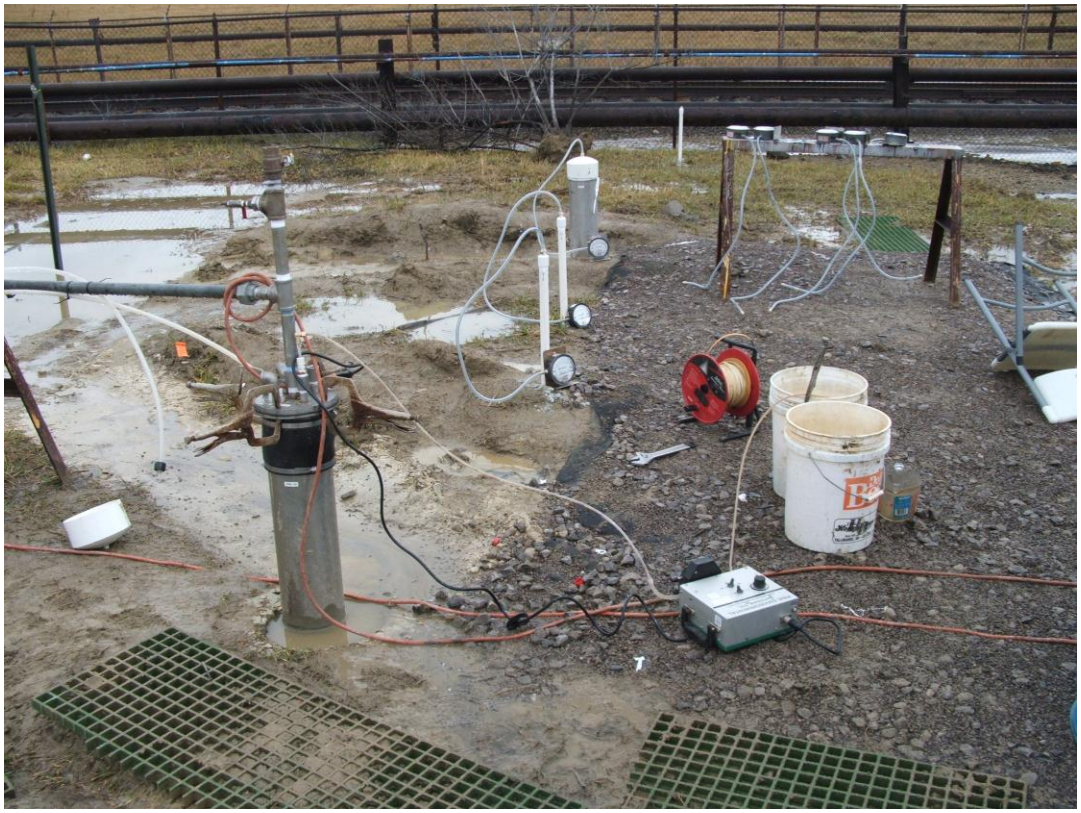
Procedure One
DNAPL or Water only

URS

PHOTOGRAPHIC LOG

Client Name: Detrex Corporation	Site Location: 1100 State Road, Ashtabula, Ohio	Project No. 13816274.11401

Photo No.	Date:	
P-7	2/5/13	
Description: RW17 Procedure Two Dual pumps		

Photo No.	Date:	
P-8	12/19/12	
Description: RW16 Procedure Three Total fluids		

URS

PHOTOGRAPHIC LOG

Client Name: Detrex Corporation	Site Location: 1100 State Road, Ashtabula, Ohio	Project No. 13816274.11401

Photo No.	Date:
P-9	1/16/13

Description:

RW15, RW16,RW17
Procedure Four
Well Group
w/ Applied Vacuum

1

APPENDIX B

RECOVERY WELL AND GEOPROBE BORING LOGS / WELL CONSTRUCTION DIAGRAMS

Project: Detrex DNAPL Recoverability Study
Project Location: 1100 State Road, Ashtabula, OH
Project Number: 13816274.11401

Key to Log of Boring

Elevation, feet	Depth, feet	SAMPLES: Type	SAMPLES: Number	SAMPLES: Recovery, inches	SAMPLES: Headspace, ppm	Graphic Log	MATERIAL DESCRIPTION	Well Details	FIELD NOTES AND WELL DETAILS
1	2	3	4	5	6	7	8	9	10

COLUMN DESCRIPTIONS

1 **Elevation:** Elevation in feet referenced to mean sea level (MSL) or site datum.

2 **Depth:** Depth in feet below the ground surface.

3 **Sample Type:** Type of soil sample collected at depth interval shown; sampler symbols are explained below.

4 **Sample Number:** Sample identification number.

5 **Recovery:** Amount of material recovered in sampler, expressed in inches of sampled interval; NA indicates data not available.

6 **Headspace, ppm** MiniRae 11.7eV Photo-Ionization Detector (PID) reading in headspace of sealable plastic bag after several minutes of vapor accumulation.

7 **Graphic Log:** Graphic depiction of subsurface material encountered; typical symbols are explained below.

8 **Material Description:** Description of material encountered; may include color, moisture, grain size, and density/consistency.

9 **Well Details:** Schematic of piezometer or well installation; materials are listed alongside well schematic; graphic symbols are explained below.

10 **Field Notes:** Comments regarding drilling or sampling made by driller or field personnel. Details about well construction materials and depths placed.

ATD At Time of Drilling
NA Not Applicable
BGS Below Ground Surface
WBZ Water Bearing Zone

TYPICAL MATERIAL GRAPHIC SYMBOLS

FILL
SILT
TOPSOIL
SILT and CLAY
Sandy SILT
CLAY

TYPICAL WELL GRAPHIC SYMBOLS

6-inch SCH 5 Stainless Steel Riser in Cement / Bentonite Grout
6-inch SCH 5 Stainless Steel 0.010-inch Slotted Screen in #7 Filter Sand
6-inch SCH 5 Stainless Steel Riser in Bentonite Chips
Native Soil Under Well
6-inch SCH 5 Stainless Steel Riser in #7 Filter Sand

TYPICAL SAMPLER GRAPHIC SYMBOLS

Geoprobe Dual Tube Sampler
Interval Re-sampled with Sonic Drill 4-inch Soil Core
Sonic Drill Bit

OTHER GRAPHIC SYMBOLS

First water encountered at time of drilling and sampling (ATD)
Static water level measured using electronic water level indicator
Minor change in material properties within a lithologic stratum

GENERAL NOTES

1. Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive; actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.

2. Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

URS

Report: GEOPROBE_WELL_KEY; File: K:\PROJECTS\D\DETREX\13816274\DOCS\LOGS\BORING LOGS\RWS 2012.GPJ; 1/31/2013

Project: Detrex DNAPL Recoverability Study **Project Location: 1100 State Road, Ashtabula, OH** **Project Number: 13816274.11401**	**Log of Recovery Well RW-15 (GP-58)** Sheet 1 of 2

Date(s) Drilled	**10/11/12**	Logged By	**C. Siegel**	Checked By	**M. Schmidt**
Drilling Method	**Direct Push / Sonic**	Drill Bit Size/Type	**2-inch Dual Tube Sampler and 12" 12-inch Sonic Barrel**	Total Depth of Borehole	**28.0 feet**
Drill Rig Type	**Geoprobe 6620 DT / Versa Drill Versa-Sonic**	Drilling Contractor	**Frontz Drilling**	Surface Elevation	**636.29 (ft msl)**
Groundwater Level and Date Measured	**Approximately 19.0' bgs ATD and 4.62' on 11/20/12**	Sampling Method(s)	**4' Dual Tube Sampler**	Backfill	**Refer to Well Detail**
Boring Location	**Refer to Site Plan (GP-58 drilled with Geoprobe and RW-15 Installed with Sonic Drill Rig in same location)**				

Elevation, feet	Depth, feet	SAMPLES Type	Number	Recovery, inches	Headspace, ppm	Graphic Log	MATERIAL DESCRIPTION	Well Details	FIELD NOTES AND WELL DETAILS
636	0						Stiff, moist, brown, CLAY with silt and sand [FILL]		
	1								
634	2		DP-1	38	N/A				
	3								Cement Grout (10% Bentonite)
632	4								
	5								
630	6		DP-2	37	N/A				
	7								
628	8						Medium dense, wet, brown, SILT with clay [FILL]		
	9								6-inch SCH 5 Stainless Steel Riser
626	10		DP-3	39	N/A				
	11								
624	12						Medium stiff to stiff, moist, gray, CLAY layered with silty CLAY with silt partings [LACUSTRINE]		
	13								
622	14		DP-4	42	N/A				
	15								

URS

Report: GEOPROBE_WELL_INSTALL; File: K:\PROJECTS\D\DETREX\13816274\DOCS\LOGS\BORING LOGS\RWS 2012.GPJ; 1/31/2013

Project: Detrex DNAPL Recoverability Study
Project Location: 1100 State Road, Ashtabula, OH
Project Number: 13816274.11401

Log of Recovery Well RW-15 (GP-58)

Elevation, feet	Depth, feet	SAMPLES Type	Number	Recovery, inches	Headspace, ppm	Graphic Log	MATERIAL DESCRIPTION	Well Details	FIELD NOTES AND WELL DETAILS
	15		DP-4	42	N/A		Medium stiff to stiff, moist, gray, CLAY layered with silty CLAY with silt partings [LACUSTRINE]		Bentonite Chips
620	16								6-inch SCH 5 Stainless Steel Riser
	17								
	18		DP-5	48	N/A				
618									
	19						Medium dense, wet, gray, SILT		#7 Filter sand
	20						Medium stiff to stiff, moist, gray, CLAY layered with silty CLAY with silt partings [LACUSTRINE]		6-inch SCH 5 Stainless Steel 0.010-Slotted Screen
616									
	21								
	22		DP-6	46	N/A				
614									
	23								Bentonite Chips
	24								
612									
	25						5-inch wet, SILT layer		
	26		DP-7	30	N/A		Stiff, moist, gray, CLAY, with silt, sand, and gravel [TILL]		Natural Soil
610									
	27								
	28						End of Boring at 28.0 ft bgs		
608									
	29								
	30								
606									
	31								
	32								
604									

Report: GEOPROBE_WELL_INSTALL; File: K:\PROJECTS\DIDETREX\13816274\DOCS\LOGS\BORING LOGS\RWS 2012.GPJ; 1/31/2013

Project: Detrex DNAPL Recoverability Study **Project Location: 1100 State Road, Ashtabula, OH** **Project Number: 13816274.11401**	**Log of Recovery Well RW-16 (GP-57)** Sheet 1 of 2

Date(s) Drilled	**10/11/12**	Logged By	**C. Siegel**	Checked By	**M. Schmidt**
Drilling Method	**Direct Push / Sonic**	Drill Bit Size/Type	**2-inch Dual Tube Sampler and 12" 12-inch Sonic Barrel**	Total Depth of Borehole	**28.0 feet**
Drill Rig Type	**Geoprobe 6620 DT / Versa Drill Versa-Sonic**	Drilling Contractor	**Frontz Drilling**	Surface Elevation	**635.81 (ft msl)**
Groundwater Level and Date Measured	**Approximately 20.0' bgs ATD and 4.25' on 11/20/12**	Sampling Method(s)	**4' Dual Tube Sampler**	Backfill	**Refer to Well Detail**
Boring Location	**Refer to Site Plan (GP-57 drilled with Geoprobe and RW-16 Drilled with Sonic Drill Rig in same location)**				

Elevation, feet	Depth, feet	SAMPLES Type	Number	Recovery, inches	Headspace, ppm	Graphic Log	MATERIAL DESCRIPTION	Well Details	FIELD NOTES AND WELL DETAILS
	0						Stiff, moist, brown, CLAY with silt and sand [FILL]		
	1								
634	2		DP-1	42	N/A				
	3								Cement Grout (10% Bentonite)
632	4								
	5								
630	6		DP-2	34	N/A				
	7								
628	8						Medium dense, wet, brown, SILT with clay [FILL]		
	9								6-inch SCH 5 Stainless Steel Riser
626	10		DP-3	50	N/A				
	11								
624	12						Medium stiff to stiff, moist, gray, CLAY layered with silty CLAY with silt partings [LACUSTRINE]		
	13								
622	14		DP-4	45	N/A				
	15								

URS

Report: GEOPROBE_WELL_INSTALL; File: K:\PROJECTS\DIDETREX\13816274\DOCS\LOGS\BORING LOGS\RWS 2012.GPJ; 1/31/2013

Project: Detrex DNAPL Recoverability Study
Project Location: 1100 State Road, Ashtabula, OH
Project Number: 13816274.11401

Log of Recovery Well RW-16 (GP-57)

Elevation, feet	Depth, feet	SAMPLES Type	Number	Recovery, inches	Headspace, ppm	Graphic Log	MATERIAL DESCRIPTION	Well Details	FIELD NOTES AND WELL DETAILS
	15		DP-4	45	N/A		Medium stiff to stiff, moist, gray, CLAY layered with silty CLAY with silt partings [LACUSTRINE]		Bentonite Chips
620	16								
	17								6-inch SCH 5 Stainless Steel Riser
618	18		DP-5	49	N/A				
	19								#7 Filter sand
616	20						Medium dense, wet, gray, SILT		6-inch SCH 5 Stainless Steel 0.010-Slotted Screen
	21						← DNAPL seep		
614	22		DP-6	46	N/A		Medium stiff to stiff, moist, gray, CLAY layered with silty CLAY with silt partings [LACUSTRINE]		
	23								Bentonite Chips
612	24								
	25								
610	26		DP-7	47	N/A		← DNAPL seep Stiff, moist, gray, CLAY, with silt, sand, and gravel [TILL]		Natural Soil
	27								
608	28						End of Boring at 28.0 ft bgs		
	29								
606	30								
	31								
604	32								

Report: GEOPROBE_WELL_INSTALL; File: K:\PROJECTS\DIDETREX\13816274\DOCS\LOGS\BORING LOGS\RWS 2012.GPJ; 1/31/2013

Project: Detrex DNAPL Recoverability Study **Project Location: 1100 State Road, Ashtabula, OH** **Project Number: 13816274.11401**	**Log of Recovery Well RW-17 (GP-59)** Sheet 1 of 2

Date(s) Drilled	**10/11/12 and 10/15/12**	Logged By	**C. Siegel / A. Heitger**	Checked By	**M. Schmidt**
Drilling Method	**Direct Push / Sonic**	Drill Bit Size/Type	**2-inch Dual Tube Sampler and 12" 12-inch Sonic Barrel**	Total Depth of Borehole	**28.0 feet**
Drill Rig Type	**Geoprobe 6620 DT / Versa Drill Versa-Sonic**	Drilling Contractor	**Frontz Drilling**	Surface Elevation	**636.10 (ft msl)**
Groundwater Level and Date Measured	**Approximately 19.5' bgs ATD and 4.10' on 11/20/12**	Sampling Method(s)	**4' Dual Tube Sampler and 4" Soil Core Sampler**	Backfill	**Refer to Well Detail**
Boring Location	**Refer to Site Plan (GP-59 drilled with Geoprobe and RW-17 Installed with Sonic Drill Rig in same location)**				

Elevation, feet	Depth, feet	SAMPLES Type	Number	Recovery, inches	Headspace, ppm	Graphic Log	MATERIAL DESCRIPTION	Well details	FIELD NOTES AND WELL DETAILS
636	0						Stiff, moist, brown, CLAY, with silt and sand [FILL]		
	1								
634	2		DP-1	40	N/A				
	3								Cement Grout (10% Bentonite)
632	4								
	5								
630	6		DP-2	47	N/A				
	7								
628	8						Medium dense, moist to wet, brown, SILT, with clay [FILL]		
	9								6-inch SCH 5 Stainless Steel Riser
626	10		DP-3	45	N/A				
	11								
624	12								
	13								
622	14		DP-4	34	N/A				
	15								

URS

Report: GEOPROBE_WELL_INSTALL; File: K:\PROJECTS\DIDETREX\13816274\DOCS\LOGS\BORING LOGS\RWS 2012.GPJ; 1/31/2013

Project: Detrex DNAPL Recoverability Study
Project Location: 1100 State Road, Ashtabula, OH
Project Number: 13816274.11401

Log of Recovery Well RW-17 (GP-59)

Elevation, feet	Depth, feet	SAMPLES Type	Number	Recovery, inches	Headspace, ppm	Graphic Log	MATERIAL DESCRIPTION	Well details	FIELD NOTES AND WELL DETAILS
	15		DP-4	34	N/A		Medium dense, moist to wet, brown, SILT, with clay [FILL]		6-inch SCH 5 Stainless Steel Riser
620	16						Medium dense, moist, to dry, orange brown and gray, sandy SILT with clay		
	17						Medium stiff, moist, gray, lean CLAY layered with silty CLAY with silt partings, trace fine sand and gravel [LACUSTRINE]		Bentonite Chips
618	18		DP-5	45	N/A		3-inch layer of wet, gray, silty SAND		
	19						with clay and silt varving		
616	20						Medium dense, wet, gray, sandy SILT with clay and alternating fine sand layers [LACUSTRINE]		#7 Filter sand
	21						DNAPL ganglia within 3-inch silt and sand layer		
614	22		DP-6	44	N/A		Medium stiff, moist, gray, varved SILT and CLAY, with fine sand [LACUSTRINE]		6-inch SCH 5 Stainless Steel 0.010-Slotted Screen
	23								
612	24						3-inch zone with DNAPL sheen		
							Medium dense, wet, gray, SILT [LACUSTRINE]		Bentonite Chips
	25								
610	26		DP-7	48	N/A				
							Stiff, moist, gray, CLAY, with silt, sand, and gravel [TILL]		Natural Soil
	27								
608	28						End of Boring at 28.0 ft bgs		
	29								
606	30								
	31								
604	32								

Report: GEOPROBE_WELL_INSTALL; File: K:\PROJECTS\DIDETREX\13816274\DOCS\LOGS\BORING LOGS\RWS 2012.GPJ; 1/31/2013

URS

Project: Detrex DNAPL Recoverability Study **Project Location: 1100 State Road, Ashtabula, OH** **Project Number: 13816274.11401**	**Log of Recovery Well RW-18 (GP-66)** Sheet 1 of 2

Date(s) Drilled	**10/12/12 and 10/17/12**	Logged By	**C. Siegel / A. Heitger**	Checked By	**M. Schmidt**
Drilling Method	**Direct Push / Sonic**	Drill Bit Size/Type	**2-inch Dual Tube Sampler and 12" 12-inch Sonic Barrel**	Total Depth of Borehole	**20.0 feet**
Drill Rig Type	**Geoprobe 6620 DT / Versa Drill Versa-Sonic**	Drilling Contractor	**Frontz Drilling**	Surface Elevation	**636.07 (ft msl)**
Groundwater Level and Date Measured	**Approximately 15.1' bgs ATD and 5.70' on 11/20/12**	Sampling Method(s)	**4' Dual Tube Sampler and 4" Soil Core Sampler**	Backfill	**Refer to Well Detail**
Boring Location	**Refer to Site Plan (GP-66 drilled with Geoprobe and RW-18 Installed with Sonic Drill Rig in same location)**				

Elevation, feet	Depth, feet	SAMPLES Type	Number	Recovery, inches	Headspace, ppm	Graphic Log	MATERIAL DESCRIPTION	Well Details	FIELD NOTES AND WELL DETAILS
636	0						Medium stiff, moist, brown, CLAY with silt, sand and grass [TOPSOIL]		
	1								
634	2		DP-1	42	N/A		Medium stiff, moist, brown and gray mottled, sandy silty CLAY		Cement Grout (10% Bentonite)
	3								
632	4								
	5								
630	6		DP-2	48	N/A		1-inch layer: loose to medium dense, wet, brown, fine to medium SAND with silt, trace DNAPL sheen		6-inch SCH 5 Stainless Steel Riser
	7						sand content increases, gray mottling decreases		
628	8						becomes stiff, sand and silt content decrease		
	9								
626	10		DP-3	41	N/A		Stiff, gray, moist to dry, lean CLAY with silt [LACUSTRINE] becomes medium stiff, with silt varving		
	11								Bentonite Chips
624	12						1-inch layer of medium dense, wet, gray, sandy SILT, trace DNAPL sheen and ganglia		
	13								#7 Filter sand
622	14		DP-4	40	N/A				6-inch SCH 5 Stainless Steel 0.010-Slotted Screen
	15								

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Project: Detrex DNAPL Recoverability Study
Project Location: 1100 State Road, Ashtabula, OH
Project Number: 13816274.11401

Log of Recovery Well RW-18 (GP-66)

Elevation, feet	Depth, feet	SAMPLES Type	Number	Recovery, inches	Headspace, ppm	Graphic Log	MATERIAL DESCRIPTION	Well Details	FIELD NOTES AND WELL DETAILS
	15		DP-4	40	N/A		Soft, wet, brown, sandy CLAY, with trace DNAPL sheen and ganglia		
620	16						Medium stiff, moist, gray, silty CLAY, with varving and fine sand seams, trace fine gravel and rock fragments		6-inch SCH 5 Stainless Steel 0.010-Slotted Screen
	17						3-inch layer of medium dense, wet, gray, sandy SILT with DNAPL in water		
							8-inch layer of medium dense to loose, wet, gray, sandy SILT		
618	18		SONIC	48	N/A		3-inch layer of alternating medium dense to medium stiff, moist, gray, SILT and CLAY with fine sand seams		
	19								Bentonite Chips
616	20						Stiff, moist, gray, silty CLAY, with fine sand and rock fragments [TILL]		
							End of Boring at 20.0 ft bgs		
	21								
614	22								
	23								
612	24								
	25								
610	26								
	27								
608	28								
	29								
606	30								
	31								
604	32								

Report: GEOPROBE_WELL_INSTALL; File: K:\PROJECTS\DIDETREX\13816274\DOCS\LOGS\BORING LOGS\RWS 2012.GPJ; 1/31/2013

Project: Detrex DNAPL Recoverability Study
Project Location: 1100 State Road, Ashtabula, OH
Project Number: 13816274.11401

Log of Recovery Well RW-19 (GP-60)

Date(s) Drilled	**10/12/12 and 10/17/12**	Logged By	**C. Siegel / A. Heitger**	Checked By	**M. Schmidt**
Drilling Method	**Direct Push / Sonic**	Drill Bit Size/Type	**2-inch Dual Tube Sampler and 12" 12-inch Sonic Barrel**	Total Depth of Borehole	**24.0 feet**
Drill Rig Type	**Geoprobe 6620 DT / Versa Drill Versa-Sonic**	Drilling Contractor	**Frontz Drilling**	Surface Elevation	**636.14 (ft msl)**
Groundwater Level and Date Measured	**Approximately 12.5' bgs ATD and 6.70' on 11/20/12**	Sampling Method(s)	**4' Dual Tube Sampler and 4" Soil Core Sampler**	Backfill	**Refer to Well Detail**
Boring Location	**Refer to Site Plan (GP-60 drilled with Geoprobe and RW-19 Drilled with Sonic Drill Rig in same location)**				

Elevation, feet	Depth, feet	SAMPLES Type	Number	Recovery, inches	Headspace, ppm	Graphic Log	MATERIAL DESCRIPTION	Well details	FIELD NOTES AND WELL DETAILS
636	0						Medium stiff, moist, brown, CLAY, with silt, sand, and gravel [FILL]		
	1								
							Stiff, moist, brown, CLAY, with silt		
634	2		DP-1	45	N/A				Cement Grout (10% Bentonite)
	3								
632	4								
	5						moisture decreases, with gray mottling, fine sand, trace wet sand seams, trace iron and manganese staining		
630	6		DP-2	39	N/A		Medium dense, wet, brown and gray, clayey sandy SILT, trace DNAPL sheen		6-inch SCH 5 Stainless Steel Riser
	7						1/2-inch seam, medium dense, wet, brown, fine to medium silty SAND, with trace DNAPL sheen		
628	8						1/2-inch seam, medium dense, wet, brown, fine to medium silty SAND, with trace DNAPL sheen 1-inch layer, medium dense, wet, brown, fine to medium silty SAND, with trace DNAPL sheen and ganglia		
	9						1-inch layer, medium dense, wet, brown, fine to medium silty SAND, trace DNAPL sheen		Bentonite Chips
626	10		DP-3	44	N/A				
	11						Medium dense, moist to dry, clayey sandy SILT with dry, orange brown, silty Sand		#7 Filter sand
624	12						Medium stiff, moist, gray, lean CLAY, with silt varving, trace fine sand and gravel [LACUSTRINE] 1/2-inch seam wet, gray, silty SAND, trace DNAPL sheen		
	13								
622	14		DP-4	41	N/A		1-inch layer, wet, gray, sandy SILT, with trace DNAPL sheen and ganglia		6-inch SCH 5 Stainless Steel 0.010-Slotted Screen
	15								

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Project: Detrex DNAPL Recoverability Study
Project Location: 1100 State Road, Ashtabula, OH
Project Number: 13816274.11401

Log of Recovery Well RW-19 (GP-60)

Elevation, feet	Depth, feet	SAMPLES Type	Number	Recovery, inches	Headspace, ppm	Graphic Log	MATERIAL DESCRIPTION	Well details	FIELD NOTES AND WELL DETAILS
	15		DP-4	41	N/A		Soft, wet, brown, sandy CLAY, with DNAPL ganglia and seeps, DNAPL sheen within the gray Clay		6-inch SCH 5 Stainless Steel 0.010-Slotted Screen
620	16						1/2-inch seam, medium dense, moist, gray, fine SAND		#7 Filter sand
	17						1/2-inch seam, medium dense, moist, gray, fine SAND		Bentonite Chips
618	18		DP-5	39	N/A				
	19						wet, gray, SILT		
616	20								
	21								Natural Soil
							Stiff, moist, gray, CLAY, with silt, sand, and gravel [TILL]		
614	22		DP-6	49	N/A				
	23								
612	24						End of Boring at 24.0 ft bgs		
	25								
610	26								
	27								
608	28								
	29								
606	30								
	31								
604	32								

Report: GEOPROBE_WELL_INSTALL; File: K:\PROJECTS\DIDETREX\13816274\DOCS\LOGS\BORING LOGS\RWS 2012.GPJ; 1/31/2013

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Project: Detrex DNAPL Recoverability Study
Project Location: 1100 State Road, Ashtabula, OH
Project Number: 13816274.11401

Log of Recovery Well RW-20 (GP-64)

Date(s) Drilled	**10/12/12 and 10/16/12-10/17/12**	Logged By	**C. Siegel / A. Heitger**	Checked By	**M. Schmidt**
Drilling Method	**Direct Push / Sonic**	Drill Bit Size/Type	**2-inch Dual Tube Sampler and 12" 12-inch Sonic Barrel**	Total Depth of Borehole	**18.0 feet**
Drill Rig Type	**Geoprobe 6620 DT / Versa Drill Versa-Sonic**	Drilling Contractor	**Frontz Drilling**	Surface Elevation	**635.89 (ft msl)**
Groundwater Level and Date Measured	**Approximately 14.5' bgs ATD and 6.15' on 11/20/12**	Sampling Method(s)	**4' Dual Tube Sampler and 4" Soil Core Sampler**	Backfill	**Refer to Well Detail**
Boring Location	**Refer to Site Plan (GP-64 drilled with Geoprobe and RW-20 Drilled with Sonic Drill Rig in same location)**				

Elevation, feet	Depth, feet	SAMPLES Type	Number	Recovery, inches	Headspace, ppm	Graphic Log	MATERIAL DESCRIPTION	Well Details	FIELD NOTES AND WELL DETAILS
	0						Medium stiff, moist, brown, CLAY with silt, sand, gravel and grass [TOPSOIL]		
	1						Stiff, moist, brown, CLAY, with silt, sand, and gravel [FILL]		
634	2		DP-1	36	N/A		Medium stiff to stiff, moist, brown and gray mottled, silty CLAY		Cement Grout (10% Bentonite)
	3								
632	4								
	5						becomes medium stiff, orange brown and gray, with sand and fine to medium angular gravel		6-inch SCH 5 Stainless Steel Riser
630	6		DP-2	38	N/A				
	7						Medium stiff to stiff, moist, brown and gray, lean CLAY with silt, trace dark gray shale fragments		
628	8						with reddish brown mottling, silt content increases, moisture decreases		
							1/8-inch dry, reddish brown fine to medium SAND		
	9						silt content decreases		Bentonite Chips
626	10		DP-3	39	N/A				
	11						Soft to medium stiff, moist, gray, lean CLAY with silt, trace fine sand [LACUSTRINE]		#7 Filter sand
624	12						medium dense, wet, gray, fine silty SAND, trace DNAPL ganglia and sheen		
							1-inch layer of medium dense, wet, gray, fine silty SAND		
	13						1-inch layer of medium dense, wet, gray, fine silty SAND		6-inch SCH 5 Stainless Steel 0.010-Slotted Screen
622	14		DP-4	41	N/A		Medium dense, wet, gray, SILT with sand seams		
							with trace DNAPL sheen and ganglia		
	15								

URS

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Project: Detrex DNAPL Recoverability Study
Project Location: 1100 State Road, Ashtabula, OH
Project Number: 13816274.11401

Log of Recovery Well RW-20 (GP-64)

Elevation, feet	Depth, feet	SAMPLES Type	Number	Recovery, inches	Headspace, ppm	Graphic Log	MATERIAL DESCRIPTION	Well Details	FIELD NOTES AND WELL DETAILS
	15		DP-4	41	N/A		Medium stiff, moist, gray, alternating SILT and CLAY with fine sand seams		6-inch SCH 5 Stainless Steel 0.010-Slotted Screen
620	16						1-inch layer of medium dense, wet, gray, fine SAND, trace DNAPL sheen		
	17		SONIC	22	N/A		Soft to medium stiff, moist, lean CLAY with silt varving, trace fine sand 1-inch layer of medium dense, wet, gray, fine SAND		#7 Filter sand
618	18						1/2 inch seam of medium dense, wet, gray, fine SAND		Bentonite Chips
							End of Boring at 18.0 ft bgs		
	19								
616	20								
	21								
614	22								
	23								
612	24								
	25								
610	26								
	27								
608	28								
	29								
606	30								
	31								
604	32								

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APPENDIX C
DAILY REPORTS / FIELD SHEETS

DETREX - Ashtabula, Ohio **RW15** **DATE:** **11/27/2012**

DNAPL Recoverability Testing - Procedure #1 **Water** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Cum. Time	Cum. Time	Well Diameter (inches)	Well Depth (feet)	Depth Water (feet)	Depth DNAPL (feet)	Water Rate (ml/min)	DNAPL Rate (ml/min)	Water Purged (ml)	DNAPL Purged (ml)	COMMENT	Delta Water (feet)	Delta DNAPL (feet)
RW-15	11/27	8:35	0:00	0:00	6	26.0	4.25	24.5	0	N/A	0	N/A	Initial, Intake at 22.5-ft, start pumping, no silt	0.0	0.0
		8:36	0:01	1.00			4.40		275		275			(0.2)	
		8:40	0:04	5.00			4.60		200		1075			(0.4)	
		8:50	0:10	15.00			5.00		200		2075			(0.8)	
		9:05	0:15	30.00									large pump failed 1/2-in tubing		
		9:20	0:15	45.00			5.60		300		2075		restart with small pump 1/4-in tubing	(1.4)	
		9:35	0:15	60.00			5.75	24.45	250		5825			(1.5)	0.1
		9:50	0:15	75.00			6.45							(2.2)	
		10:05	0:15	90.00			7.15							(2.9)	
		10:20	0:15	105.00			7.80							(3.6)	
		10:35	0:15	120.00			8.45	24.4	250		20825			(4.2)	0.1
		10:50	0:15	135.00			9.45							(5.2)	
		11:05	0:15	150.00			10.20							(6.0)	
		11:20	0:15	165.00			10.65							(6.4)	
		11:35	0:15	180.00			11.15	24.4	250		35825			(6.9)	0.1
		11:50	0:15	195.00			11.85							(7.6)	
		12:05	0:15	210.00			12.50							(8.3)	
		12:20	0:15	225.00			13.25							(9.0)	
		12:35	0:15	240.00			13.90	24.45	250		50825		RW-16 - Depth to Water at 4.2-ft	(9.7)	0.1
		12:50	0:15	255.00			14.50							(10.3)	
		13:05	0:15	270.00			15.00	24.4	275		59075			(10.8)	0.1
		13:20	0:15	285.00			15.65							(11.4)	
		13:35	0:15	300.00			16.40	24.4	275		67325			(12.2)	0.1
		13:50	0:15	315.00			16.70							(12.5)	
		14:05	0:15	330.00			17.20	24.4	250		74825			(13.0)	0.1
		14:20	0:15	345.00			18.00							(13.8)	
		14:35	0:15	360.00			18.20							(14.0)	
		14:50	0:15	375.00			18.55	24.4	250		86075			(14.3)	0.1
		15:05	0:15	390.00			18.95						RW-16 - Depth to Water at 4.3-ft	(14.7)	
		15:20	0:15	405.00			19.60							(15.4)	
		15:35	0:15	420.00			19.90	24.4	250		**97325**		Stop pumpimg	(15.7)	0.1
		15:35	0:00	420.00			19.90	24.4	0				Begin recharge	(15.7)	0.1
		15:50	0:15	435.00			19.80		0					(15.6)	
		16:05	0:15	450.00			19.60	24.4	0					(15.4)	0.1
		16:20	0:15	465.00			19.45	24.4	0					(15.2)	0.1
		16:35	0:15	480.00			19.30	24.4	0					(15.1)	0.1
		16:50	0:15	495.00			19.20	24.4	0				Final, no silt at Bottom of well	(15.0)	0.1
	11/28	8:15	15:25	1420.00			10.5	23.8	0				next day	(6.3)	0.7
	11/29	15:40	7:25	3305.00			6.8	23.7	0					(2.5)	0.8
	11/30	8:33	16:53	4318.00			6.6	23.9	0					(2.4)	0.6

Note:
(0.2) = Decrease Thickness
(0.2 = Increase Thickness

Note: Barometer reading at Initial 29.66 at Final 29.64, Cloudy 32-40^{0}F
RW-16 - Initial depth to Water at 4.15-ft and depth to DNAPL at 25.0-ft , Final depth to Water at 4.2-ft and depth to DNAPL at 25.0-ft
Water in well from 19.9-4.25=15.65ft*1.63gal/ft=25.51gal*3785ml/gal=**96553ml**

Rate H2O Entry = 2 mL/min

DETREX - Ashtabula, Ohio **RW-16** **DATE:** **11/29/2012**

DNAPL Recoverability Testing - Procedure #1 **Water** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time	Well Diameter (inches)	Well Depth (feet)	Depth Water (feet)	Depth DNAPL (feet)	Water Rate (ml/min)	DNAPL Rate (ml/min)	Water Purged (ml)	DNAPL Purged (ml)	COMMENT	Delta Water (feet)	Delta DNAPL (feet)
RW-16	11/29	8:25	0:00	0:00	6	26.0	5.1	24.9	0	N/A	0	N/A	Initial, Intake at 22-ft, start pumping	0.0	0.0
		8:30	0:05	5.00			5.45		375		1875			(0.4)	
		8:35	0:05	10.00			5.7		375		3750			(0.6)	
		8:50	0:15	25.00			6.45		375		5625			(1.4)	
		9:05	0:15	40.00			7.25							(2.2)	
		9:20	0:15	55.00			8.05							(3.0)	
		9:35	0:15	70.00			8.8	24.8	375		22500		MP-16A depth to water at 6.8-ft	(3.7)	0.1
		9:50	0:15	85.00			9.45							(4.4)	
		10:05	0:15	100.00			10.2							(5.1)	
		10:20	0:15	115.00			10.85							(5.8)	
		10:35	0:15	130.00			11.5	24.8	375		45000		MP-16A depth to water at 7.5-ft	(6.4)	0.1
		10:50	0:15	145.00			12.05							(7.0)	
		11:05	0:15	160.00			12.55							(7.5)	
		11:20	0:15	175.00			13.1							(8.0)	
		11:35	0:15	190.00			13.75	24.7	375		67500		MP-16A depth to water at 8.2-ft	(8.7)	0.2
		11:50	0:15	205.00			14.15							(9.1)	
		12:05	0:15	220.00			14.6							(9.5)	
		12:20	0:15	235.00			15.05							(10.0)	
		12:35	0:15	250.00			15.45	24.65	375		90000		MP-16A depth to water at 8.75-ft	(10.4)	0.3
		12:50	0:15	265.00			15.8							(10.7)	
		13:05	0:15	280.00			16.2							(11.1)	
		13:20	0:15	295.00			16.6							(11.5)	
		13:35	0:15	310.00			16.9	24.65	375		112500		MP-16A depth to water at 9.35-ft	(11.8)	0.3
		13:50	0:15	325.00			17.2							(12.1)	
		14:05	0:15	340.00			17.45							(12.4)	
		14:20	0:15	355.00			17.8							(12.7)	
		14:35	0:15	370.00			18.0	24.65	375		135000		MP-16A depth to water at 9.95-ft	(12.9)	0.3
		14:50	0:15	385.00			18.25							(13.2)	
		15:05	0:15	400.00			18.55							(13.5)	
		15:35	0:30	430.00			18.9	24.5	375		151875		Stop pumpimg	(13.8)	0.4
		15:35	0:00	430.00			18.9	24.5	0				Begin recharge	(13.8)	0.4
		15:50	0:15	445.00			18.3		0					(13.2)	
		16:35	0:45	490.00			17.8	24.5	0				Final, 0.2-ft silt at Bottom of well	(12.7)	0.4
	11/30	8:37	16:02	1452.00			6.5	24.50	0						

Note:
(0.2) = Decrease Thickness
(0.2 = Increase Thickness

Note: Barometer reading at Initial 29.66 at Final 29.66, Partly Cloudy, 32-43°F
MP-16A - Initial depth to Water at 6.2-ft and depth to DNAPL at 18.15-ft
Water in 6-inch well from 18.9-5.1=13.8ft*1.63gal/ft=22.49gal*3785ml/gal=**85140ml**

Rate H2O Entry = 155 mL/min

DETREX - Ashtabula, Ohio **RW-17** **DATE:** **11/28/2012**

DNAPL Recoverability Testing - Procedure #1 **Water** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time	Well Diameter (inches)	Well Depth (feet)	Depth Water (feet)	Depth DNAPL (feet)	Water Rate (ml/min)	DNAPL Rate (ml/min)	Water Purged (ml)	DNAPL Purged (ml)	COMMENT	Delta Water (feet)	Delta DNAPL (feet)
RW-17	11/28	8:50	0:00	0:00	6	26.0	4.0	23.25	0	N/A	0	N/A	Initial, Intake at 23-ft, start pumping, no silt	0.0	0.0
		8:55	0:05	5.00			4.3		400		2000		small pump 1/4-in tubing	(0.3)	
		9:00	0:05	10.00			4.45		300		3500			(0.5)	
		9:05	0:05	15.00			4.8	23.25	300		5000			(0.8)	0.0
		9:20	0:15	30.00			5.5							(1.5)	
		9:35	0:15	45.00			6.2							(2.2)	
		9:50	0:15	60.00			6.9	23.25	300		18500		MP-17A depth to water at 5.8	(2.9)	0.0
		10:05	0:15	75.00			7.55							(3.6)	
		10:20	0:15	90.00			8.25	23.25	300		27500			(4.3)	0.0
		10:35	0:15	105.00			8.9							(4.9)	
		10:50	0:15	120.00			9.55	23.25	300		36500		MP-17A depth to water at 5.95	(5.6)	0.0
		11:05	0:15	135.00			10.2							(6.2)	
		11:20	0:15	150.00			10.8	23.25	300		45500		MP-17A depth to water at 6.05	(6.8)	0.0
		11:35	0:15	165.00			11.5							(7.5)	
		11:50	0:15	180.00			11.85						MP-17A depth to water at 6.2	(7.9)	
		12:05	0:15	195.00			12.45							(8.5)	
		12:20	0:15	210.00			13.0	23.0	300		63500		MP-17A depth to water at 6.5	(9.0)	0.3
		12:35	0:15	225.00			13.45							(9.5)	
		12:50	0:15	240.00			13.8	22.8	300		72500			(9.8)	0.4
		13:05	0:15	255.00			14.35						MP-17A depth to water at 6.6	(10.4)	
		13:20	0:15	270.00			14.8							(10.8)	
		13:35	0:15	285.00			15.25							(11.3)	
		13:50	0:15	300.00			15.75							(11.8)	
		14:05	0:15	315.00			16.05	22.6	300		95000			(12.1)	0.6
		14:20	0:15	330.00			16.55							(12.6)	
		14:35	0:15	345.00			16.8	22.5	300		104000		MP-17A depth to water at 7.2	(12.8)	0.8
		14:50	0:15	360.00			17.2	22.5	300		108500		Stop pumpimg	(13.2)	0.8
		14:50	0:00	360.00			17.2		0				Begin recharge	(13.2)	
		15:05	0:15	375.00			16.95		0					(13.0)	
		15:20	0:15	390.00			16.65	22.5	0					(12.7)	0.8
		15:35	0:15	405.00			16.45		0					(12.5)	
		15:50	0:15	420.00			16.25		0					(12.3)	
		16:05	0:15	435.00			16.0		0					(12.0)	
		16:20	0:15	450.00			15.75	22.5	0					(11.8)	0.8
		16:35	0:15	465.00			15.5		0					(11.5)	
		16:50	0:15	480.00			15.25	22.5	0				Final, no silt at Bottom of well	(11.3)	0.8
	11/29	8:15	15:25	1405.00			8.50	21.8	0				next day	(4.5)	1.5
	11/29	15:40	7:25	1850.00			7.45	21.9	0				next day	(3.5)	1.4
	11/29	8:40	17:00	2870.00			6.45	22.1	0				next day	(2.5)	1.2
													next day		

Note:
(0.2) = Decrease Thickness
(0.2 = Increase Thickness

Note: Barometer reading at Initial 29.63 at Final 29.62, Cloudy, light snow 25-32°F
MP-17A - Initial depth to Water at 5.7-ft and depth to DNAPL at 21.0-ft
Water in well from 17.2-4.0=13.2ft*1.63gal/ft=21.52gal*3785ml/gal=**81438ml**

Rate H2O Entry = 75 mL/min

DETREX - Ashtabula, Ohio **RW-18** **DATE:** **11/28/2012**

DNAPL Recoverability Testing - Procedure #1 **Water** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time	Well Diameter (inches)	Well Depth (feet)	Depth Water (feet)	Depth DNAPL (feet)	Water Rate (ml/min)	DNAPL Rate (ml/min)	Water Purged (ml)	DNAPL Purged (ml)	COMMENT	Delta Water (feet)	Delta DNAPL (feet)
RW-18	11/28	12:10	0:00	0	6	21.95	5.5	0.00	0	N/A	0	N/A	Initial, Intake at 23-ft, start pumping, no silt	0.0	0.0
		12:15	0:05	5			5.8		350		1750		small pump 1/4-in tubing	(0.3)	
		12:20	0:05	10			6.0	0.00	250		3000			(0.5)	
		12:25	0:05	15			6.2							(0.7)	0.0
		12:40	0:15	30			6.65	0.00	275		8500			(1.2)	
		12:55	0:15	45			7.25							(1.8)	
		13:10	0:15	60			7.7	0.00	250		16000		MP-18A depth to water at 6.35, MP-19B at 7.8	(2.2)	0.0
		13:25	0:15	75			8.35							(2.9)	
		13:40	0:15	90			8.75	0.00	250		23500			(3.3)	0.0
		13:55	0:15	105			9.15							(3.7)	
		14:10	0:15	120			9.6	0.00	250		31000		MP-18A depth to water at 7.3, MP-19B at 8.25	(4.1)	0.0
		14:25	0:15	135			10.0							(4.5)	
		14:40	0:15	150			10.4							(4.9)	0.0
		14:55	0:15	165			10.8							(5.3)	
		15:10	0:15	180			11.15	0.00	250		46000		MP-18A depth to water at 8.05, MP-19B at 8.5	(5.7)	
		15:25	0:15	195			11.6							(6.1)	
		15:40	0:15	210			12.1							(6.6)	0.0
		15:55	0:15	225			12.5							(7.0)	
		16:10	0:15	240			12.95	0.00	250		61000			(7.5)	0.0
		16:25	0:15	255			13.35						MP-18A depth to water at 8.8, MP-19B at 9.2	(7.9)	
		16:40	0:15	270			13.7	0.0	250		68500		Stop pumpimg	(8.2)	
		16:40	0:00	270			13.7	0.0	0				Begin recharge	(8.2)	
		16:45	0:05	275			13.65	0.0	0					(8.2)	0.0
		16:55	0:10	285			13.6	0.00	0				Final, no silt at Bottom of well	(8.1)	
	11/29	10:10	17:15	1320			7.00	0.0					next day	(1.5)	0.0
	11/30	8:43	22:33	2673			6.6	0.0						(1.1)	0.0

Note:
(0.2) = Decrease Thickness
(0.2 = Increase Thickness

Note: Barometer reading at Initial 29.62 at Final 29.62, Cloudy, light snow 25-32°F
MP-18A - Initial depth to Water at 5.7-ft and depth to DNAPL at ND=none detected
MP-19B - Initial depth to Water at 7.5-ft and depth to DNAPL at 13.05-ft
Water in well from 13.7-5.5=8.2ft*1.63gal/ft=13.37gal*3785ml/gal=**50590ml**

Rate H2O Entry = 66 mL/min

DETREX - Ashtabula, Ohio **RW-19** **DATE:** **11/29/2012**

DNAPL Recoverability Testing - Procedure #1 **Water** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time	Well Diameter (inches)	Well Depth (feet)	Depth Water (feet)	Depth DNAPL (feet)	Water Rate (ml/min)	DNAPL Rate (ml/min)	Water Purged (ml)	DNAPL Purged (ml)	COMMENT	Delta Water (feet)	Delta DNAPL (feet)
RW-19	11/29	13:00	0:00	0	6	20.0	6.6	18.65	0	N/A	0	N/A	Initial, Intake at 18.5-ft, start pumping, no silt	0.0	0.0
		13:05	0:05	5			6.85		500		2500		small pump 1/4-in tubing	(0.3)	
		13:10	0:05	10			7.2		350		4250			(0.6)	
		13:15	0:05	15			7.5	18.6	375		6125			(0.9)	0.0
		13:25	0:10	25			8.1							(1.5)	
		13:40	0:15	40			8.95							(2.4)	
		13:55	0:15	55			9.85	18.6	375		21125		MP-19A depth to water at 7.9, DNAPL at 11.3	(3.3)	0.0
		14:10	0:15	70			10.75							(4.2)	
		14:25	0:15	85			11.7							(5.1)	
		14:40	0:15	100			12.6							(6.0)	
		14:55	0:15	115			13.4	18.6	375		43625		MP-19A depth to water at 8.05, DNAPL at 11.3	(6.8)	0.0
		15:10	0:15	130			14.25							(7.7)	
		15:25	0:15	145			14.95							(8.4)	
		15:55	0:30	175			16.65	18.55	375		66125		MP-19A depth to water at 8.1, DNAPL at 11.55	(10.1)	0.1
		16:10	0:15	190			17.4	18.5						(10.8)	0.1
		16:15	0:05	195			17.5	18.5						(10.9)	0.1
		16:20	0:05	200			17.6	18.6	375		**75500**		Stop pumpimg, intaking water with DNAPL	(11.0)	0.0
														6.6	
		16:20	0:00	200			17.6	18.6	0				Begin recharge	(11.0)	0.0
		16:30	0:10	210			17.5	18.6	0					(10.9)	0.0
		16:40	0:10	220			17.35	18.5	0				Final, no silt at Bottom of well	(10.8)	0.1
	11/30	8:45	16:05	1185			13.15	18.2	0				next day		

Note:
(0.2) = Decrease Thickness
(0.2 = Increase Thickness

Rate H2O Entry = 38 mL/min

Note: Barometer reading at Initial 29.66 at Final 29.66, Cloudy, light snow 25-32 °F
MP-19A - Initial depth to Water at 7.85-ft and depth to DNAPL at 11.3-ft
Water in well from 17.6-6.6=11.0ft*1.63gal/ft=17.93gal*3785ml/gal= **67865ml**

DETREX - Ashtabula, Ohio **RW-20** **DATE:** **11/29/2012**

DNAPL Recoverability Testing - Procedure #1 **Water** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time	Well Diameter (inches)	Well Depth (feet)	Depth Water (feet)	Depth DNAPL (feet)	Water Rate (ml/min)	DNAPL Rate (ml/min)	Water Purged (ml)	DNAPL Purged (ml)	COMMENT	Delta Water (feet)	Delta DNAPL (feet)
RW-20	11/29	8:55	0:00	0:00	6	20.0	5.9	20.00	0	N/A	0	N/A	Initial, Intake at 18.8-ft, start pumping, no silt	0.0	0.0
		9:00	0:05	5.00			6.2		350		1750		small pump 1/4-in tubing	(0.3)	
		9:05	0:05	10.00			6.5							(0.6)	
		9:10	0:05	15.00			6.8	20.00	375		5500			(0.9)	0.0
		9:25	0:15	30.00			7.65							(1.8)	
		9:40	0:15	45.00			8.65							(2.8)	
		9:55	0:15	60.00			9.6	20.00	375		22375		MP-20A depth to water at 6.75-ft	(3.7)	0.0
		10:10	0:15	75.00			10.45							(4.6)	
		10:25	0:15	90.00			11.5							(5.6)	
		10:40	0:15	105.00			12.45							(6.6)	
		10:55	0:15	120.00			13.3	20.0	375		44875		MP-20A depth to water at 7.15-ft	(7.4)	0.0
		11:10	0:15	135.00			14.25							(8.4)	
		11:25	0:15	150.00			14.85							(9.0)	
		11:40	0:15	165.00			15.25							(9.4)	
		11:55	0:15	180.00			15.7	20.0	375		67375		MP-20A depth to water at 7.55-ft	(9.8)	0.0
		12:10	0:15	195.00			16.25							(10.4)	
		12:25	0:15	210.00			16.9	20.0	375		78625			(11.0)	0.0
		12:40	0:15	225.00			17.4							(11.5)	
		12:55	0:15	240.00			17.9	20.0	375		**89875**		Stop pumpimg, MP-20A DTW at 7.75-ft	(12.0)	0.0
		12:55	0:00	240.00			17.9	20.0	0				Begin recharge	(12.0)	0.0
		13:00	0:05	245.00			17.9		0					(12.0)	
		13:10	0:10	255.00			17.85		0					(12.0)	
		13:25	0:15	270.00			17.75		0					(11.9)	
		13:40	0:15	285.00			17.65		0					(11.8)	
		13:55	0:15	300.00			17.6		0					(11.7)	
		14:10	0:15	315.00			17.55		0					(11.7)	
		14:40	0:30	345.00			17.4		0					(11.5)	
		15:10	0:30	375.00			17.25		0					(11.4)	
		16:10	1:00	435.00			16.95		0					(11.1)	
		16:40	0:30	465.00			16.85	20.0	0				Final, no silt at Bottom of well	(11.0)	0.0
	11/30	8:48	16:08	1433.00			12.8	20.0	0				DNAPL layer at bottom of well	(6.9)	0.0

Note:
(0.2) = Decrease Thickness
(0.2 = Increase Thickness

Note: Barometer reading at Initial 29.66 at Final 29.66, Cloudy, light snow 25-32 °F
MP-20A - Initial depth to Water at 6.65-ft and depth to DNAPL at ND=none detected
Water in well from 17.9-5.9=12.0ft*1.63gal/ft=19.56gal*3785ml/gal=**74034ml**

Rate H2O Entry = 66 mL/min

DETREX - Ashtabula, Ohio **RW15** **DATE:** **11/30/2012**

DNAPL Recoverability Testing - Procedure #1 **DNAPL** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time [min]	Well Diameter (inches)	Well Depth (feet)	Depth Water (feet)	Depth DNAPL (feet)	Water Rate (ml/min)	DNAPL Rate (ml/min)	Water Purged (ml)	DNAPL Purged (ml)	COMMENT	Delta Water (feet)	Delta DNAPL (feet)
RW-15	11/30	9:40	0:00	0	6	26.0	6.6	23.9	N/A	0	N/A	0	Initial, Intake at 25.6-ft, start pumping	0.00	0.00
		9:45	0:05	5			6.8	23.9		200		1000	small pump 1/4-in tubing, no silt	(0.20)	0.00
		9:50	0:05	10			6.8	24.0						(0.20)	(0.10)
		9:55	0:05	15			6.95	24.2		200		3000		(0.35)	(0.30)
		10:00	0:05	20			7.15	24.3						(0.55)	(0.40)
		10:15	0:15	35			7.7	24.8		200		7000		(1.10)	(0.90)
		10:30	0:15	50			8.4	25.3					RW-15A - DTW at 5.75-ft, DNAPL at 18.75-ft	(1.80)	(1.40)
		10:45	0:15	65			8.4	25.6		200		**13000**	Stop pumping, in taking water	(1.80)	(1.70)
		10:45	0:00	65			8.4	25.6		0			Begin recharge	(1.80)	(1.70)
		11:00	0:15	80			8.4	25.6		0				(1.80)	(1.70)
		11:15	0:15	95			8.4	25.6		0				(1.80)	(1.70)
		11:30	0:15	110			8.4	25.55		0				(1.80)	(1.65)
		11:45	0:15	125			8.3	25.5		0				(1.70)	(1.60)
		12:00	0:15	140			8.3	25.5		0				(1.70)	(1.60)
		12:15	0:15	155			8.3	25.5		0				(1.70)	(1.60)
		12:40	0:25	180			8.25	25.5		0				(1.65)	(1.60)
		14:30	1:50	290			8.0	25.5		0			no silt bottom of well	(1.40)	(1.60)

Note:
(0.2) = Decrease Thickness
(0.2 = Increase Thickness

Rate DNAPL Entry = 39 mL/min

0.010 gpm

Note: Barometer reading at Initial 29.55 at Final 29.55, Cloudy 35-42°F
MP-15A - Initial depth to Water at 5.75-ft and depth to DNAPL at 18.9
DNAPL in well from 26.0-23.9=2.1ft*1.63gal/ft=3.42gal*3785ml/gal=12956ml
Intake at 25.6-ft DNAPL volume in well, recoverable, 25.6-23.9=1.7ft*1.63gal/ft=2.77gal*3785ml/gal=**10488ml**

DETREX - Ashtabula, Ohio **RW16** **DATE:** **11/30/2012**

DNAPL Recoverability Testing - Procedure #1 **DNAPL** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time [min]	Well Diameter (inches)	Well Depth (feet)	Depth Water (feet)	Depth DNAPL (feet)	Water Rate (ml/min)	DNAPL Rate (ml/min)	Water Purged (ml)	DNAPL Purged (ml)	COMMENT
RW-16	11/30	14:20	0:00	0	6	26.0	6.5	24.50	N/A	0	N/A	0	Initial, Intake at 25.8-ft, start pumping
		14:25	0:05	5			6.6	24.60		200		1000	small pump 1/4-in tubing, 0.2-ft silt
		14:30	0:05	10			6.7	24.80		200		2000	
		14:40	0:10	20			6.8	25.00		200		3000	
		14:45	0:05	25			7.0	25.25					
		15:00	0:15	40			7.15	25.70		200		7000	RW-16A - DTW at 8.65-ft, DNAPL at 21.45-ft
		15:05	0:05	45			7.2	25.85		175		**7875**	Stop pumping, intaking water
		15:05	0:00	45			7.2	25.85					Begin recharge
		15:10	0:05	50			7.2	25.70		0			
		15:15	0:05	55			7.1	25.70		0			
		15:25	0:10	65			7.1	25.65		0			0.2-ft silt at Bottom of well

Delta Water (feet)	Delta DNAPL (feet)
0.0	0.0
(0.1)	(0.1)
(0.2)	(0.3)
(0.3)	(0.5)
(0.5)	(0.8)
(0.7)	(1.2)
(0.7)	(1.4)
(0.7)	(1.4)
(0.7)	(1.2)
(0.6)	(1.2)
(0.6)	(1.2)

Note:
(0.2) = Decrease Thickness
(0.2 = Increase Thickness

Rate DNAPL Entry = -3 mL/min

0.00 gpm

Note: Barometer reading at Initial 29.55 at Final 29.55, Cloudy 35-42°F
MP-16A - Initial depth to Water at 8.6-ft and depth to DNAPL at 21.4-ft
DNAPL in well from 26.0-24.5=1.5ft*1.63gal/ft=2.45gal*3785ml/gal=9254ml
Intake at 25.8-ft DNAPL volume in well, recoverable, 25.8-24.5=1.3ft*1.63gal/ft=2.12gal*3785ml/gal=**8020ml**

DETREX - Ashtabula, Ohio **RW17** **DATE:** **11/30/2012**

DNAPL Recoverability Testing - Procedure #1 **DNAPL** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time [min]	Well Diameter (inches)	Well Depth (feet)	Depth Water (feet)	Depth DNAPL (feet)	Water Rate (ml/min)	DNAPL Rate (ml/min)	Water Purged (ml)	DNAPL Purged (ml)	COMMENT	Delta Water (feet)	Delta DNAPL (feet)
RW-17	11/30	10:00	0:00	0	6	26.0	6.45	22.1	N/A	0	N/A	0	Initial, Intake at 25.8-ft, start pumping	0.0	0.0
		10:05	0:05	5			6.5	22.2		200		1000	small pump 1/4-in tubing, 0.2-ft silt	(0.0)	(0.1)
		10:10	0:05	10			6.7	22.35						(0.3)	(0.3)
		10:15	0:05	15			6.8	22.5						(0.4)	(0.4)
		10:20	0:05	20			7.0	22.65		200		4000		(0.6)	(0.5)
		10:35	0:15	35			7.25	23.0		200		7000	MP-17A - DTW at 6.65-ft, DNAPL at 21.2-ft	(0.8)	(0.9)
		10:50	0:15	50			7.6	23.35						(1.2)	(1.3)
		11:05	0:15	65			7.8	23.5		175		12250	intaking air bubbles	(1.4)	(1.4)
		11:20	0:30	80			8.0	23.7						(1.6)	(1.6)
		11:35	0:15	95			8.2	23.9						(1.8)	(1.8)
		11:50	0:15	110			8.3	24.0		125		17875	MP-17A - DTW at 6.65-ft, DNAPL at 21.35-ft	(1.9)	(1.9)
		12:05	0:15	125			8.45	24.15						(2.0)	(2.1)
		12:20	0:15	140			8.5	24.3		100		20875		(2.1)	(2.2)
		12:35	0:15	155			8.65	24.45						(2.2)	(2.4)
		12:50	0:15	170			8.75	24.6		100		23875	MP-17A - DTW at 6.8-ft, DNAPL at 21.3-ft	(2.3)	(2.5)
		13:05	0:15	185			8.85	24.7						(2.4)	(2.6)
		13:20	0:15	200			8.95	24.85		100		26875		(2.5)	(2.8)
		13:35	0:15	215			9.0	24.95		75		28000		(2.6)	(2.9)
		13:50	0:15	230			9.1	25.05		50		28750		(2.6)	(3.0)
		14:10	0:20	250			9.15	25.25		75		**30250**	Stop pumping, intaking air back from discharge	(2.7)	(3.2)
		14:10	0:00	250			9.15	25.25		0			Begin recharge	(2.7)	(3.2)
		14:20	0:10	260			9.2	25.2		0				(2.7)	(3.1)
		14:35	0:15	275			9.2	25.2		0				(2.8)	(3.1)
		14:50	0:15	290			9.0	25.15		0				(2.6)	(3.1)
		17:05	2:15	425			8.9	25.15		0				(2.5)	(3.1)
		17:20	0:15	440			8.85	25.15		0			0.2-ft silt	(2.4)	(3.1)

Note:
(0.2) = Decrease Thickness
(0.2 = Increase Thickness

Rate DNAPL Entry = 9 mL/min

0.002 gpm

Note: Barometer reading at Initial 29.55 at Final 29.55, Cloudy 35-42°F
MP-17A - Initial depth to Water at 6.65-ft and depth to DNAPL at 21.3
DNAPL in well from 26.0-22.1=3.9ft*2.0gal/ft=7.8gal*3785ml/gal=29523ml
Intake at 25.8-ft DNAPL volume in well, recoverable, 25.8-22.1=3.7ft*2.0gal/ft=7.4gal*3785ml/gal=**28009ml**

DETREX - Ashtabula, Ohio **RW19** **DATE:** **11/30/2012**

DNAPL Recoverability Testing - Procedure #1 **DNAPL** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time [min]	Well Diameter (inches)	Well Depth (feet)	Depth Water (feet)	Depth DNAPL (feet)	Water Rate (ml/min)	DNAPL Rate (ml/min)	Water Purged (ml)	DNAPL Purged (ml)	COMMENT	Delta Water (feet)	Delta DNAPL (feet)
RW-19	11/30	12:40	0:00	0	6	20.0	12.4	18.1	N/A	0	N/A	0	Initial, Intake at 19.8-ft, start pumping	0.0	0.0
		12:45	0:05	5			12.6	18.3		200		1000	small pump 1/4-in tubing, no silt	(0.2)	(0.2)
		12:50	0:05	10			12.7	18.40		175		1875		(0.3)	(0.3)
		12:55	0:05	15			12.9	18.6		175		4500		(0.4)	(0.5)
		13:05	0:10	25			13.1	18.85						(0.7)	(0.8)
		13:15	0:10	35			13.40	19.2		175		8000	RW-19A - DTW at 8.45-ft, DNAPL at 11.85-ft	(1.0)	(1.1)
		13:30	0:15	50			13.8	19.55					RW-19B - DTW at 8.0-ft, DNAPL at 14.8-ft	(1.4)	(1.5)
		13:40	0:10	60			14.1	19.8		175		**12375**	Stop pumping, intaking water	(1.7)	(1.7)
		13:40	0:00	60			14.1	19.8		0			Begin recharge	(1.7)	(1.7)
		13:55	0:15	75			14.0	19.8		0				(1.6)	(1.7)
		14:10	0:15	90			14.0	19.8		0				(1.6)	(1.7)
		14:40	0:30	120			13.90	19.70		0				(1.5)	(1.6)
		17:10	2:30	270			13.8	19.8		0			no silt at bottom of well	(1.4)	(1.7)

Note:
(0.2) = Decrease Thickness
(0.2 = Increase Thickness

Rate DNAPL Entry = **11 mL/min**

0.003 gpm

Note: Barometer reading at Initial 29.55 at Final 29.55, Cloudy 35-42oF
MP-19A - Initial depth to Water at 8.85-ft and depth to DNAPL at 11.85-ft
MP-19B - Initial depth to Water at 8.05-ft and depth to DNAPL at 14.8-ft
DNAPL in well from 20.0-18.1=1.9ft*1.63gal/ft=3.10gal*3785ml/gal=11722ml
Intake at 19.8-ft DNAPL volume in well, recoverable, 19.8-18.1=1.7ft*1.63gal/ft=2.77gal*3785ml/gal=10488ml

DETREX - Ashtabula, Ohio 7 December 2012

URS representative arrived onsite for the DNAPL Recoverability Testing - Procedure #2 – Dual pumps in the former lagoon area.

The water pump is PumpWorks model PW2003-NO and the DNAPL pump is model PW2003-FO, both pumps are rate controllable.

Detrex, SunPro and URS representative personnel installed the PumpWorks DNAPL and water pumps in RW-15 on the 6 of December 2012.

The water pump intake set at 19.5-feet in depth from top of casing and the DNAPL pump intake set at 25.4-feet.

The test at RW-15 was started on 7 December 2012, with only the water pump running due to the DNAPL intake was above the depth to DNAPL.

See the included DNAPL Recoverability Testing - Procedure #2 - RW15 - Dual Pumps data sheet #1 and sheet #2.

Initially the water pump was started to lower the depth to water in the well.

The low vacuum set point shut off the vacuum pump at 11-Hg, the onsite URS representative called ProAct to allow the reset of the low vacuum set point to 5-Hg.

The first step applied vacuum at RW-15 was 5.8-Hg, second step of 10.5-Hg, third step of 15.2-Hg and fourth step of 19.6-Hg.

After increasing the applied vacuum to 19.6-Hg the water pump was running and not discharging water due the internal piston short stroking against the higher vacuum pull back.

All induced vacuum measurements were taken with Dwyer series 2000 differential gauges of various ranges that were calibrated by a Dwyer series 424 inclined manometer.

DETREX - Ashtabula, Ohio **RW15** **DATE:** **12/7/2012**

DNAPL Recoverability Testing - Procedure #2 **Dual Pumps** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time [min]	Well Diameter (inches)	Well Depth (feet)	Depth Water (feet)	Well Vacuum (in Hg)	Air Flow (CFM)	Depth DNAPL (feet)	Water Rate (ml/min)	DNAPL Rate (ml/min)	Water Purged (ml)	DNAPL Purged (ml)	COMMENT			Delta Water (feet)	Delta DNAPL (feet)
RW-15	12/7	10:30	0:00	0	6	26.0	5.6	0	0	25.7	0	0	0	0	start water pump intake at 19.5-ft	0	0	0.00	0.00
		10:45	0:15	15			5.75	0	0	25.7	100	0	1500	0		0	15	(0.15)	0.00
		10:50	0:05	20			5.9	0	0	25.7	100	0	2000	0		0	5	(0.30)	0.00
		11:00	0:10	30			6.1	0	0	25.7	100	0	3000	0		0	10	(0.50)	0.00
		11:15	0:15	45			6.35	0	0	25.7	100	0	4500	0		0	15	(0.75)	0.00
		11:30	0:15	60			6.65	0	0	25.7	100	0	6000	0		0	15	(1.05)	0.00
		12:00	0:30	90			7.2	0	0	25.7	100	0	9000	0		0	30	(1.60)	0.00
		13:00	1:00	150			8.15	0	0	25.7	100	0	15000	0	Start 5.8 Hg vacuum	1	60	(2.55)	0.00
		13:30	0:30	180			8.4	6.0	0	25.4	100	0	18000	0		0	30	(2.80)	0.30
		14:00	0:30	210			8.6	5.8	0	25.4	100	0	21000	0	start 200ml/min water rate	0	30	(3.00)	0.30
		14:30	0:30	240			8.65	5.8	0	25.4	200	0	27000	0		0	30	(3.05)	0.30
		15:00	0:30	270			8.7	5.8	0	25.4	200	0	33000	0		0	30	(3.10)	0.30
		15:30	0:30	300			9.5	5.8	0	25.4	200	0	39000	0		0	30	(3.90)	0.30
		16:00	0:30	330			10.25	5.8	0	25.4	200	0	45000	0	Start 10.5 Hg vacuum	0	30	(4.65)	0.30
		16:15	0:15	345			10.5	10.5	0	25.4	200	0	48000	0		0	15	(4.90)	0.30
		16:30	0:15	360			10.7	10.5	0	25.4	200	0	51000	0		0	15	(5.10)	0.30
		17:00	0:30	390			11.0	10.5	0	25.4	200	0	57000	0		0	30	(5.40)	0.30
		17:30	0:30	420			11.05	10.5	0	25.4	200	0	63000	0		0	30	(5.45)	0.30
		18:00	0:30	450			11.25	10.5	0	25.4	200	0	69000	0	Start 15.2 Hg vacuum	0	30	(5.65)	0.30
		18:30	0:30	480			11.1	15.2	0	25.4	200	0	75000	0		0	30	(5.50)	0.30
		19:00	0:30	510			10.8	15.2	0	25.4	200	0	81000	0		0	30	(5.20)	0.30
		19:30	0:30	540			10.5	15.2	0	25.4	200	0	87000	0		0	30	(4.90)	0.30
		20:00	0:30	570			10.1	15.2	0	25.3	200	0	93000	0	Start 19.5 Hg vacuum	0	30	(4.50)	0.40
		20:30	0:30	600			8.8	19.5	0	25.35	0	0	93000	0	pump running no discharge	0	30	(3.20)	0.35

Note:
(0.2) = Decrease Thickness
(0.2 = Increase Thickness

Note: Cloudy to rain, 38 to 48°F, barometer start at 29.40 at end 29.37
DNAPL in well from 26.0-25.7=0.3ft*1.63gal/ft=0.49gal*3785ml/gal=1851 ml
Intake at 25.6-ft DNAPL volume in well, recoverable, 25.6-25.4=0.2ft*1.63gal/ft=0.33gal*3785ml/gal=**1234ml**

From Applied Vacuum
Rate DNAPL Entry = 2 mL/min

0.001 gpm

DETREX - Ashtabula, Ohio **RW15** **DATE: 12/7/2012**

DNAPL Recoverability Testing - Procedure #2 **Dual Pumps/Induced Vacuum** **URS onsite Tech: Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time [min]	Well Vacuum (In Hg)	MP 15A	MP 15B	MP 15C	MP 15D	RW 16	MP 16A	MP 16B	MP 16C	RW 17	MP 17A	MP 17B	MW1
						Induced Vacuum (inches of water)											
RW-15	12/7	13:00	0:00	0	5.8	0	0	0	0	0	0	0	0	0	0	0	0
		13:05	0:05	5	5.8	0.60	0	0	0	0	0.02	0	0	0	0	0	0
		13:10	0:05	10	6.0	0.90	0	0	0	0.01	0.02	0	0	0	0	0	0
		13:15	0:05	15	6.0	1.05	0	0	0	-	0.04	0	0	0	0	0	0
		13:30	0:15	30	6.0	1.40	0	0	0	0.06	0.12	0	0	0	0	0	0
		13:45	0:15	45	6.0	1.55	0	0	1.0	0.08	0.12	0	0	0	0	0	0
		14:00	0:15	60	5.8	1.9	0	0	1.5	0.10	0.12	0	0	0	0	0	0
		14:30	0:30	90	5.8	2.0	0	0	2.6	0.10	0.12	0	0	0	0	0	0.15
		15:00	0:30	120	5.8	2.0	0	0	2.7	0.10	0.12	0	0	0	0	0	0.20
		15:30	0:30	150	5.8	2.0	0.15	0	2.8	0.10	0.12	0	0	0	0	0	0.25
		16:00	0:30	180	5.8	1.8	0.20	0	3.0	0.10	0.20	0.02	0	0	0	0	0.20
		16:15	0:15	195	10.5	2.4	0.26	0	4.1	0.15	0.30	0.06	0	0	0	0	0.20
		16:30	0:15	210	10.5	2.8	0.30	0	5.4	0.15	0.48	0.08	0	0	0	0	0.25
		17:00	0:30	240	10.5	2.9	0.45	0.35	7.4	0.15	0.55	0.38	0.16	0	0	0	0.35
		17:30	0:30	270	10.5	2.9	0.70	0.80	9.6	0.15	0.55	0.44	0.18	0	0	0	0.50
		18:00	0:30	300	10.5	3.4	0.80	1.55	10.5	0.20	0.50		0.40	0	0	0	0.60
		18:15	0:15	315	15.2	4.8	0.75	1.40	14.0	0.20	0.55		0.40	0	0	0	0.65
		18:30	0:15	330	15.2	5.2	0.70	1.35	16.0	0.25	0.75		0.30	0	0	0	0.70
		19:00	0:30	360	15.2	5.8	0.95	2.0	17.5	0.30	0.80		0.34	0	0	0	0.85
		19:30	0:30	390	15.2	6.4	1.00	2.8	18.0	0.25	0.50		0.46	0	0	0	0.85
		20:00	0:30	420	15.2	7.4	1.05	2.8	20.0	0.25	0.50		0.48	0	0	0	0.85
		20:15	0:15	435	19.6	8.4	1.15	3.0	21	0.30	0.60		0.58	0	0	0.16	0.85
		20:30	0:15	450	19.6	9.2	1.35	3.6	22	0.35	0.65		0.66	0	0	0.20	0.85

Note: * MP 16B not measurable even after replacing cap valve

DETREX - Ashtabula, Ohio 11 December 2012

URS representative arrived onsite for the DNAPL Recoverability Testing - Procedure #2 – Dual pumps in the former lagoon area.

The water pump is PumpWorks model PW2003-NO and the DNAPL pump is model PW2003-FO, both pumps are rate controllable.

Detrex, Sunpro and URS representative personnel installed the PumpWorks DNAPL and water pumps in RW-16 on the 10 of December 2012.

The water pump intake set at 19.5-feet in depth from top of casing and the DNAPL pump intake set at 25.4-feet.

The test at RW-16 was started on 10 December 2012.

Power was applied to the water pump which tripped its GFI power supply.

The URS representative tested the power lines to the pump and found 2500 ohms short to ground.

After disassembly of the power supply pipeline to the pump, the URS representative noted that water had entered this 1/2-inch stainless steel pipeline and shorted out the power lines to the pump.

The power lines were resealed and the pumps were reassembled on 10 December 2012.

The test at RW-16 was restarted on 11 December 2012.

Initially the water pump was started to lower the depth to water in the well.

See the included DNAPL Recoverability Testing - Procedure #2 - RW16 - Dual Pumps data sheet #1 and sheet #2.

The first step applied vacuum at RW-16 was 6.0-Hg and second step at 10.0-Hg.

The water pump was running and stopped discharging at 10.0-Hg applied vacuum.

The DNAPL pump was restarted and running and not discharging at 10.0-Hg applied vacuum.

DETREX - Ashtabula, Ohio **RW16** **DATE:** **12/11/2012**

DNAPL Recoverability Testing - Procedure #2 **Dual Pumps** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time [min]	Well Diameter (inches)	Well Depth (feet)	Depth Water (feet)	Well Vacuum (In Hg)	Air Flow (CFM)	Depth DNAPL (feet)	Water Rate (ml/min)	DNAPL Rate (ml/min)	Water Purged (ml)	DNAPL Purged (ml)	COMMENT			Delta Water (feet)	Delta DNAPL (feet)
RW-16	12/11	10:30	0:00	0	6	26.0	3.95	0	0	24.0	0	0	0	0	Start water pump intake at 19.5-ft	0	0	0.00	0.00
		11:00	0:30	30			5.85	0	0	24.05	400	0	12000	0	Apply vacuum at 6.0 Hg	0	30	(1.90)	(0.05)
		11:30	0:30	60			6.8	5.8	0	24.1	400	0	24000	0		0	30	(2.85)	(0.10)
		12:00	0:30	90			7.7	5.8	0	23.9	400	0	36000	0	Start DNAPL pump intake at 25.4-ft	0	30	(3.75)	0.10
		12:30	0:30	120			8.35	5.8	0	24.1	350	0	46500	500	DNAPL pump running no discharge	0	30	(4.40)	(0.10)
		13:00	0:30	150			8.55	5.8	0	24.1	350	0	57000		Apply vacuum at 10.0 Hg	0	30	(4.60)	(0.10)
		13:30	0:30	180			7.8	10.2	0	23.95	150	0	61500		Start DNAPL pump intake at 25.4-ft	0	30	(3.85)	0.05
		13:30	0:00	180					-			0	61500		DNAPL pump running no discharge	0	0		
		14:00	0:30	210			7.1	10.0	0	24.0	175	0	66750			0	30	(3.15)	0.00
		14:10	0:10	220				10.0	0		175	0	68500		Water pump running no discharge	0	10		
		14:30	0:20	240			6.5	10.0	0	23.95		0			Shut off pumps and vacuum	0	20	(2.55)	0.05
		15:00	0:30	270			6.3	0	0	24.1		0			End test	0	30	(2.35)	(0.10)

Note:

(0.2) = Decrease Thickness

(0.2 = Increase Thickness

From Applied Vacuum

Rate DNAPL Entry = **0 mL/min**

0.000 gpm

Note: light snow 30 to 35°F, barometer start at 29.35 at end 29.35

Purged water or DNAPL is a totalized value

DNAPL in well from 26.0-24.0=2.0ft*1.63gal/ft=2.77gal*3785ml/gal=10488ml

Intake at 25.4-ft DNAPL volume in well, recoverable, 25.4-24.1=1.3ft*1.63gal/ft=2.12gal*3785ml/gal=8020ml

DETREX - Ashtabula, Ohio **RW16** **DATE:** **12/11/2012**

DNAPL Recoverability Testing - Procedure #2 **Dual Pumps/Induced Vacuum** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time [min]	Well Vacuum (In Hg)	MP 17A	MP 17B	RW 15	MP 15A	RW 15B	MP 15C	MP 15D	RW 17	MP 16A	MP 16B	MP 16C	DPT 7	MW1
						Induced Vacuum (inches of water)												
RW-16	12/11	10:30	0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		11:00	0:30	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		11:05	0:05	35	5.8	0	0	0	0.8	0	0	0	0	7.0	0	0	0	0
		11:10	0:05	40	5.8	0	0	0	5.2	0	0	0	0	15	1.0	0	0	0
		11:15	0:05	45	5.8	0	0	0	8.4	0	0	0	0	16	2.8	0	0	0
		11:30	0:15	60	5.8	0	0	0.04	12.5	0.10	0	0	0	18	6.4	1.0	0	0.15
		11:45	0:15	75	5.8	0	0	0.08	12.5	0.16	0	0	0	13	7.4	1.75	0	0.25
		12:00	0:15	90	5.8	0	0	0.10	17.0	0.20	0	0	0	17	10.0	2.0	0	0.20
		12:15	0:15	105	5.8	0	0	0.12	15.0	0.44	0	0	0	17	10.5	1.9	0	0.15
		12:30	0:15	120	5.8	0	0	0	17.5	0.50	0	0	0	17	12.0	2.0	0	0.25
		13:00	0:30	150	5.8	0	0	0.10	19.0	0.65	0.26	0	0	14	15.0	2.5	0	0.45
		13:15	0:15	165	10.2	0	0.35	0.08	21.5	1.0	0.80	1.6	0	18	17.0	2.8	0	0.50
		13:30	0:15	180	10.2	0	0.38	0.02	30	1.75	2.2	4.0	0.04	14	15.0	3.5	0	0.55
		14:00	0:30	210	10.0	0	0.40	0	30	1.65	2.8	4.2	0.90	11	16.0	2.8	0.34	0.60
		14:30	0:30	240	10.0	0	0.80	0.50	22	1.8	0.8	4.4	0.40	9	14.0	0.6	0.35	0.50
		15:00	0:30	270	10.0	0	0.20	0	20	1.4	1.5	4.2	0.30	5.5	12.5	0.2	0.40	0.40

Note: After the 12:00 reading removed and replaced RW15 cap seal

DETREX - Ashtabula, Ohio 12 December 2012

URS representative arrived onsite for the DNAPL Recoverability Testing - Procedure #2 – Dual pumps in the former lagoon area.

The water pump is PumpWorks model PW2003-NO and the DNAPL pump is model PW2003-FO, both pumps are rate controllable.

Detrex, Sunpro and URS representative personnel removed the PumpWorks DNAPL and water pumps from RW-16 on the 11 of December 2012.

The pumps were setup for bench testing.

The prime setting power was applied to the water pump which were running very slowly with low output pressure.

Next the water pump was placed in a bucket of water and after ~5-minutes the water pump ran at full output pressure.

The DNAPL pump was placed in a bucket of soapy water and the DNAPL pump could only produce ~5-feet of lift output pressure.

The URS representative tested the power lines to the pumps and found no issues.

The power lines to the DNAPL pump were removed and place on the spare DNAPL pump.

DETREX - Ashtabula, Ohio 13 December 2012

URS representative arrived onsite for the DNAPL Recoverability Testing - Procedure #2 – Dual pumps in the former lagoon area.

The water pump is PumpWorks model PW2003-NO and the DNAPL pump is model PW2003-FO, both pumps are rate controllable.

Detrex, Sunpro and URS representative personnel removed the PumpWorks DNAPL and water pumps from RW-16 on the 12 of December 2012.

After each power and control lines were tested and found to run and control a pump. The initial water pump and the spare DNAPL pump were setup and placed into RW-17.

The prime setting power was applied to the water pump which ran at 1000-ml per minute.

Next prime setting power was applied to the DNAPL pump which ran at 300-ml per minute.

The test at RW-17 was started on 13 December 2012.

Initially the water pump was started to lower the depth to water in the well.

See the included DNAPL Recoverability Testing - Procedure #2 - RW17 - Dual Pumps data sheet #1 and sheet #2.

The first step applied vacuum at RW-15 was 6.0-Hg, second step at 10.0-Hg and the third step at 14.0-Hg.

The water pump was running and stopped discharging at 14.0-Hg applied vacuum.

After 60-minutes of run time at 14.0-Hg applied vacuum, the test was stopped due to the DNAPL pump was running with the discharge inconsistently dripping.

DETREX - Ashtabula, Ohio **RW17** **DATE:** **12/13/2012**

DNAPL Recoverability Testing - Procedure #2 **Dual Pumps** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time [min]	Well Diameter (inches)	Well Depth (feet)	Depth Water (feet)	Well Vacuum (In Hg)	Air Flow (CFM)	Depth DNAPL (feet)	Water Rate (ml/min)	DNAPL Rate (ml/min)	Water Purged (ml)	DNAPL Purged (ml)	COMMENT			Delta Water (feet)	Delta DNAPL (feet)
RW-17	12/13	14:00	0:00	0	6	26.0	3.6	0	0	24.3	0	0	0	0	start water pump intake at 18.6-ft	0	0	0.00	0.00
		14:00	0:00	0			3.6	0	0	24.3	0	0	0	0	prime DNAPL pump	0	0	0.00	0.00
		14:15	0:15	15			6.90	0	0	24.65	1000	0	15000	0		0	15	(3.30)	(0.35)
		14:30	0:15	30			8.25	5.8	0	24.55	475	0	22125	0	start applied vacuum at 5.8	0	15	(4.65)	(0.25)
		14:50	0:20	50				6.0	0		300	0	25125	0		0	20		
		15:00	0:10	60			9.05	6.0	0	24.4	425	0	27250	0		0	10	(5.45)	(0.10)
		15:30	0:30	90			10.35	6.0	0	24.35	350	0	37750	0		0	30	(6.75)	(0.05)
		16:00	0:30	120			11.25	6.0	0	24.2	350	0	48250	0		0	30	(7.65)	0.10
		16:15	0:15	135				6.0	0						start DNAPL pump intake at 25.7-ft	0	15		
		16:30	0:15	150			12.45	6.0	0	24.35	325	100	58000	1500		0	15	(8.85)	(0.05)
		17:00	0:30	180			13.2	6.0	0	24.5	300	100	67000	4500	start applied vacuum at 10.0	0	30	(9.60)	(0.20)
		17:30	0:30	210			14.75	10.0	0	24.65	250	50	74500	6000		0	30	(11.15)	(0.35)
		18:00	0:30	240			14.9	10.0	0	24.7	50	50	76000	7500		0	30	(11.30)	(0.40)
		18:30	0:30	270			14.75	10.0	0	24.85	30	30	76900	8400		0	30	(11.15)	(0.55)
		19:00	0:30	300			13.55	10.0	0	24.95	10	20	77200	9000	start applied vacuum at 14.0	0	30	(9.95)	(0.65)
		19:30	0:30	330			13.1	14.0	0	25.05	0	20	77200	9600	water pump running not discharging	0	30	(9.50)	(0.75)
		20:00	0:30	360			12.05	14.0	0	25.15	0	10	77200	9900	DNAPL pump running discharge dripping	0	30	(8.45)	(0.85)
	12/14	9:00					8.25	0	0	24.9	-	-	-	-	next day, silt at 25.8-ft				

Note:

(0.2) = Decrease Thickness

(0.2 = Increase Thickness

From Applied Vacuum

Rate DNAPL Entry = 18 mL/min

Note: Cloudy 30 to 45°F, barometer start at 29.70 at end 29.60

DNAPL in well from 26.0-24.3=1.7ft*1.63gal/ft=2.77gal*3785ml/gal=10488ml

Intake at 25.7-ft DNAPL volume in well, recoverable, 25.7-25.15=0.55ft*1.63gal/ft=0.9gal*3785ml/gal=3392ml

0.005 gpm

DETREX - Ashtabula, Ohio **RW17** **DATE: 12/13/2012**

DNAPL Recoverability Testing - Procedure #2 **Dual Pumps/Induced Vacuum** **URS onsite Tech: Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time [min]	Well Vacuum (In Hg)	MP 17A	MP 17B	RW 15	MP 15A	RW 15B	MP 15C	MP 15D	RW 16	MP 16A	MP 16B	MP 16C	NPZ-7
						Induced Vacuum (inches of water)											
RW-17	12/13	14:30	0:00	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0
		14:35	0:05	5	5.8	0.30	0	0	0	0	0	0	0	0	0	0.30	0
		14:40	0:05	10	5.8	0.75	0	0	0	0	0	0	0	0	0	0.8	0
		14:50	0:10	20	6.0	2.0	0	0	0	0	0	0	0	0	0	1.20	0
		15:00	0:10	30	6.0	2.0	0	0	0	0	0	0	0	0	0	1.60	0
		15:15	0:15	45	6.0	3.0	0.50	0	0	0	0	0	0	0	0	1.90	0.04
		15:30	0:15	60	6.0	3.2	1.25	0	0	0	0	0	0	0	0	2.1	0.16
		15:45	0:15	75	6.0	2.7	1.6	0	0	0	0	0	0	0	0	2.1	0.20
		16:00	0:15	90	6.0	2.8	1.8	0	0	0	0	0	0	0	0	2.2	0.22
		16:15	0:15	105	6.0	2.5	2.1	0	0	0	0	0	0	0	0	2.5	0.24
		16:30	0:15	120	6.0	2.5	2.5	0	0	0	0	0	0	0	0	2.5	0.46
		17:00	0:30	150	6.0	2.3	3.4	0	0	0	0	0	0	0	0	2.7	0.68
		17:30	0:30	180	10.0	2.6	4.5	0	0	0.08	0.75	0	0	0	0	3.8	0.50
		18:00	0:30	210	10.0	3.2	5.1	0	0	0.14	1.25	0	0	0	0	3.5	0.18
		18:30	0:30	240	10.0	2.6	6.5	0	0	0.24	1.95	0	0	0	0.30	3.1	0.14
		19:00	0:30	270	10.2	1.75	3.2	0	0	0.54	0.20	0	0	0	1.4	2.5	0.62
		19:30	0:30	300	14.0	1.8	4.0	0	0	0.82	0	0	0.10	0	2.2	3.0	0.80
		20:00	0:30	330	14.0	0.7	4.8	0	0	0.82	0	0	0.20	0	2.2	2.5	0.44

Note: Cloudy 30 to 40°F, barameter start at 29.70 at end 29.60

DETREX - Ashtabula, Ohio 14 December 2012

URS representative arrived onsite for the DNAPL Recoverability Testing - Procedure #2 – Dual pumps in the former lagoon area.

The water pump is PumpWorks model PW2003-NO and the DNAPL pump is model PW2003-FO, both pumps are rate controllable.

Before removing the initial water pump and the spare DNAPL pump assembly from RW-17 each pump was tested for run and control.

Detrex, Sunpro and URS representative personnel removed the PumpWorks DNAPL and water pump setup from RW-17 and placed it into RW-16 on the 14 of December 2012.

The prime setting power was applied to the water pump which ran at 2000-ml per minute.

Next prime setting power was applied to the DNAPL pump which ran at 200-ml per minute.

The test at RW-16 was started on 14 December 2012.

Initially the water pump was started to lower the depth to water in the well.

The URS representative noted the water pump controller would not control the flow rate.

The water pump conduit was found to be filled with water.

The power and control wires were tested and found the initial water pump would not rate control.

The initial water pump and initial DNAPL pump were sent to PumpWorks for inspection.

The spare water pump was wired into the pump assembly.

DETREX - Ashtabula, Ohio 18 December 2012

URS representative arrived onsite for the DNAPL Recoverability Testing - Procedure #3 – Total Fluids in the former lagoon area.

The pump is peristaltic type and is rate controllable.

Detrex and URS representative personnel setup the vacuum line and the peristaltic pump in RW-16 on the 18 of December 2012.

The Procedure #3 – Total Fluids test at RW-16 was started on 18 December 2012.

The peristaltic pump intake was set at 25.0-ft in depth from top of casing stickup.

See the included DNAPL Recoverability Testing - Procedure #3 - RW16 – Total Fluids data sheet #1 and sheet #2.

The first step applied vacuum at RW-16 was 6.2-Hg, second step at 10.0-Hg and the third step at 14.0-Hg.

The peristaltic pump stopped discharging fluids, at 14.0-Hg applied vacuum after the depth to water/DNAPL level measurements, caused by air being pulled into the pump from the discharge tubing.

DETREX - Ashtabula, Ohio **RW16** **DATE:** **12/18/2012**

DNAPL Recoverability Testing - Procedure #3 **Total Fluids** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time [min]	Well Diameter (inches)	Well Depth (feet)	Depth Water (feet)	Well Vacuum (In Hg)	Air Flow (CFM)	Depth DNAPL (feet)	Purged Rate (ml/min)	Purged Total (ml)	Water Purged (ml)	DNAPL Purged (ml)	COMMENT			Delta Water (feet)	Delta DNAPL (feet)
RW16	12/18	11:30	0:00	0	6	26.0	3.9	0	0	23.8	0	0			Start pump intake at 25.0	0	0	0.00	0.00
		11:40	0:10	10			5.6	0	0	24.2	600	6000			Start 6.2-Hg applied vacuum	0	10	(1.70)	(0.40)
		12:00	0:20	30			6.1	6.2	0	24.1	475	15500				0	20	(2.20)	(0.30)
		12:30	0:30	60			7.0	6.2	0	24.15	400	27500				0	30	(3.10)	(0.35)
		13:00	0:30	90			7.8	6.2	0	24.15	450	41000				0	30	(3.90)	(0.35)
		13:30	0:30	120			8.95	6.2	0	24.15	450	54500				0	30	(5.05)	(0.35)
		14:00	0:30	150			9.5	6.2	0	24.15	400	66500			Start 10.0-Hg applied vacuum	0	30	(5.60)	(0.35)
		14:30	0:30	180			9.2	10.0	0	24.15	300	75500				0	30	(5.30)	(0.35)
		15:00	0:30	210			9.05	10.0	0	24.15	275	83750				0	30	(5.15)	(0.35)
		15:30	0:30	240			8.9	10.0	0	24.15	250	91250				0	30	(5.00)	(0.35)
		16:00	0:30	270			8.85	10.0	0	24.15	275	99500			Start 14.0-Hg applied vacuum	0	30	(4.95)	(0.35)
		16:30	0:30	300			7.75	14.0	0	24.15	175	104750			Start 0-Hg applied vacuum	0	30	(3.85)	(0.35)
		17:00	0:30	330			7.9	0	0	24.45	300	113750				0	30	(4.00)	(0.65)
		17:30	0:30	360			8.3	0	0	25.2	300	122750				0	30	(4.40)	(1.40)
	12/18	9:30					4.5	0	0	24.9	0								

Note:

(0.2) = Decrease Thickness

(0.2 = Increase Thickness

From Applied Vacuum	
DNAPL Rec. Rate =	**58 mL/min**
Rate DNAPL Entry =	**37 mL/min**

Note: After taking the depth to water/ DNAPL readings at 16:30 and reapplying 14.0-Hg vacuum, the pump was running with no flow 0.015 gpm
the vacuum in the well was pulling back air into the pump 0.010 gpm
All fluids purged were place into 55-gallon drum then separated on 19 December 2012 yielding the following
3-gallons of dark DNAPL, 2.5-gallons of brown DNAPL/water and 26-gallons of water as measured in a 5-gallon bucket.

DETREX - Ashtabula, Ohio **RW16** **DATE:** **12/18/2012**

DNAPL Recoverability Testing - Procedure #2 **Total Fluids/Induced Vacuum** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time [min]	Well Vacuum (In Hg)	MP 17A	MP 17B	RW 15	MP 15A	MP 15B	MP 15C	MP 15D	RW 17	MP 16A	MP 16B	MP 16C	DPT 7	MW1
						Induced Vacuum (inches of water)												
RW-16	12/18	11:40	0:00	0	0	0	0	0	0.44	0	0	0	0	2.5	0	0	0	0
		11:50	0:10	10	6.2	0	0	0.02	8.0	0	0	0	0	4.6	0.64	0.18	0	0
		12:00	0:10	20	6.2	0	0	0.02	12.0	0	0	0	0	4.2	4.2	0.8	0	0
		12:30	0:30	50	6.2	0	0	0.04	17.0	0	0	0	0	7.2	3.8	2.4	0	0
		13:00	0:30	80	6.2	0	0	0.04	20.0	0	0	0	0	10.0	1.0	3.2	0	0
		13:30	0:30	110	6.2	0	0	0.08	21.0	0	0	0	0	8.4	1.2	3.0	0	0
		14:00	0:30	140	6.2	0	0	0.10	24.5	0	0	0	0	11.0	2.8	3.7	0	0
		14:30	0:30	170	10.0	0	0	0.10	34	0.56	0	0	0	15.5	7.0	4.5	0	0
		15:00	0:30	200	10.0	0	0	0.12	34	1.25	0.8	0	0	17.0	1.5	4.5	0	0.84
		15:30	0:30	230	10.0	0	0	0.14	32	1.95	2.0	0	0	10.5	2.4	3.7	0	0.86
		16:00	0:30	260	10.0	0	0	0.16	31	1.80	2.7	0	0	9.5	3.8	2.8	0	0.84
		16:30	0:30	290	14.0	0	0	0.16	37	2.6	1.6	0	0	14.0	8.6	2.8	0	0.86
		17:00	0:30	320	14.0	0	0	0.16	19	3.0	3.2	0	0	0	0	2.0	0	0.84
		17:30	0:30	350	0	0	0	0.16	15	2.8	3.2	0	0	0	0	1.0	0	0.84

Note:

DETREX - Ashtabula, Ohio 19 December 2012

URS representative arrived onsite for the DNAPL Recoverability Testing - Procedure #3 – Total Fluids in the former lagoon area.

The pump is peristaltic type and is rate controllable.

A check valve was added to the peristaltic pump intake that was set at 25.1-ft in depth from top of casing stickup.

Sunpro and URS representative personnel setup the vacuum line and the peristaltic pump in RW-16 on the 19 of December 2012.

The Procedure #3 – Total Fluids test at RW-16 was started on 19 December 2012.

See the included DNAPL Recoverability Testing - Procedure #3 - RW16 – Total Fluids data sheet #1 and sheet #2.

The first step applied vacuum at RW-16 was first 10.0-Hg, second step at 14-Hg and the third step at 19.0-Hg.

The peristaltic pump stalled and stopped discharging fluids after applying 19.0-Hg vacuum.

DETREX - Ashtabula, Ohio **RW16** **DATE:** **12/19/2012**

DNAPL Recoverability Testing - Procedure #3 **Total Fluids** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time [min]	Well Diameter (inches)	Well Depth (feet)	Depth Water (feet)	Well Vacuum (In Hg)	Air Flow (CFM)	Depth DNAPL (feet)	Purged Rate (ml/min)	Purged Total (ml)	Water Purged (ml)	DNAPL Purged (ml)	COMMENT			Delta Water (feet)	Delta DNAPL (feet)
RW16	12/19	10:00	0:00	0	6	26.0	4.5	0	0	24.9					Start pump intake at 25.1	0	0	0.00	0.00
		10:15	0:15	15			5.0	0	0	25.2	500	7500				0	15	(0.50)	(0.30)
		10:30	0:15	30			6.2	0	0	25.2	500	15000			Start 10.0-Hg applied vacuum	0	15	(1.70)	(0.30)
		11:00	0:30	60				10.0	0		350	25500				0	30		
		11:30	0:30	90				10.0	0		350	36000			Start 14.0-Hg applied vacuum	0	30		
		12:00	0:30	120				14.0	0		225	42750				0	30		
		12:30	0:30	150				14.0	0		250	50250			Start 19.0-Hg applied vacuum	0	30		
		12:50	0:20	170			3.9	19.0	0	25.2	5	50350			Pump stalled, start 0-Hg	0	20	0.60	(0.30)
		13:30	0:40	210			2.5	0	0	25.15	0	50350				0	40	2.00	(0.25)
	12/18	9:30					4.5	0	0	24.9	0								

Note:

(0.2) = Decrease Thickness

(0.2 = Increase Thickness

From Applied Vacuum	
DNAPL Rec. Rate =	**19 mL/min**
Rate DNAPL Entry =	**13 mL/min**

0.005 gpm

0.003 gpm

Note: After applying 19.0-Hg vacuum the pump was running with no flow
All fluids purged were place into 55-gallon drum then separated on 20 December 2012 yielding the following
108-ounces of dark DNAPL, 28-ounces of brown DNAPL/water and 12.5-gallons of water.

DNAPL in well from 26.0-24.9=1.1ft*1.63gal/ft=1.79gal*3785ml/gal=6787 ml

Intake at 25.1-ft DNAPL volume in well, recoverable, 25.1-24.9=0.2ft*1.63gal/ft=0.33gal*3785ml/gal=1250 **ml**

DETREX - Ashtabula, Ohio **RW16** **DATE:** **12/19/2012**

DNAPL Recoverability Testing - Procedure #2 **Total Fluids/Induced Vacuum** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time [min]	Well Vacuum (In Hg)	MP 17A	MP 17B	RW 15	MP 15A	RW 15B	MP 15C	MP 15D	RW 17	MP 16A	MP 16B	MP 16C	NPZ 9	MW1
						Induced Vacuum (inches of water)												
RW-16	12/19	10:00	0:00	0	0	0	0	0.00	0	0	0	0	0	0	0	0	0	0
		10:30	0:30	30	0.0	0	0	0.04	0.0	0.00	0.0	0	0	0	0	0.0	0	0
		11:00	0:30	60	10.0	0	0	0.08	2.8	0.6	1.8	0	0	19	0	2.4	0	0.00
		11:30	0:30	90	10.0	0	0	0.06	1.6	1.7	4.0	0	0	13	0.0	2.8	0.00	0.2
		12:00	0:30	120	14.0	0	0	0.06	2.1	2.6	2.1	0	0	17	3.8	3.6	0.40	1.1
		12:30	0:30	150	14.0	0	0	0.08	6.2	3.4	7.6	0	0	19	1.0	3.5	0.22	1.2
		12:50	0:20	170	19.0	0	0	0.08	13.0	4	9	0	0	12.0	1.2	3.6	0	2

Note:

DETREX - Ashtabula, Ohio 20 December 2012

URS representative arrived onsite for the DNAPL Recoverability Testing - Procedure #3 – Total Fluids in the former lagoon area.

The pump is peristaltic type and is rate controllable.

A check valve was added to the peristaltic pump intake that was set at 25.2-ft in depth from top of casing stickup.

Sunpro and URS representative personnel setup the vacuum line and the peristaltic pump line into RW-17 on the 19 of December 2012.

The Procedure #3 – Total Fluids test at RW-17 was started on 20 December 2012.

See the included DNAPL Recoverability Testing - Procedure #3 - RW17 – Total Fluids data sheet #1 and sheet #2.

The first step applied vacuum at RW-16 was first 6.2-Hg, second step at 9.6-Hg and the third step at 14.0-Hg.

The peristaltic pump stalled and stopped discharging fluids after 1-hour of applied vacuum of 14.0-Hg.

DETREX - Ashtabula, Ohio **RW17** **DATE:** **12/20/2012**

DNAPL Recoverability Testing - Procedure #3 **Total Fluids** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time [min]	Well Diameter (inches)	Well Depth (feet)	Depth Water (feet)	Well Vacuum (In Hg)	Air Flow (CFM)	Depth DNAPL (feet)	Purged Rate (ml/min)	Purged Total (ml)	Water Purged (ml)	DNAPL Purged (ml)	COMMENT			Delta Water (feet)	Delta DNAPL (feet)
RW17	12/20	8:15	0:00	0	6	26.0	4.0	0	0	24.3	0	0			Start pump intake at 25.2	0	0	0.00	0.00
		8:20	0:05	5				0	0		2000	10,000			Prime pump tubing to surface	0	5		
		8:30	0:10	15			5.3	0	0	24.3	550	23,750			Stop pump, fitting leaking air	0	10	(1.30)	0.00
		10:00	1:30	105			8.4	0	0	24.3	550	23,750			Restart pump intake at 25.2	1	30	(4.40)	0.00
		10:05	0:05	110							550	26,500			Prime pump tubing to surface	0	5		
		10:15	0:10	120			8.8	0	0	24.3	525	29,000			Start 6.2-Hg applied vacuum	0	10	(4.80)	0.00
		10:30	0:15	135			8.0	6.2	0	24.2	400	35,000				0	15	(4.00)	0.10
		10:45	0:15	150				6.2	0		375	40,625				0	15		
		11:00	0:15	165				6.2	0		350	45,875				0	15		
		11:15	0:15	180				6.2	0		350	51,125				0	15		
		11:30	0:15	195				6.2	0		350	56,375				0	15		
		11:45	0:15	210				6.2	0		375	62,000				0	15		
		12:00	0:15	225				6.2	0		350	67,250				0	15		
		12:15	0:15	240			13.2	6.2	0	25.1	350	72,500			Start 9.6-Hg applied vacuum	0	15	(9.20)	(0.80)
		12:30	0:15	255				9.6	0		200	75,500				0	15		
		12:45	0:15	270				9.6	0		200	78,500				0	15		
		13:00	0:15	285				9.6	0		225	81,875				0	15		
		13:15	0:15	300				9.6	0		225	85,250				0	15		
		13:45	0:30	330				9.6	0		225	92,000			Start 14.0-Hg applied vacuum	0	30		
		14:15	0:30	360			14.1	14.0	0	25.25	5	92,150				0	30	(10.10)	(0.95)
		14:45	0:30	390			14.2	13.8	0	25.25	5	92,300			Pump stopped discharging	0	30	(10.20)	(0.95)
		15:15	0:30	420			14.2	13.8	0	25.25	0	92,300				0	30	(10.20)	(0.95)
		15:30	0:15	435			12.0	0	0	25.1	0	92,300				0	15	(8.00)	(0.80)
	12/26	9:30					3.45	0	0	24.6	0	-						0.55	(0.30)

Note: After applying 14.0-Hg vacuum, the pump was running with low and intermittent stopping flow.
All fluids purged were place into 55-gallon drum then separated on 21 December 2012 yielding the following
4.5-gallons of dark DNAPL, 1/2-gallon of brown DNAPL/water and 23-gallons of water.

DNAPL in well from 26.0-24.3=1.7ft*1.63gal/ft=2.77gal*3785ml/gal=10488 ml
Intake at 25.1-ft DNAPL volume in well, recoverable, 25.1-24.3=0.8ft*1.63gal/ft=1.34gal*3785ml/gal=4936 **ml**

Note:
(0.2) = Decrease Thickness
(0.2 = Increase Thickness

From Applied Vacuum

DNAPL Rec. Rate =	**44 mL/min**
Rate DNAPL Entry =	**32 mL/min**

0.011 gpm
0.008 gpm

DETREX - Ashtabula, Ohio **RW17** **DATE:** **12/20/2012**

DNAPL Recoverability Testing - Procedure #2 **Total Fluids/Induced Vacuum** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time [min]	Well Vacuum (In Hg)	MP 17A	MP 17B	RW 15	MP 15A	MP 15B	MP 15C	MP 15D	RW 16	MP 16A	MP 16B	MP 16C	NPZ 7	MW1
						Induced Vacuum (inches of water)												
RW-17	12/20	8:15	0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		8:20	0:05	5	0.0	0.00	0	0	0	0	0	0	0	0	0	0.0	0.00	0
		8:30	0:10	15	0.0	0.00	0	0	0	0	0	0	0	0	0	0.0	0.00	0
		10:00	1:30	105	0.0	0.00	0	0	0	0	0	0	0	0	0	0.0	0.00	0
		10:05	0:05	110	0.0	0.00	0	0	0	0	0	0	0	0	0	0.0	0.00	0
		10:15	0:10	120	0.0	0.00	0	0	0	0	0	0	0	0	0	0.0	0.00	0
		10:30	0:15	135	6.2	0.70	0	0	0	0	0	0	0	0	0	1.0	0.08	0
		10:45	0:15	150	6.2	1.75	0	0	0	0	0	0	0	0	0	1.3	0.04	0
		11:00	0:15	165	6.2	1.80	0	0	0	0	0	0	0	0	0	1.6	0	0
		11:15	0:15	180	6.2	1.90	0	0	0	0	0	0	0	0	0	1.7	0	0
		11:30	0:15	195	6.2	2.3	0.34	0	0	0	0	0	0	0	0	1.8	0	0
		11:45	0:15	210	6.2	1.9	0.78	0	0	0	0	0	0	0	0	1.8	0	0
		12:00	0:15	225	6.2	1.7	1.0	0	0	0	0	0	0	0	0	1.8	0.04	0
		12:15	0:15	240	9.6	1.4	1.4	0	0	0	0	0	0	0	0	1.7	0.06	0
		12:30	0:15	255	9.6	1.0	1.7	0	0	0	0	0	0	0	0	1.7	0	0
		12:45	0:15	270	9.6	1.0	1.7	0	0	0	0	0	0	0	0	1.7	0	0
		13:00	0:15	285	9.6	0.7	2.1	0	0	0	0	0	0	0	0	2.4	0	0
		13:15	0:15	300	9.6	0.6	1.7	0	0	0	0	0	0	0	0	2.1	0	0
		13:45	0:30	330	9.6	0.2	2.4	0	0	0	0	0	0	0	0	2.8	0.34	0
		14:15	0:30	360	14.0	0	1.8	0	0	0	0	0	0	0	0	3.0	0.38	0
		14:45	0:30	390	13.8	0	2.0	0	0	0	0	0	0	0	0	3.8	0.36	0

Note: Cloudy to rain 35 to 45°F, barameter start at 28.92 at end 28.88

DETREX - Ashtabula, Ohio 26 December 2012

URS representative arrived onsite for the DNAPL Recoverability Testing - Procedure #3 – Total Fluids in the former lagoon area.

The pump is peristaltic type and is rate controllable.

A check valve was added to the peristaltic pump intake that was set at 25.2-ft in depth from top of casing stickup.

Sunpro and URS representative personnel setup the vacuum line and the peristaltic pump line into RW-15 on the 26 of December 2012.

The Procedure #3 – Total Fluids test at RW-15 was started on 26 December 2012.

See the included DNAPL Recoverability Testing - Procedure #3 - RW15 – Total Fluids data sheet #1 and sheet #2.

The first step applied vacuum at RW-15 was first 6.0-Hg, second step at 10.2-Hg, third step at 14.2-Hg and the fourth step at 18.0-Hg.

DETREX - Ashtabula, Ohio **RW15** **DATE:** **12/26/2012**

DNAPL Recoverability Testing - Procedure #3 **Total Fluids** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time [min]	Well Diameter (inches)	Well Depth (feet)	Depth Water (feet)	Well Vacuum (In Hg)	Air Flow (CFM)	Depth DNAPL (feet)	Purged Rate (ml/min)	Purged Total (ml)	Water Purged (ml)	DNAPL Purged (ml)	COMMENT			Delta Water (feet)	Delta DNAPL (feet)
RW15	12/26	9:35	0:00	0	6	26.0	4.15	0	0	24.6	0	0			Start pump intake at 25.2	0	0	0.00	0.00
		9:55	0:20	20			6.0	0	0	25.2	150	3000			DNAPL stopped flowing	0	20	(1.85)	(0.60)
		10:05	0:10	30				0	0		600	9000			Start applied vacuum at 6.0-Hg	0	10		
		10:15	0:10	40				6.0	0		400	13000				0	10		
		10:35	0:20	60			7.1	6.0	0	25.2	400	21000				0	20	(2.95)	(0.60)
		11:05	0:30	90			8.5	6.0	0	25.2	400	33000				0	30	(4.35)	(0.60)
		11:35	0:30	120			9.9	6.0	0	25.2	400	45000				0	30	(5.75)	(0.60)
		12:05	0:30	150			11.3	6.0	0	25.2	400	57000			Start applied vacuum at 10.2-Hg	0	30	(7.15)	(0.60)
		12:35	0:30	180				10.2	0		225	63750				0	30		
		13:05	0:30	210				10.2	0		250	71250				0	30		
		13:35	0:30	240				10.2	0		200	77250				0	30		
		14:05	0:30	270				10.2	0		200	83250			Start applied vacuum at 14.2-Hg	0	30		
		14:35	0:30	300			9.3	14.2	0	25.2	100	86250				0	30	(5.15)	(0.60)
		15:05	0:30	330				14.2	0		100	89250				0	30		
		15:35	0:30	360				14.2	0		100	92250				0	30		
		16:05	0:30	390			7.8	14.2	0	25.25	100	95250			Start applied vacuum at 18.0-Hg	0	30	(3.65)	(0.65)
		16:35	0:30	420			6.6	18.0	0	25.25	25	96000			End test due to low flow	0	30	(2.45)	(0.65)
	12/27	10:00					4.8	0	0	24.95	0	0							

Note:

(0.2) = Decrease Thickness

(0.2 = Increase Thickness

Note: After applying 18.0-Hg vacuum, the pump was running with low and intermittent stopping of flow.

All fluids purged were place into 55-gallon drum then separated on 27 December 2012 yielding the following

2-gallons of dark DNAPL, 1.5 of brown DNAPL/water and 25-gallons of water.

DNAPL in well from 26.0-24.6=1.4ft*1.63gal/ft=2.28gal*3785ml/gal=8637 ml

Intake at 25.2-ft DNAPL volume in well, recoverable, 25.2-24.6=0.6ft*1.63gal/ft=0.98gal*3785ml/gal= **3702ml**

From Applied Vacuum

DNAPL Rec. Rate =	**32**	**mL/min**
Rate DNAPL Entry =	**23**	**mL/min**

0.008 gpm

0.006 gpm

DETREX - Ashtabula, Ohio **RW15** **DATE:** **12/26/2012**

DNAPL Recoverability Testing - Procedure #3 **Total Fluids/Induced Vacuum** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time [min]	Well Vacuum (In Hg)	MP 15A	MP 15B	MP 15C	MP 15D	RW 16	MP 16A	MP 16B	MP 16C	RW 17	MP 17A	MP 17B	MW1
						Induced Vacuum (inches of water)											
RW-15	12/26	9:35	0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		9:55	0:20	20	6.0	0.00	0	0	0	0	0.00	0	0	0	0	0	0
		10:05	0:10	30	0.0	0.00	0	0	0.0	0	0.00	0	0	0	0	0	0
		10:15	0:10	40	6.0	1.50	0	0	0	0	0.34	0	0	0	0	0	0
		10:35	0:20	60	6.0	1.70	0	0	1.1	0	0.36	0	0	0	0	0	0
		11:05	0:30	90	6.0	1.70	0	0	2.5	0.20	0.40	0	0	0	0	0	0
		11:35	0:30	120	6.0	2.0	0	0	6	0.20	0.40	0	0	0	0	0	0
		12:05	0:30	150	10.2	2.0	0	0	2.0	0.35	0.44	0.15	0	0	0	0	0
		12:35	0:30	180	10.2	3.5	0	0	6	0.45	0.70	0.70	0	0	0	0	0
		13:05	0:30	210	10.2	4.0	0	0	3.0	0.50	0.86	1.70	0	0	0	0	0
		13:35	0:30	240	10.2	3.5	0	0	1.0	0.60	0.76	1.70	0.14	0	0	0	0
		14:05	0:30	270	10.2	3.5	0	0	0.5	0.60	0.60	2.0	0.32	0	0	0	0
		14:35	0:30	300	14.2	4.5	0	0	1.25	0.70	0.82	0.20	0.40	0	0	0	0
		15:05	0:30	330	14.2	3.5	0	0	6	0.75	0.88	0.20	0.50	0	0	0	0
		15:35	0:30	360	14.2	1.8	0	0	4.0	0.80	0.48	0.20	0.60	0	0	0	0
		16:05	0:30	390	14.2	1.6	0	0	3.0	0.80	0.46	0	0.70	0	0	0	0
		16:35	0:30	420	18.0	2.2	0	0	4.0	0.65	0.50	0	0.70	0	0	0	0

Note: Cloudy to snow, 35 to 32°F, barometer start at 29.16 at end 29.14

DETREX - Ashtabula, Ohio 2 January 2013

URS representative arrived onsite for the DNAPL Recoverability Testing - Procedure #3 – Total Fluids in the former lagoon area.

The pump is peristaltic type and is rate controllable.

A check valve was added to the peristaltic pump intake that was set at 18.5-ft in depth from top of casing stickup.

Sunpro and URS representative personnel setup the vacuum line and the peristaltic pump line into RW-18 on the 27 of December 2012.

The Procedure #3 – Total Fluids test at RW-18 was started on 2 January 2013.

See the included DNAPL Recoverability Testing - Procedure #3 - RW18 – Total Fluids data sheet #1 and sheet #2.

The first step applied vacuum at RW-18 was first 6-Hg, second step at 10-Hg, third step at 14-Hg and the fourth step at 18-Hg.

Detrex - Ashtabula, Ohio **RW18** **DATE:** **1/2/2013**

DNAPL Recoverability Testing - Procedure #3 **Total Fluids** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time [min]	Well Diameter (inches)	Well Depth (feet)	Depth Water (feet)	Well Vacuum (In Hg)	Air Flow (CFM)	Depth DNAPL (feet)	Purged Rate (ml/min)	Purged Total (ml)	Water Purged (ml)	DNAPL Purged (ml)	COMMENT
RW18	1/2	9:25	0:00	0	6	22.0	4.3	0	0	ND	0	0	0	0	Start pump intake at 18.5-ft
		9:40	0:15	15	6	22.0	6.2	0.25	0	ND	900	13500			
		9:55	0:15	30	6	22.0	7.45	0.5	0	ND	650	23250			
		10:25	0:30	60	6	22.0	9.4	0.75	0	ND	650	42750			Start apllied vacuum of 6.0-Hg
		10:40	0:15	75	6	22.0	10.0	6.0	0	ND	525	50625			
		10:55	0:15	90	6	22.0	10.8	6.0	0	ND	500	58125			
		11:25	0:30	120	6	22.0	11.6	6.0	0	ND	500	73125			
		11:55	0:30	150	6	22.0	12.5	6.0	0	ND	450	86625			
		12:25	0:30	180	6	22.0	12.9	6.0	0	ND	450	100125			Start apllied vacuum of 10.0-Hg
		12:40	0:15	195	6	22.0	13.0	10.0	0	ND	350	105375			
		12:55	0:15	210	6	22.0	12.7	10.0	0	ND	350	110625			
		13:25	0:30	240	6	22.0	12.6	10.0	0	ND	250	118125			
		13:55	0:30	270	6	22.0	14.7	10.0	0	ND	250	125625			
		14:25	0:30	300	6	22.0	14.4	10.0	0	ND	275	133875			Start apllied vacuum of 14.0-Hg
		14:40	0:15	315	6	22.0	13.75	14.0	0	ND	225	137250			noted turbid water discharge
		14:55	0:15	330	6	22.0	13.15	14.0	0	ND	175	139875			
		15:25	0:30	360	6	22.0	12.05	14.0	0	ND	175	145125			
		15:55	0:30	390	6	22.0	11.15	14.0	0	ND	200	151125			
		16:25	0:30	420	6	22.0	10.6	14.0	0	ND	200	157125			Start apllied vacuum of 18.0-Hg
		16:40	0:15	435	6	22.0	10.15	18.0	0	ND	200	160125			
		16:55	0:15	450	6	22.0	9.85	18.0	0	ND	200	163125			
		17:25	0:30	480	6	22.0	8.3	18.0	0	ND	175	168375			
		17:55	0:30	510	6	22.0	7.8	18.0	0	ND	175	171000			
		18:25	0:30	540	6	22.0	7.2	18.0	0	ND	200	174000			Start apllied vacuum of 22.0-Hg
		18:40	0:15	555	6	22.0	6.4	22.0	0	ND	100	175500			End test
	1/3	9:30			6	22.0	6.4	0.0	0	ND	0	-			

Note: All fluids purged were place into a 300-gallon container 2 January 2013 yielding the following 54-gallons of water and 0-gallons of DNAPL

Initial silt at bottom of well at 21.8-ft after test on 3 January 2013 at 21.6-ft

DETREX - Ashtabula, Ohio **RW18** **DATE:** **1/2/2013**

DNAPL Recoverability Testing - Procedure #3 **Total Fluids/Induced Vacuum** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time [min]	Well Vacuum (In Hg)	MP 18A	MP 18B	RW 19	MP 19A	MP 19B	RW 20	MP 20A	MP 20B	MP 20C	MP 20D	MP 20E	NPZ 20-1
						Induced Vacuum (inches of water)											
RW-18	1/2	9:25	0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		9:40	0:15	15	0	0.70	0	0	0	0	0	0	0	0	0	0	0
		9:55	0:15	30	0	5.1	0	0	0	0.95	0	0	0	0	0	0	0
		10:25	0:30	60	0	5.6	0	0.05	0	6	0	0	0	0.25	0	0	0
		10:40	0:15	75	0	17.5	0	0.30	0	12.5	0	0	0.5	0.75	0	0	0
		10:55	0:15	90	6.0	22	0.60	0.60	0	20	0	0	2.0	4.0	0	0	0
		11:25	0:30	120	6.0	25	0.84	1.10	0.40	21	0	0	2.4	9.5	0	0	0
		11:55	0:30	150	6.0	20	0.84	2.4	0.80	26	0	0.22	2.4	13.5	0	0	0
		12:25	0:30	180	6.0	22	0.84	3.5	2.2	29	0	0.96	3.8	16.0	0	0	0
		12:40	0:15	195	10.0	25	0.86	3.8	2.6	32	0.04	0.75	4.5	17.0	0	0	0
		12:55	0:15	210	10.0	26	0.84	4.4	3.4	36	0.26	1.15	6.5	19.0	0	0	0
		13:25	0:30	240	10.0	28	0.84	5.6	4.8	38	0.44	2.2	7.0	23.5	0	0	0
		13:55	0:30	270	10.0	12	0.84	6.0	6.2	21.5	0.96	2.8	6.0	22.0	0	0	0
		14:25	0:30	300	10.0	4.0	0.92	6.4	6.6	36	1.10	3.6	6.0	24.0	0	0	0
		14:40	0:15	315	14.0	5.0	0.94	6.8	6.8	42	1.25	3.8	0.9	25.5	0	0	0
		14:55	0:15	330	14.0	4.8	0.92	7.0	7.0	46	1.10	3.6	0.9	20.5	0	0	0
		15:25	0:30	360	14.0	1.6	0.84	7.0	7.0	50	1.35	4.9	2.2	25.0	0	0	0
		15:55	0:30	390	14.0	0.9	0.84	9.6	10.0	51	1.65	5.2	3.6	27	0	0	0
		16:25	0:30	420	14.0	0.1	0.84	9.6	10.5	51	1.90	2.5	4.6	28	0	0	0
		16:40	0:15	435	18.0	1.2	0.86	9.6	12.0	52	1.95	1.65	4.6	29	0	0	0.10
		16:55	0:15	450	18.0	1.4	0.86	9.6	12.0	52	2.0	1.6	4.6	29	0	0	0.20
		17:25	0:30	480	18.0	0.0	0.86	12.0	13.0	54	2.1	1.2	5.0	29	0	0	0.24
		17:55	0:30	510	18.0	0.0	0.86	13.0	15.0	55	1.0	2.0	5.0	30	0	0	0.30
		18:25	0:30	540	18.0	0.0	0.86	13.0	15.0	54	1.0	2.0	4.8	30	0	0	0.40
		18:40	0:15	555	22.0	0.0	0.84	13.0	15.0	53	1.0	2.2	4.8	32	0	0	0.40
		18:55	0:15	570	22.0	3.6	0.84	14.0	16.0	56	0.85	1.6	5.0	35	0	0	0.44

Note: Cloudy light snow 18 to 23°F, barameter start at 29.50 at end 29.50

DETREX - Ashtabula, Ohio 4 January 2013

URS representative arrived onsite for the DNAPL Recoverability Testing - Procedure #3 – Total Fluids in the former lagoon area.

The pump is peristaltic type and is rate controllable.

A check valve was added to the peristaltic pump intake that was set at 18.5-ft in depth from top of casing stickup.

Detrex, Sunpro and URS representative personnel setup the vacuum line and the peristaltic pump line into RW-20 on the 3 of January 2012.

The Procedure #3 – Total Fluids test at RW-20 was started on 4 January 2013.

See the included DNAPL Recoverability Testing - Procedure #3 – RW20 – Total Fluids data sheet #1 and sheet #2.

The first step applied vacuum at RW-20 was first 6-Hg, second step at 10-Hg, third step at 14-Hg and the fourth step at 18-Hg.

Detrex - Ashtabula, Ohio **RW20** **DATE:** **1/4/2013**

DNAPL Recoverability Testing - Procedure #3 **Total Fluids** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time nterva [min]	Cum. Time [min]	Well Diameter (inches)	Well Depth (feet)	Depth Water (feet)	Well Vacuum (In Hg)	Air Flow (CFM)	Depth DNAPL (feet)	Purged Rate (ml/min)	Purged Total (ml)	Water Purged (ml)	DNAPL Purged (ml)	COMMENT
RW20	1/4	8:45	0:00	0	6	20.0	5.0	0	0	19.9	0	0			
		9:00	0:15	15	6	20.0	6.9	0	0	19.9	900	13500			
		9:15	0:15	30	6	20.0		0	0	19.9	600	22500			
		9:30	0:15	45	6	20.0	9.9	0	0	19.9	550	30750			Start applied vacuum of 6.0-Hg
		9:45	0:15	60	6	20.0	10.5	6.0	0	19.9	550	39000			
		10:00	0:15	75	6	20.0	12.0	6.0	0	19.9	500	46500			
		10:30	0:30	105	6	20.0	13.8	6.0	0	19.9	500	61500			
		11:00	0:30	135	6	20.0	14.7	6.0	0	19.9	500	76500			Start applied vacuum of 10.0-Hg
		11:15	0:15	150	6	20.0	14.95	10.0	0	19.9	275	80625			
		11:30	0:15	165	6	20.0	15.25	10.0	0	19.9	275	84750			
		12:00	0:30	195	6	20.0	15.65	10.0	0	19.9	250	88500			
		12:30	0:30	225	6	20.0	15.85	10.0	0	19.9	225	95250			
		13:00	0:30	255	6	20.0	15.95	10.0	0	19.9	225	102000			Start applied vacuum of 14.0-Hg
		13:15	0:15	270	6	20.0	15.75	14.0	0	19.9	10	102150			
		13:30	0:15	285	6	20.0	15.35	14.0	0	19.9	10	102300			
		14:00	0:30	315	6	20.0	14.25	14.0	0	19.9	10	102600			
		14:30	0:30	345	6	20.0	13.45	14.0	0	19.9	20	103200			
		15:00	0:30	375	6	20.0	11.1	14.0	0	19.9	50	104700			Start applied vacuum of 22.0-Hg
		15:15	0:15	390	6	20.0	12.1	18.0	0	19.9	80	105900			
		15:30	0:15	405	6	20.0	10.25	18.0	0	19.9	90	107250			
		16:00	0:30	435	6	20.0	9.0	18.0	0	19.9	100	110250			
		16:30	0:30	465	6	20.0	7.9	18.0	0	19.9	150	114750			
		17:00	0:30	495	6	20.0	6.9	18.0	0	19.9	150	119250			Applied 22.0-Hg
		17:15	0:15	510	6	20.0	6.3	22.0	0	19.9	10	119400			
		17:30	0:15	525	6	20.0	6.1	22.0	0	19.9	5	119475			End test due to intermittent flow
	1/7	8:30			6	20.0	4.5	0.0	0	19.9	0	-			

Note: All fluids purged were place into a 300-gallon container on 4 January 2013 yielding the following 32-gallons of water and 0-gallons of DNAPI

Initial silt at bottom of well at 19.9-ft after test on 7 January 2013 at 19.7-ft

Detrex - Ashtabula, Ohio **RW20** **DATE:** **1/4/2013**

DNAPL Recoverability Testing - Procedure #3 **Total Fluids/Induced Vacuum** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time [min]	Well Vacuum (In Hg)	MP 18A	MP 18B	RW 19	MP 19A	MP 19B	RW 18	MP 20A	MP 20B	MP 20C	MP 20D	MP 20F	NPZ 20-1
						Induced Vacuum (inches of water)											
RW-20	1/4	8:45	0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		9:00	0:15	15	0	0	0	0	0	0	0	0.25	0	0	0	0	0.35
		9:30	0:30	45	6.0	0	0	0	0	0	0	0.85	0	0	0	0	0.25
		10:00	0:30	75	6.0	0	0	0	0	0	0	1.5	0.46	0	0	0	0
		10:30	0:30	105	6.0	0	0	0	0	0	0	3.6	0.66	0	0	0	0.10
		11:00	0:30	135	6.0	0	0	0	0	0	0	4.7	0.80	0	0	0	0
		11:15	0:15	150	10.0	0	0	0.10	0	0	0	8	1.0	0	0	1.3	0
		11:30	0:15	165	10.0	0	0	0.15	0	0	0	13	1.0	0	0	1.6	0.15
		12:00	0:30	195	10.0	0	0	0.15	0	0	0	19	1.5	0	0	2.0	0.15
		12:30	0:30	225	10.0	0	0	0.10	0.0	0	0	23	1.7	0	0	2.2	0.20
		13:00	0:30	255	10.0	0	0	0.20	0.2	0	0	25	1.8	0	0	2.6	0.50
		13:15	0:15	270	14.0	0	0	0.25	0.5	0	0	26	1.9	0	0	2.5	0.60
		13:30	0:15	285	14.0	0	0	0.20	0.6	0	0	26	2.0	0	0	3.4	0.75
		14:00	0:30	315	14.0	0	0	0.20	1.1	0	0	28	2.4	0	0	3.4	1.25
		14:30	0:30	345	14.0	0	0	0.10	1.1	0	0	29	2.3	0	0	4.4	1.65
		15:00	0:30	375	14.0	0	0	0.12	1.4	0	0	29	2.3	0	0	4.8	2.1
		15:15	0:15	390	18.0	0	0	0.14	1.8	0	0	30	2.4	0	0	4.2	2.0
		15:30	0:15	405	18.0	0	0	0.10	2.0	0	0	31	2.4	0	0	4.2	0.3
		16:00	0:30	435	18.0	0	0	0.20	0.8	0	0	30	2.6	0	0	3.8	0.7
		16:30	0:30	465	18.0	0	0	0.15	0.9	0	0	30	2.8	0	0	3.6	0.7
		17:00	0:30	495	18.0	0	0	0.20	1.2	0	0	30	2.8	0	0	3.2	2.2
		17:15	0:15	510	22.0	0	0	0.08	1.4	0	0	30	2.8	0.15	0	3.0	1.6
		17:30	0:15	525	22.0	0	0	0	1.3	0	0	29	2.7	0.30	0	3.0	2.0

Note: Cloudy, windy, light snow 28 to 33°F, barometer start at 29.40 at end 29.34

DETREX - Ashtabula, Ohio 9 January 2013

URS representative arrived onsite for the DNAPL Recoverability Testing - Procedure #3 – Total Fluids in the former lagoon area.

The pump is peristaltic type and is rate controllable.

A check valve was added to the peristaltic pump intake that was set at 18.5-ft in depth from top of casing stickup.

Detrex and URS representative personnel setup the vacuum line and the peristaltic pump line into RW-19 on the 7 of January 2012.

The Procedure #3 – Total Fluids test at RW-19 was started on 7 January 2013.

The vacuum blower shut off during the test due to high oil temperature fault.

The blower was found to continue to produce high oil temperature fault after cooling down.

The rental trailer's representative arrived onsite to check the blower temperature fault.

The blower was found to operate with no faults.

The Procedure #3 – Total Fluids test at RW-19 was restarted on 8 January 2013.

The vacuum blower shut off during the test due to high oil temperature fault.

The rental trailer's representative arrived onsite to check the blower temperature fault.

The blower's auto oil switch/valve to the chiller was found to be not working.

The auto oil switch/valve was removed and later operations would continue with the manual oil valve to the chiller.

The Procedure #3 – Total Fluids test at RW-19 was restarted on 9 January 2013.

See the included DNAPL Recoverability Testing - Procedure #3 – RW19 – Total Fluids data sheet #1 and sheet #2.

The first step applied vacuum at RW-19 was first 6-Hg, second step at 10-Hg, third step at 14-Hg, fourth step at 18-Hg and the fifth step at 22-Hg.

Detrex - Ashtabula, Ohio **RW19** **DATE:** **1/9/2013**

DNAPL Recoverability Testing - Procedure #3 **Total Fluids** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time [min]	Well Diameter (inches)	Well Depth (feet)	Depth Water (feet)	Well Vacuum (In Hg)	Air Flow (CFM)	Depth DNAPL (feet)	Purged Rate (ml/min)	Purged Total (ml)	Water Purged (ml)	DNAPL Purged (ml)	COMMENT			Delta Water (feet)	Delta DNAPL (feet)
RW19	1/7	9:00			6	20.0	5.0	0	0	17.3	0	0			Start pump intake at 18.5				
	1/7	9:30					6.35	0	0	18.15	150				purged 1-1/2-gal DNAPL				
	1/7	10:00					10.1	0	0	18.15	600				Start 5.2-Hg applied vacuum				
	1/7	10:15						0	0		600				Vacuum blower failure, end test				
RW19	1/8	8:30			6	20.0	9.4	0	0	17.5	0	0			Start pump intake at 18.5				
	1/8	9:00					10.2	0	0	18.2	150				purged 1-1/2-gal DNAPL				
	1/8	9:30					13.1	0	0	18.2	500				Start 6.0-Hg applied vacuum				
	1/8	9:30						0	0	18.2	500				Vacuum blower failure, end test				
RW19	1/9	8:20	0:00	0	6	20.0	9.8	0	0	17.1	0	0			Start pump intake at 18.5	0	0	(4.80)	0.20
	1/9	8:40	0:20	20			10.3	0	0	18.15	150	3000				0	20	(5.30)	(0.85)
	1/9	9:00	0:20	40			11.5	0	0	18.15	500	13000			Start 6.0-Hg applied vacuum	0	20	(6.50)	(0.85)
	1/9	9:15	0:15	55			12.5	6.0	0	18.15	450	19750				0	15	(7.50)	(0.85)
	1/9	9:30	0:15	70			13.25	6.0	0	18.15	450	26500				0	15	(8.25)	(0.85)
	1/9	10:00	0:30	100			14.65	6.0	0	18.15	400	38500				0	30	(9.65)	(0.85)
	1/9	10:30	0:30	130			15.9	6.0	0	18.15	350	49000				0	30	(10.90)	(0.85)
	1/9	11:00	0:30	160			16.7	6.0	0	18.15	350	59500			Start 10.0-Hg applied vacuum	0	30	(11.70)	(0.85)
	1/9	11:15	0:15	175			16.65	10.0	0	18.15	100	61000				0	15	(11.65)	(0.85)
	1/9	11:30	0:15	190			16.8	10.0	0	18.15	125	62875				0	15	(11.80)	(0.85)
	1/9	11:45	0:15	205			16.85	10.0	0	18.15	125	64750				0	15	(11.85)	(0.85)
	1/9	12:00	0:15	220			16.85	10.0	0	18.15	125	66625				0	15	(11.85)	(0.85)
	1/9	12:30	0:30	250			16.8	10.0	0	18.15	125	70375				0	30	(11.80)	(0.85)
	1/9	13:00	0:30	280			16.95	10.0	0	18.15	125	74125			Start 14.0-Hg applied vacuum	0	30	(11.95)	(0.85)
	1/9	13:30	0:30	310			16.45	14.0	0	18.15	50	75625				0	30	(11.45)	(0.85)
	1/9	14:00	0:30	340			16.45	14.0	0	18.15	50	77125				0	30	(11.45)	(0.85)
	1/9	14:30	0:30	370			15.95	14.0	0	18.1	50	78625				0	30	(10.95)	(0.80)
	1/9	15:00	0:30	400			15.9	14.0	0	18.15	40	79825			Start 18.0-Hg applied vacuum	0	30	(10.90)	(0.85)
	1/9	15:30	0:30	430			15.8	18.0	0	18.15	40	81025				0	30	(10.80)	(0.85)
RW19	1/9	16:00	0:30	460			15.0	18.0	0	18.15	40	82225				0	30	(10.00)	(0.85)
RW19	1/9	16:30	0:30	490			14.4	18.0	0	18.2	20	82825				0	30	(9.40)	(0.90)
	1/9	17:00	0:30	520			14.3	18.0	0	18.2	20	83425				0	30	(9.30)	(0.90)
	1/9	17:30	0:30	550			14.1	18.0	0	18.2	20	84025			Start 22.0-Hg applied vacuum	0	30	(9.10)	(0.90)
	1/9	18:00	0:30	580			13.5	22.0	0	18.2	20	84625				0	30	(8.50)	(0.90)
	1/9	18:30	0:30	610			13.2	22.0	0	18.2	20	85225			End test	0	30	(8.20)	(0.90)
	1/10	9:30					12.4	0	0	18.1	0	-							

Note: All fluids purged on 9 January 2013 were place into 55-gallon drum then separated on 10 January 2013 yielding the following
2.5-gallons of dark DNAPL, 1/4-gallon of brown DNAPL/water and 21-gallons of water.
Initial silt at bottom of well at 19.9-ft after test on 9 January 2013 at 19.9-ft

DNAPL in well from 20.0-17.1=2.9ft*1.63gal/ft=4.73gal*3785ml/gal=17892 ml
Intake at 18.5-ft DNAPL volume in well, recoverable, 18.5-18.2=0.3ft*1.63gal/ft=0.49gal*3785ml/gal=1851 **ml**

Note:
(0.2) = Decrease Thickness
(0.2 = Increase Thickness

From Applied Vacuum	
DNAPL Rec. Rate =	**11 mL/min**
Rate DNAPL Entry =	**8 mL/min**

0.003 gpm
0.002 gpm

Detrex - Ashtabula, Ohio **RW19** **DATE:** **1/9/2013**

DNAPL Recoverability Testing - Procedure #3 **Total Fluids/Induced Vacuum** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time [min]	Well Vacuum (In Hg)	RW 18	MP 18A	MP 18B	MP 19A	MP 19B	RW 20	MP 20A	MP 20B	MP 20C	MP 20D	MP 20F	NPZ 20-1
						Induced Vacuum (inches of water)											
RW-19	1/9	9:30	0:00	0	6	0	0	0	0	0	0	0	0	0	0	0	0
		9:45	0:15	15	6.0	0	0	0	0	0	0	0	0	0	0	0	0
		10:00	0:15	30	6.0	0	0	0	0.15	0	0	0	0	0	0	0	0
		10:30	0:30	60	6.0	0	0	0	2.5	0	0	0	0	0	0	0	0
		11:00	0:30	90	6.0	0	0	0	4.7	0	0	0	0	0	0	0	0
		11:15	0:15	105	10.0	0	0	0	4.0	0	0	0	0	0	0	0	0
		11:30	0:15	120	10.0	0	0	0	3.8	0	0	0	0	0	0	0	0
		12:00	0:30	150	10.0	0	0	0	3.8	0	0	0	0	0	0	0	0
		12:30	0:30	180	10.0	0	0	0	3.6	0	0	0	0	0	0	0	0
		13:00	0:30	210	10.0	0	0	0	3.4	0.38	0	0	0	0	0	0	0
		13:30	0:30	240	14.0	0	0	0	3.0	2.1	0	0	0	0	0	0	0
		14:00	0:30	270	14.0	0.20	0	0	3.8	3.0	0	0	0	0	0	0	0
		14:30	0:30	300	14.0	1.00	0	0	3.6	3.6	0	0	0	0	0	0	0
		15:00	0:30	330	14.0	1.00	0	0	2.4	2.2	0	0	0	0	0	0	0
		15:30	0:30	360	18.0	1.50	0	0	3.5	5.5	0.06	0	0	0	0	0	0
		16:00	0:30	390	18.0	1.65	0	0	5.0	7.8	0.08	0	0	0	0	0	0
		16:30	0:30	420	18.0	1.85	0	0	5.0	10.0	0.06	0	0	0	0	0	0
		17:00	0:30	450	18.0	1.85	0	0	4.8	11.0	0.06	0	0	0	0	0	0
		17:30	0:30	480	18.0	1.60	0	0	4.8	13.0	0.06	0	0	0	0	0	0
		18:00	0:30	510	22.0	1.00	0	0	4.3	13.5	0.06	0	0	0	0	0	0
		18:30	0:30	540	22.0	1.00	0	0	4.3	15.0	0.06	0	0	0	0	0	0

Note: Rain 36 to 40°F, barometer start at 28.92 at end 28.85

DETREX - Ashtabula, Ohio 16 January 2013

URS representative arrived onsite for the DNAPL Recoverability Testing - Procedure #4 in the former lagoon area.

Sunpro and URS representative personnel setup combined vacuum line to RW-15, RW-16 and RW-17 on the 15 of January 2013.

The Procedure #4 test was started at RW-15, RW-16 and RW-17 on 16 January 2013.

The vacuum was applied 25.0-Hg for 3-hours at RW-15, RW-16 and RW-17

See the included DNAPL Recoverability Testing - Procedure #4 RW15 RW-16 RW-17 data sheet #1 and sheet #2.

DETREX - Ashtabula, Ohio **RW15 RW16 RW17** **DATE: 1/16/2013**

DNAPL Recoverability Testing - Procedure #4 **URS onsite Tech: Charles Siegel**

Date	Time	Time Interval [min]	Cum. Time [min]	Applied Vacuum (In Hg)	RW15				RW16				RW17				COMMENT
					RW-15 Depth Water (feet)	Purged Water (gal)	RW-15 Depth DNAPL (feet)	Purged DNAPL (gal)	RW-16 Depth Water (feet)	Purged Water (gal)	RW-16 Depth DNAPL (feet)	Purged DNAPL (gal)	RW-17 Depth Water (feet)	Purged Water (gal)	RW-17 Depth DNAPL (feet)	Purged DNAPL (gal)	
1/15	10:30	0:00	0	0	3.7		24.9		3.4		23.8		3.0		23.55		Start purge RW15
	11:30	1:00	60	0	10.0		24.9										
	12:00	0:30	90	0	15.5		24.9										Start purge RW16
	12:30	0:30	120	0					5.0		23.8						
	13:00	0:30	150	0					9.0								
	13:30	0:30	180	0					10.5								
	14:00	0:30	210	0	15.0		24.9		11.5								
	14:30	0:30	240	0					13.0								
	15:00	0:30	270	0	14.5		24.9		14.2								
	15:30	0:30	300	0	14.0		25.4		15.0		25.8						
1/16	8:30	17:00	1320	0	6.5		25.4		5.0		25.8		3.6		23.5		Start purge RW15, RW17
	9:00	0:30	1350	0	12.8		25.4						13.8		24.0		
	9:15	0:15	1365	0	15.8		25.4						22.9		25.2		
	9:20	0:05	1370	0					5.0		25.8		22.3		25.3		Start purge RW16
	9:30	0:10	1380	0	19.0		25.4		11.0		25.8		22.3		25.3		Stop purging RW17
	9:45	0:15	1395	0	23.5		25.2		14.0		25.8						Stop purging RW15
	10:00	0:15	1410	0	22.7		25.2		23.8		25.8		20.9		23.6		Stop purging RW16
	10:20	0:20	1430	0													Start vacuum 25.0-Hg
	10:30	0:10	1440	25.0	21.5		25.1		22.0		25.8		19.6		22.8		
	11:00	0:30	1470	25.0	19.3		25.0		17.0		25.8		16.6		22.45		
	12:00	1:00	1530	25.0	14.45		24.5		10.8		25.6		12.2		22.0		
	13:00	1:00	1590	25.0	9.4		24.15		6.25		25.45		8.3		21.7		
	13:30	0:30	1620	25.0	7.2		24.1		4.4		25.4		6.7		21.5		Stop applied vacuum
1/17	15:15	1:45	3165	0.0	5.0		24.6		5.0		25.6		5.6		22.3		

Note: Purged 0.5-gallons of DNAPL from RW15 and 5-gallons of DNAPL from RW17.

Purged the water from RW15, RW16 and RW17 to above listed depths before applying vacuum.

After on 17 January 2013 at RW15 silt at 25.5-ft, RW16 silt at 25.7-ft and RW17 silt at 25.6-f

After on 17 January 2013 purged 8.3-gallons of DNAPL from RW17

		RW-15 Delta Water (feet)	RW-15 Delta DNAPL (feet)	RW-16 Delta Water (feet)	RW-16 Delta DNAPL (feet)	RW-17 Delta Water (feet)	RW-17 Delta DNAPL (feet)
0	0	0.00	0.00	0.00	0.00	0.00	0.00
1	0	(6.30)	0.00				
0	30	(11.80)	0.00				
0	30			(1.60)	0.00		
0	30			(5.60)			
0	30			(7.10)			
0	30	(11.30)	0.00	(8.10)			
0	30			(9.60)			
0	30	(10.80)	0.00	(10.80)			
0	30	(10.30)	(0.50)	(11.60)	(2.00)		
17	0	(2.80)	(0.50)	(1.60)	(2.00)	(0.60)	0.05
0	30	(9.10)	(0.50)			(10.80)	(0.45)
0	15	(12.10)	(0.50)			(19.90)	(1.65)
0	5			(1.60)	(2.00)	(19.30)	(1.75)
0	10	(15.30)	(0.50)	(7.60)	(2.00)	(19.30)	(1.75)
0	15	(19.80)	(0.30)	(10.60)	(2.00)		
0	15	(19.00)	(0.30)	(20.40)	(2.00)	(17.90)	(0.05)
0	20						
0	10	(17.80)	(0.20)	(18.60)	(2.00)	(16.60)	0.75
0	30	(15.60)	(0.10)	(13.60)	(2.00)	(13.60)	1.10
1	0	(10.75)	0.40	(7.40)	(1.80)	(9.20)	1.55
1	0	(5.70)	0.75	(2.85)	(1.65)	(5.30)	1.85
0	30	(3.50)	0.80	(1.00)	(1.60)	(3.70)	2.05
1	45	(1.30)	0.30	(1.60)	(1.80)	(2.60)	1.25

Note:

(0.2) = Decrease Thickness

(0.2 = Increase Thickness

From Applied Vacuum

DNAPL Rec. Rate (RW-15) =	**38**	**mL/min**
DNAPL Rec. Rate (RW-16) =	**14**	**mL/min**
DNAPL Rec. Rate (RW-17) =	**72**	**mL/min**

0.010 gpm
0.004 gpm
0.019 gpm

DETREX - Ashtabula, Ohio **RW15 RW16 RW17** **DATE: 1/11/2013**

DNAPL Recoverability Testing - Procedure #4 **Induced Vacuum** **URS onsite Tech: Charles Siegel**

Well ID RW	Date	Time	Time Interval [min]	Cum. Time [min]	Well Vacuum (In Hg)	MP 15A	MP 15B	MP 15C	MP 15D	MP 16A	MP 16B	MP 16C	MP 17A	MP 17B	MW 1	DPT 7	NPZ 17-7
						Induced Vacuum (inches of water)											
15,16,17	1/16	10:20	0:00	0	0	26	0.90	4.0	7.0	34	8.0	6.6	6.0	2.8	0	0	0
		10:30	0:10	10	25.0	60	2.2	6.4	13.5	88	12.0	11.0	12.0	4.0	0	0	0
		10:45	0:15	25	25.0	86	2.2	17.0	27	92	2.4	17.0	17.5	5.5	0.25	0	0
		11:00	0:15	40	25.0	98	2.0	15.0	32	100	6.0	21.0	20.0	7.5	0.25	0	0
		11:30	0:30	70	25.0	98	2.2	21	34	96	7.0	21.5	15.0	10.0	0.30	0	0.30
		12:00	0:30	100	25.0	102	2.2	26	32	80	6.2	19.0	12.0	13.0	0.25	0	0.30
		12:30	0:30	130	25.0	90	1.8	28	32	64	4.8	16.0	3.0	15.0	0.25	0	0.30
		13:00	0:30	160	25.0	90	2.6	32	28	54	5.6	15.5	4.0	14.0	0.25	0	0.30
		13:30	0:30	190	25.0	80	2.3	30	26	40	2.8	12.0	1.5	12.0	0.25	0	0.45

Note: Cloudy to sunny, 28 to 34°F, barometer start at 29.45 at end 29.52

DETREX - Ashtabula, Ohio 14 January 2013

URS representative arrived onsite for the DNAPL Recoverability Testing - Procedure #4 in the former lagoon area.

Sunpro and URS representative personnel setup combined vacuum line to RW-18, RW-19 and RW-20 on the 11 of January 2013.

The Procedure #4 test was started at RW-18, RW-19 and RW-20 on 14 January 2013.

The vacuum was applied 25.0-Hg for 2-hours at RW-18, RW-19 and RW-20

See the included DNAPL Recoverability Testing - Procedure #4 RW18 RW-19 RW-20 data sheet #1 and sheet #2.

DETREX - Ashtabula, Ohio **RW18 RW19 RW20** **DATE: 1/14/2013**

DNAPL Recoverability Testing - Procedure #4 **URS onsite Tech: Charles Siegel**

Date	Time	Time Interval [min]	Cum. Time [min]	Applied Vacuum (In Hg)	RW18				RW19				RW20				COMMENT
					RW-18 Depth Water (feet)	Purged Water (gal)	RW-18 Depth DNAPL (feet)	Purged DNAPL (gal)	RW-19 Depth Water (feet)	Purged Water (gal)	RW-19 Depth DNAPL (feet)	Purged DNAPL (gal)	RW-20 Depth Water (feet)	Purged Water (gal)	RW-20 Depth DNAPL (feet)	Purged DNAPL (gal)	
1/14	8:15	0:00	0	0	4.0		20.0		4.5		17.4		4.0		19.8		
	8:30	0:15	15	0													Start purge RW18
	10:00	1:30	105	0	16.5		20.00										
	10:30	0:30	135	0	17.8		20.00										Start purge RW19
	11:00	0:30	165	0					10.7		20.0						
	11:30	0:30	195	0					14.3		20.0						
	12:00	0:30	225	0	14.8		20.00		16.6		20.0						
	12:30	0:30	255	0					18.0		19.6						Start purge RW20
	13:00	0:30	285	0	13.7		20.00						12.0		20.0		
	13:30	0:30	315	0	13.0		20.00		17.3		19.6		15.6		19.9		Stop purging
	14:00	0:30	345	0	12.5		20.00		17.1		19.6		15.6		19.9		
	14:10	0:10	355	0	15.6		20.00										Start vacuum 25.0-Hg
	14:40	0:30	385	25.0	11.5		20.00										
	14:55	0:15	400	25.0	8.45		20.00										
	15:40	0:45	445	25.0	6.8		20.00		14.0		19.1		5.3		19.7		
	16:10	0:30	475	25.0	5.4		20.00		13.2		19.0		2.3		19.7		stop applied vacuum
1/15	9:30	17:20	1515	0	6.05		20.00		8.8		19.0		4.7		19.9		
1/16	8:45	23:15	2910	0	4.3		20.00		4.8		18.9		4.3		19.9		

Note: Purged 4-gallons of DNAPL from RW19. Then the water from RW18, RW19 and RW20 to above listed depths before applying vacuum.
All fluids purged were place into 300-gallon container

		RW-18 Delta Water (feet)	RW-18 Delta DNAPL (feet)	RW-19 Delta Water (feet)	RW-19 Delta DNAPL (feet)	RW-20 Delta Water (feet)	RW-20 Delta DNAPL (feet)
0	0	0.00	0.00	0.00	0.00	0.00	0.00
0	15						
1	30						
0	30	(13.80)	0.00				
0	30			(6.20)	(2.60)		
0	30			(9.80)	(2.60)		
0	30	(10.80)	0.00	(12.10)	(2.60)		
0	30			(13.50)	(2.20)		
0	30	(9.70)	0.00			(8.00)	(0.20)
0	30	(9.00)	0.00	(12.80)	(2.20)	(11.60)	(0.10)
0	30	(8.50)	0.00	(12.60)	(2.20)	(11.60)	(0.10)
0	10	(11.60)	0.00				
0	30	(7.50)	0.00				
0	15	(4.45)	0.00				
0	45	(2.80)	0.00	(9.50)	(1.70)	(1.30)	0.10
0	30	(1.40)	0.00	(8.70)	(1.60)	1.70	0.10
17	20	(2.05)	0.00	(4.30)	(1.60)	(0.70)	(0.10)
23	15	(0.30)	0.00	(0.30)	(1.50)	(0.30)	(0.10)

Note:

(0.2) = Decrease Thickness

(0.2 = Increase Thickness

From Applied Vacuum

DNAPL Rec. Rate (RW-18) =	**0**	**mL/min**
DNAPL Rec. Rate (RW-19) =	**41**	**mL/min**
DNAPL Rec. Rate (RW-20) =	**14**	**mL/min**

0.000 gpm
0.011 gpm
0.004 gpm

DETREX - Ashtabula, Ohio **RW18 RW19 RW20** **DATE: 1/14/2013**

DNAPL Recoverability Testing - Procedure #4 **Induced Vacuum** **URS onsite Tech: Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time [min]	Well Vacuum (In Hg)	MP 18A	MP 18B	MP 19A	MP 19B	MP 20A	MP 20B	MP 20C	MP 20D	MP 20E	MP 20F	MP 20G	NPZ 20-1
						Induced Vacuum (inches of water)											
18,19,20	1/14	14:10	0:00	0	0	50	10.0	5	10.0	13.0	7.0	0.8	0	0	0	0	0
		14:25	0:15	15	20.0	90	16.0	3.4	26	18.0	12.0	5.5	0	0	0.8	0	0
		14:40	0:15	30	20.0	100	21.5	3.4	5.8	28	14.0	6.5	0.24	0	2.1	0	0.40
		14:55	0:15	45	25.0	100	25.0	9.4	11.0	36	16.0	7.0	0.70	0	2.0	0	0.45
		15:10	0:15	60	25.0	62	28	11.0	12.0	38	20.0	6.0	1.10	0	2.1	0	0.75
		15:40	0:30	90	25.0	64	32	22	12.0	50	23.0	7.0	2.00	0.10	2.0	0	1.05
		16:10	0:30	120	25.0	58	30	27	5.0	52	22.0	4.5	1.80	0.10	1.0	0	1.75
		8:30			0	0	0	0	0	0	0	0	1.80	0.20	0	0	2.20

Note: Cloudy, 28 to 40°F, barameter start at 29.20 at end 29.40

DETREX - Ashtabula, Ohio 23 January 2013

URS representative arrived onsite for the DNAPL Recoverability Testing – 3-day Dual Pumps in the former lagoon area.

Sunpro and URS representative personnel setup the dual Pump Works pumps and vacuum line to RW-17 on the 23 of January 2013.

The test was started at RW-17 on 23 January 2013.

The vacuum was applied at 10.0-Hg at RW-17.

After 4-hours the DNAPL pump stopped working due to water entering into the electrical conduit line down well.

DETREX - Ashtabula, Ohio 29 January 2013

URS representative arrived onsite for the DNAPL Recoverability Testing – 3-day with Dual Pumps in the former lagoon area.

This test was started at RW-17 on 29 January 2013.

Initially the DNAPL and water was manually purged with the large peristaltic pump.

Then vacuum was applied 10.0-Hg at RW-17.

After 29-hours the water pump stopped working, later water was purged with the large peristaltic pump.

See the included DNAPL Recoverability Testing - RW-17 – 3-day with Dual Pumps data sheet #1 and sheet #2.

DETREX - Ashtabula, Ohio **RW17** **DATE:** **1/29/2013**

DNAPL Recoverability Testing - 3 Day **Dual Pumps/Induced Vacuum** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval (min)	Cum. Time (min)	Well Vacuum (in Hg)	MP 17A	MP 17B	RW 15	MP 15A	MP 15B	MP 15C	MP 15D	RW 16	MP 16A	MP 16B	MP 16C	NPZ-7
						Induced Vacuum (inches of water)											
RW-17		8:50	0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		9:20	0:30	30	0	0.50		0	0	0	0	0	0	0	0		
		9:50	0:30	60	0	2.80		0	0	0	0	0	0	0	0		
		10:20	0:30	90	0	5.6		0	0	0	0	0	0	0	0		
		10:50	0:30	120	0	7.0	0.50	0	0	0	0	0	0	0	0		
		11:05	0:15	135	10.0	8.0	1.10	0	0	0	0	0	0	0	0		
		11:20	0:15	150	10.0	10.5	1.80	0	0	0		0					
		11:50	0:30	180	10.0	12.0	2.5	0	0	0		0					
		12:20	0:30	210	10.0	13.0	3.0	0	0	0		0					
		12:50	0:30	240	10.0	12.0	3.0	0	0	0		0					
		13:50	1:00	300	10.0	5.0	3.0	0	0	0		0					
		14:50	1:00	360	10.0	4.0	2.5	0	0	0		0					
		15:20	0:30	390	10.0	18.0	3.6	0	0			0					
		15:50	0:30	420	10.0	16.0	3.6	0	0			0					
		16:50	1:00	480	10.0	10.0	2.8	0	0			0					
		17:50	1:00	540	10.0	0	3.0	0	0			0					
		18:50	1:00	600	10.0	0	0.2	0	0			0					
		20:50	2:00	720	10.0	23.0	0.75	0				0					
		21:50	1:00	780	10.0	22.0	1.00	0.20				0					
		22:50	1:00	840	10.0	22.0	0	0.20				0					
		23:50	1:00	900	10.0							0					

Note:

DETREX - Ashtabula, Ohio **RW17** **DATE:** **1/29/2013**

DNAPL Recoverability Testing - 3-Day **Dual Pumps** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time [min]	Well Diameter (inches)	Well Depth (feet)	Depth Water (feet)	Well Vacuum (In Hg)	Air Flow (CFM)	Depth DNAPL (feet)	Water Rate (ml/min)	Water Purged (ml)	DNAPL Rate (ml/min)	DNAPL Purged (ml)	COMMENT
RW-17	1/29	8:20	0:00	0	6	26.0	3.5	0	0	23.9	0	0		3785	purged 1-gallon of DNAPL
		8:50	0:30	30			4.0	0	0	24.5	0	0		3785	start water pump intake at 18.7
		9:20	0:30	60			7.85	0	0	24.3	1000	30000		3785	
		9:50	0:30	90			10.0	0	0	24.1	700	51000		3785	
		10:20	0:30	120			12.85	0	0	24.15	600	69000		3785	
		10:50	0:30	150			15.3	0	0	24.0	600	78000		3785	Start applied vacuum of 10-Hg
		11:05	0:15	165			16.8	10	0	23.8	400	84000		3785	
		11:20	0:15	180			16.95	10	0	23.8	300	88500		3785	
		11:50	0:30	210			16.4	10	0	23.6	350	99000		3785	
		12:20	0:30	240			15.75	10	0	23.4	350	109500		3785	
		12:50	0:30	270			16.05	10	0	23.3	300	118500		3785	
		13:50	1:00	330			17.45	10	0	23.0	250	126000	46	15140	purge 3-gallons of DNAPL
		14:20	0:30	360			19.1		0	24.4	300	135000		15140	
		14:50	0:30	390			16.6	10	0	23.9	250	142500		15140	
		15:20	0:30	420			15.2	10	0	23.8	300	151500		15140	
		15:50	0:30	450			15.8	10	0	23.5	300	160500		15140	
		16:50	1:00	510			16.3	10	0	23.15	300	178500		15140	
		17:50	1:00	570			15.9	10	0	22.9	250	193500		15140	
		18:50	1:00	630			14.85	10	0	22.4	200	205500	50	30280	purge 4-gallons of DNAPL
		19:20	0:30	660			18.2		0	24.0	100	208500		30280	
		19:50	0:30	690			18.2	10	0	23.6	75	210750		30280	
		20:50	1:00	750			17.9	10	0	23.3	75	215250		30280	
		21:50	1:00	810			17.4	10	0	23.0	75	219750		30280	
		22:50	1:00	870			17.25	10	0	22.6	100	225750		30280	
		23:50	1:00	930			16.9	10	0	22.4	150	234750		30280	

DETREX - Ashtabula, Ohio **RW17** **DATE:** **1/29/2013**

DNAPL Recoverability Testing - 3-Day **Dual Pumps** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time [min]	Well Diameter (inches)	Well Depth (feet)	Depth Water (feet)	Well Vacuum (In Hg)	Air Flow (CFM)	Depth DNAPL (feet)	Water Rate (ml/min)	Water Purged (ml)	DNAPL Rate (ml/min)	DNAPL Purged (ml)	COMMENT
RW-17	1/30	0:50	1:00	990	6	26.0	16.6	10	0	22.2	150	243750		30280	
		1:50	1:00	1050			19.0	10	0	23.0	50	246750	18	37850	purge 2-gal DNAPL, 4.5-gal water
		2:50	1:00	1110			18.0	10	0	22.9	50	249750		37850	
		3:50	1:00	1170			16.95	10	0	22.7	50	252750		37850	
		4:50	1:00	1230			17.5	10	0	22.4	50	255750	42	45420	purge 2-gal DNAPL, 5-gal water
		5:50	1:00	1290			18.1	10	0	23.1	0	255750		45420	
		6:50	1:00	1350			16.85	10	0	23.0	50	258750		45420	
		7:50	1:00	1410			14.4	10	0	22.8	50	261750		45420	
		8:50	1:00	1470			14.0	10	0	22.6	50	264750		45420	
		9:50	1:00	1530			13.6	10	0	22.6	100	270750		45420	purge 6-gallons of water
		10:20	0:30	1560			17.4	10	0	22.5	0	270750		45420	
		10:50	0:30	1590			17.0	10	0	22.4	0	270750		45420	
		11:50	1:00	1650			16.0	10	0	22.1	0	270750		45420	purge 6-gallons water
		12:50	1:00	1710			14.9	10	0	21.9	50	273750		45420	
		13:50	1:00	1770			12.1	10	0	21.8	150	282750		45420	purge 9-gallons water
		14:50	1:00	1830			14.8	10	0	21.5	0	282750	38	68130	purge 6-gallons DNAPL
		15:50	1:00	1890			16.9	10	0	24.6	0	282750		68130	
		16:50	1:00	1950			14.6	10	0	24.3	0	282750		68130	
		17:50	1:00	2010			14.4	10	0	24.3	0	282750		68130	purge 8-gallons water
		18:50	1:00	2070			17.6	10	0	23.6	0	282750		68130	
		19:50	1:00	2130										68130	
		20:50	1:00	2190										68130	
		21:50	1:00	2250										68130	

DETREX - Ashtabula, Ohio **RW17** **DATE:** **1/29/2013**

DNAPL Recoverability Testing - 3-Day **Dual Pumps** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time [min]	Well Diameter (inches)	Well Depth (feet)	Depth Water (feet)	Well Vacuum (In Hg)	Air Flow (CFM)	Depth DNAPL (feet)	Water Rate (ml/min)	Water Purged (ml)	DNAPL Rate (ml/min)	DNAPL Purged (ml)	COMMENT
RW-17	1/31	0:50	3:00	2430	6	26.0	15.3	10	0	23.3				68130	
		1:50	1:00	2490			12.3	10	0	23.3				68130	purge 8-gallons water
		2:50	1:00	2550			14.9	10	0	23.3				68130	
		3:50	1:00	2610			12.9	10	0	23.3				68130	purge 9-gallons water
		4:50	1:00	2670			15.3	10	0	23.3				68130	
		5:50	1:00	2730			13.0	10	0	23.3				68130	purge 7-gallons water
		6:50	1:00	2790			15.2	10	0	23.3				68130	
		7:50	1:00	2850			14.4	10	0	23.3				68130	purge 8-gallons water
		8:50	1:00	2910			15.9	10	0	23.4				90840	
		9:50	1:00	2970			14.9	10	0	23.3			20	90840	purge 6-gallons DNAPL
		10:20	0:30	3000			16.6	10	0	24.7				90840	
		10:50	0:30	3030			15.3	10	0	24.7				90840	
		11:50	1:00	3090			14.0	10	0	24.7				90840	
		12:50	1:00	3150			11.7	10	0	24.7				90840	purge 12-gallons water
		13:50	1:00	3210			15.2	10	0	24.7				90840	
		14:50	1:00	3270			13.4	10	0	24.6				90840	
		15:50	1:00	3330			11.2	10	0	24.6				90840	purge 12-gallons water
		16:50	1:00	3390			15.8	10	0	24.6				90840	
		17:50	1:00	3450			13.50	10	0	23.6			16	98410	purge 4-gallon DNAPL/water
		18:50	1:00	3510			13.7	10	0	24.3				98410	
		19:50	1:00	3570			11.8	10	0	24.3				98410	
		20:50	1:00	3630			15.6	10	0	23.7				98410	
		21:50	1:00	3690			13.0	10	0	23.7				98410	
		22:50	1:00	3750			15.80	10	0	23.6				98410	
		23:50	1:00	3810			13.4	10	0	23.4				98410	

DETREX - Ashtabula, Ohio **RW17** **DATE:** **1/29/2013**

DNAPL Recoverability Testing - 3-Day **Dual Pumps** **URS onsite Tech:** **Charles Siegel**

Well ID	Date	Time	Time Interval [min]	Cum. Time [min]	Well Diameter (inches)	Well Depth (feet)	Depth Water (feet)	Well Vacuum (In Hg)	Air Flow (CFM)	Depth DNAPL (feet)	Water Rate (ml/min)	Water Purged (ml)	DNAPL Rate (ml/min)	DNAPL Purged (ml)	COMMENT
RW-17	2/1	0:50	1:00	3870			11.90	10	0	23.1				98410	
		1:50	1:00	3930			16.60	10	0	23.1				98410	
		2:50	1:00	3990			13.90	10	0	23.0				98410	
		3:50	1:00	4050			12.00	10	0	23.0				98410	
		4:50	1:00	4110			15.00	10	0	22.8				98410	
		5:50	1:00	4170			12.80	10	0	22.7				102195	purge 1-gallon DNAPL
		6:50	1:00	4230			16.60	10	0	23.0				102195	
		7:50	1:00	4290			15.00	10	0	22.9			11	105980	purge 1-gallon DNAPL
		8:50	1:00	4350			17.50	10	0	23.8				105980	
		9:50	1:00	4410			14.00	10	0	22.7				105980	
		10:50	1:00	4470			11.90	10	0	22.6				105980	
		11:50	1:00	4530				10	0						

Note: After 24-hours of operation, measured 125-gallons of purged water placed in onsite container.

APPENDIX D

DNAPL RECOVERABILITY TESTING STATUS SUMMARY PRESENTATION – FEBRUARY 2013

URS

DNAPL Recoverability Testing Status Summary

Detrex Site – Former Lagoon Area

FEBRUARY 2013

Meeting Agenda

URS

Topics

- Overview
- Work Completed
- Data Summary
- Preliminary Conclusions
- Discussion
- Path Forward
- Site Tour (Equipment and Testing Procedures)

OVERVIEW

URS

Overview

- Based on USEPA-approved Enhanced DNAPL Recovery Testing Work Plan
- Plan consisted of:
  - Seventeen (17) pilot Geoprobe locations to site new recovery wells (see attached)
  - Installation of 6 newly installed DNAPL recovery wells (see attached)
  - Installation of a network of thirty-seven (37) observation points (see attached)
- Surveying /Re-development / Preliminary gauging
- Testing of enhanced DNAPL recovery techniques
  - Water or DNAPL only (Procedure #1)
  - Dual-phase vacuum enhanced (DPE) / Dual Pumps (Procedure #2)
  - DPE / Total Fluids (Procedure #3)
  - Applied Vacuum / DNAPL only recovery (Procedure #4)
- Data Evaluation
- Detrex/USEPA Technical Meeting
- Reporting

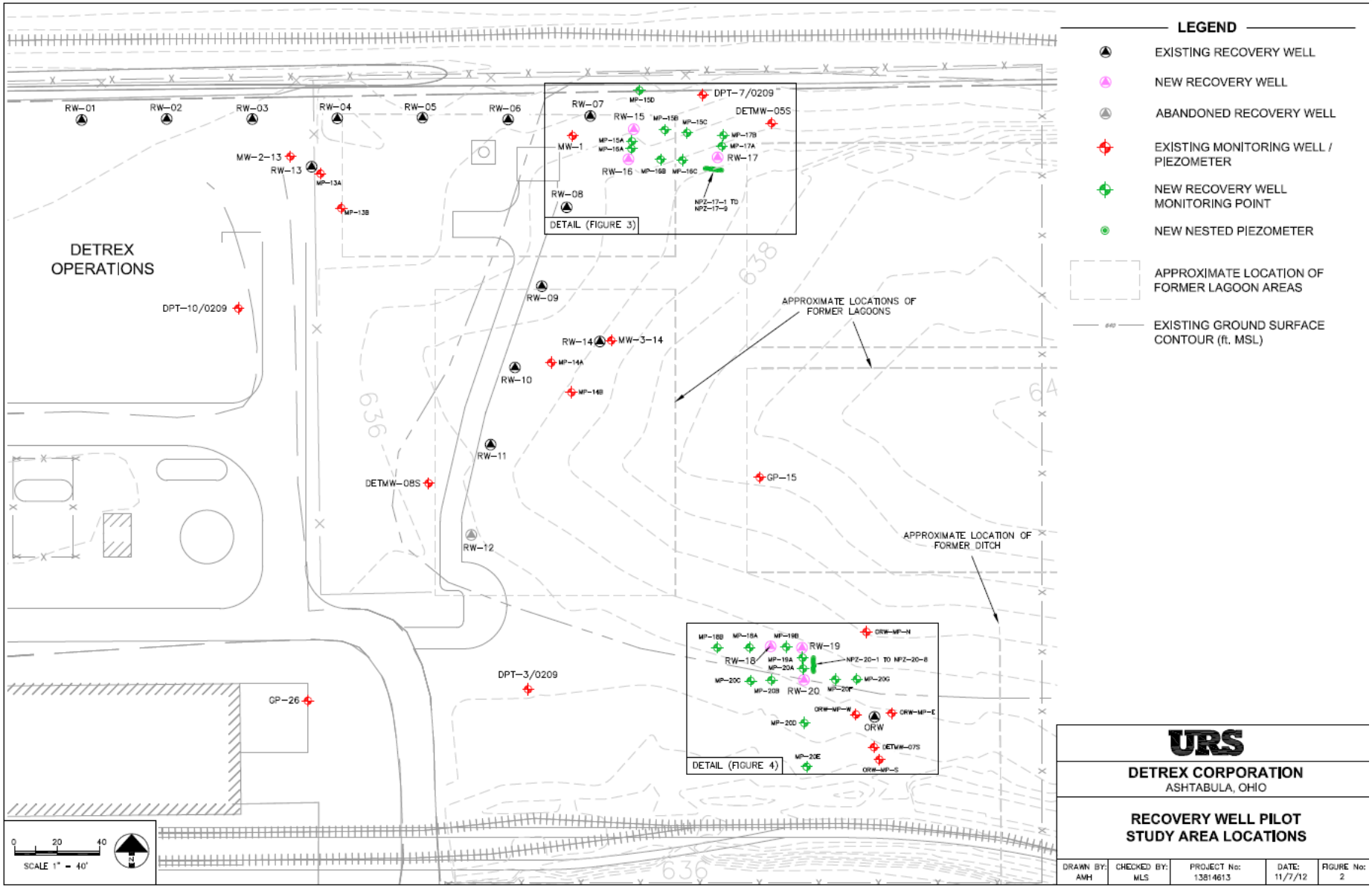
WORK COMPLETED

Work Completed

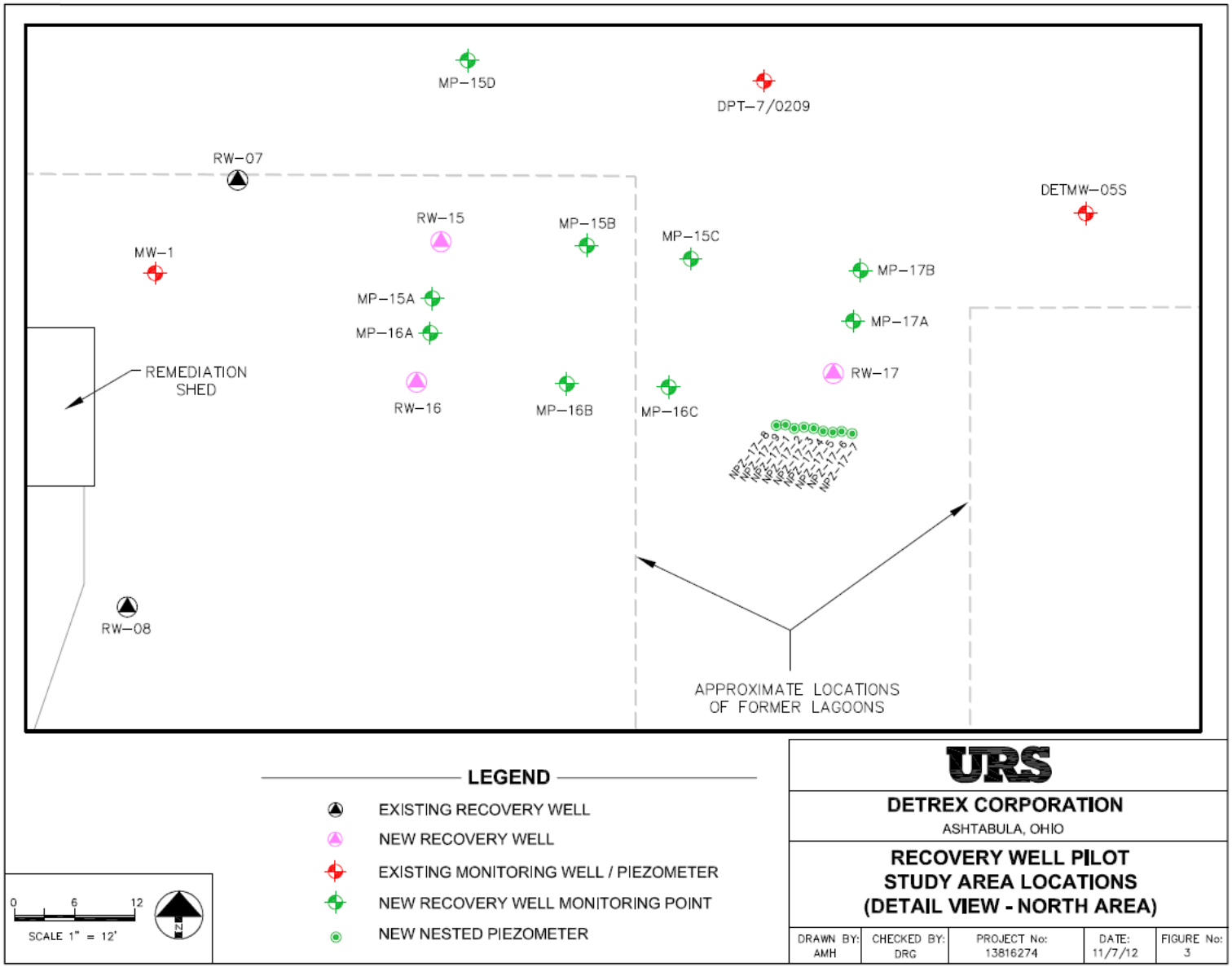
URS

- New DNAPL Recovery wells
  - North Area – 3 locations (RW-15 / RW-16 / RW-17)
  - South Area – 3 locations (RW-18 / RW-19 / RW-20)
- Observation Well Network
  - North Area – nineteen (19) observation point locations
  - South Area - eighteen (18) observation point locations
- Surveying / Re-development / Preliminary Gauging
  - All wells re-developed using vacuum truck and surging
    - Prior to re-development wells had measureable silt in sumps and screen intervals
    - Following re-development all wells essentially silt free
  - After installation all wells were surveyed for horizontal and vertical control
  - Well gauging completed
    - Water level
    - DNAPL level

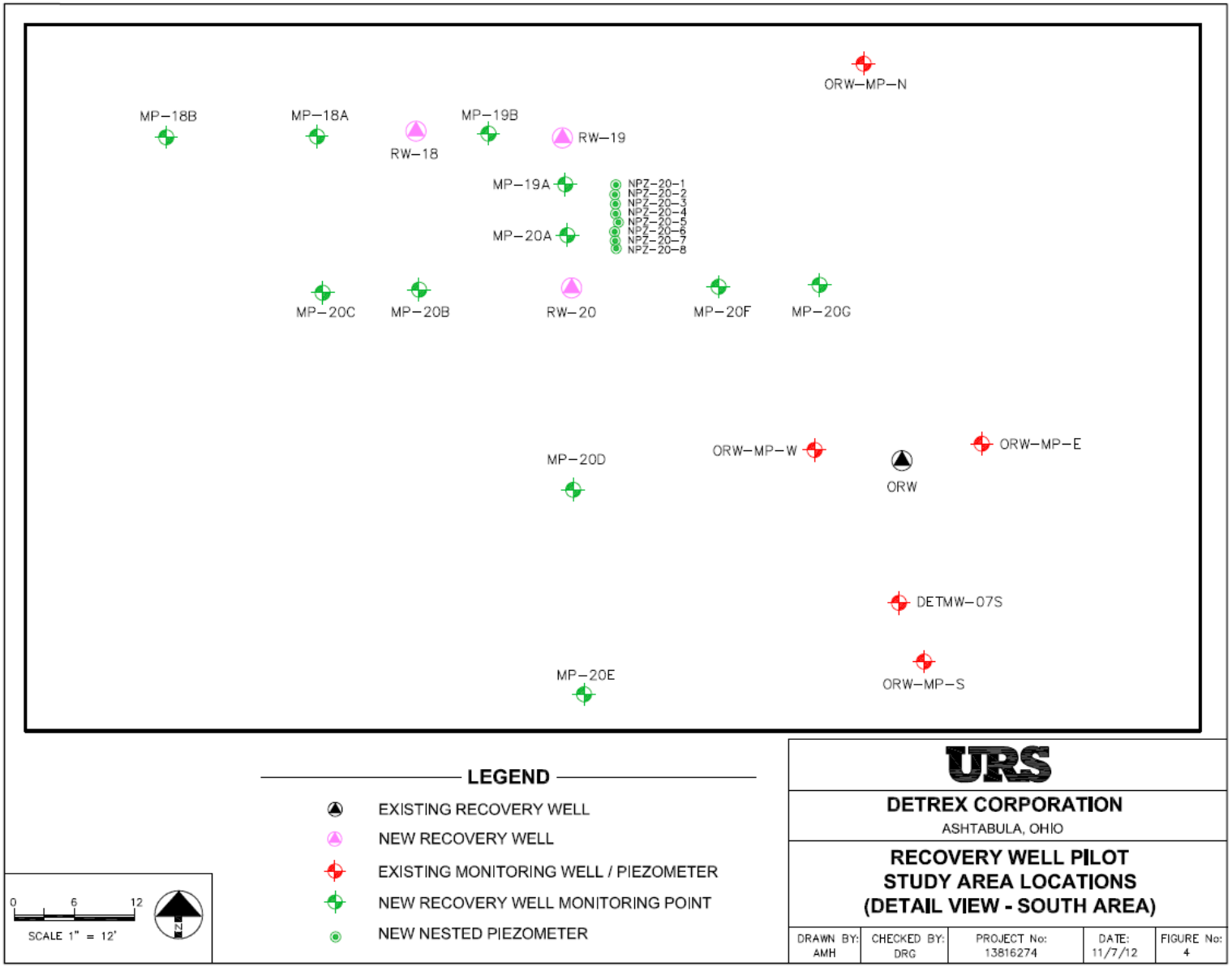
Overall DNAPL Testing Area



North DNAPL Testing Area



South DNAPL Testing Area



North Area DNAPL Well Construction & Boring Log

URS

URS

WELL COMPLETION LOG

WELL NO. RW-17

PAGE 1 OF 1

PROJECT NAME	Detrex		
LOCATION	Ashtabula, OH	*GEOLOGIST/ENGINEER*	
DRILLING COMPANY	Frontz Drilling	*DRILLER*	
DRILLING METHOD	Roto-sonic	*RIG TYPE*	
DRILLING FLUID	potable water		
DRILLING START DATE	10/16/2012	*DRILLING COMPLETION DATE*	10/16/2012

INSTALLATIONS

ELEVATION / DEPTH DATA

GROUND SURFACE ELEV.	NA
SURFACE PAD ELEV.	NA
HOLE DEPTH	25-feet
WELL DEPTH	25-feet
WELL RISER (TOP)	NA
PROTECTIVE CASING (TOP)	NA

BOREHOLE DIMENSIONS

DIAMETER	DEPTH INTERVAL
12-inches	0 to 25-feet

PROTECTIVE CASING

TYPE	NA
MATERIAL	NA
DIAMETER	NA
DEPTH INTERVAL	NA
SURFACE PAD DIMENSIONS	NA

OUTER CASING

MATERIAL	NA
DIAMETER	NA
JOINT TYPE	NA
DEPTH INTERVAL	NA

WELL RISER CASING

MATERIAL	Sch. 5 Stainless Steel
DIAMETER	6-inch
JOINT TYPE	Flush thread
DEPTH INTERVAL	+1 to 19-feet

WELL SCREEN

MATERIAL	Sch. 5 Stainless Steel
DIAMETER	6-inch
JOINT TYPE	Flush thread
OPENINGS	0.010 inch
DEPTH INTERVAL	19 to 23-feet

BLANK CASING

MATERIAL	Stainless Steel
DIAMETER	6-inch
JOINT TYPE	Flush thread
DEPTH INTERVAL	23 to 25-feet

BOTTOM CAP

MATERIAL	Stainless steel
TYPE	Flush thread
DEPTH	25-feet

ANNULAR GROUT

INSTALL. METHOD	Tremmie pipe
MATERIAL	Portland
MIX PROPORTIONS	Portland with 10% Bentonite
QUANTITIES	NA
DEPTH INTERVAL	0 to 16-feet

ANNULAR SEAL

INSTALL. METHOD	Pour
MATERIAL	Bentonite chips
QUANTITY	3-bags
DEPTH INTERVAL	16 to 18-feet

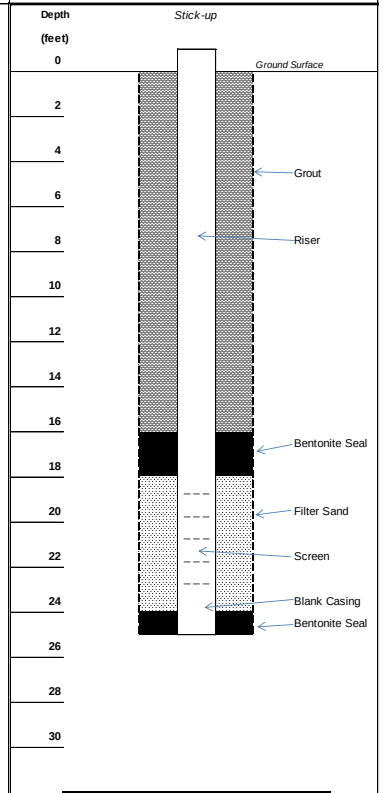
FILTER PACK

INSTALL. METHOD	Pour
MATERIAL	sand
QUANTITY	6-lbs
DEPTH INTERVAL	18 to 24-feet

DEVELOPMENT

METHOD	Pump
TIME	NA
Purge Volume	NA

WELL CONSTRUCTION SKETCH



RW-17

Not to Scale

ADDITIONAL INFORMATION

North Area DNAPL Well Construction & Boring Log

URS

Project: Detrex DNAPL Recoverability Study
Project Location: 1100 State Road, Ashtabula, OH
Project Number: 13816274.11401

Log of Boring RW-17 (GP59)

Sheet 1 of 2

Date(s) Drilled	10/11/12 and 10/15/12	Logged By	C. Siegel / A. Heitger	Checked By	M. Schmidt
Drilling Method	Direct Push / Sonic	Drill Bit Size/Type	2" Dual Tube Sampler and 12" Sonic Barrel	Total Depth of Borehole	28.0 feet
Drill Rig Type	Geoprobe 6620 DT / Versa Drill Versa-Sonic	Drilling Contractor	Frontz Drilling	Surface Elevation	636.10 (ft msl)
Groundwater Level and Date Measured	Approximately 19.5' bgs ATD and 4.05' on 11/14/12	Sampling Method(s)	4' Dual Tube Sampler and 4" Soil Core Sampler	Backfill	Refer to Well Detail
Boring Location	Refer to Site Plan (GP59 drilled with Geoprobe and RW-17 Drilled with Sonic Drill Rig in same location)				

Elevation, feet	Depth, feet	Samples: Type	Number	Recovery, inches	Headspace, ppm	Graphic Log	Material Description	Well details	Field Notes and Well Details
636	0						Stiff, moist, brown, CLAY, with silt and sand [FILL]		
	1								
634	2		DP-1	40	N/A				
	3								Cement Grout (10% Bentonite)
632	4								
	5								
630	6		DP-2	47	N/A				
	7								
628	8						Medium dense, moist to wet, brown, SILT, with clay [FILL]		
	9								6-inch SCH 5 Stainless Steel Riser
626	10		DP-3	45	N/A				
	11								
624	12								
	13								
622	14		DP-4	34	N/A				
	15								

URS

Project: Detrex DNAPL Recoverability Study
Project Location: 1100 State Road, Ashtabula, OH
Project Number: 13816274.11401

Log of Boring RW-17 (GP59)

Sheet 2 of 2

Elevation, feet	Depth, feet	Samples: Type	Number	Recovery, inches	Headspace, ppm	Graphic Log	Material Description	Well details	Field Notes and Well Details
	15		DP-4	34	N/A		Medium dense, moist to wet, brown, SILT, with clay [FILL]		6-inch SCH 5 Stainless Steel Riser
620	16						Medium dense, moist, to dry, orange brown and gray, sandy SILT with clay		
	17						Medium stiff, moist, gray, lean CLAY layered with silty CLAY with silt partings, trace fine sand and gravel [LACUSTRINE]		Bentonite Chips
618	18		DP-5	45	N/A		3-inch layer of wet, gray, silty SAND		
	19						with clay and silt varving		
616	20						Medium dense, wet, gray, sandy SILT with clay and alternating fine sand layers [LACUSTRINE]		#7 Filter sand
	21						DNAPL ganglia within 3-inch silt and sand layer		
614	22		DP-6	44	N/A		Medium stiff, moist, gray, varved SILT and CLAY, with fine sand [LACUSTRINE]		6-inch SCH 5 Stainless Steel 0.010-Slotted Screen
	23								
612	24						3-inch zone with DNAPL sheen		
	25						Medium dense, wet, gray, SILT [LACUSTRINE]		
610	26		DP-7	48	N/A				
	27						Stiff, moist, gray, CLAY, with silt, sand, and gravel [TILL]		Natural Soil
608	28						End of Boring at 28' bgs.		
	29								
606	30								
	31								
604	32								

URS

South Area DNAPL Well Construction & Boring Log

URS

URS

WELL COMPLETION LOG

WELL NO. RW-19

PAGE 1 OF 1

PROJECT NAME	Detrex		
LOCATION	Ashtabula, OH	*GEOLOGIST/ENGINEER*	
DRILLING COMPANY	Frontz Drilling	*DRILLER*	
DRILLING METHOD	Roto-sonic	*RIG TYPE*	
DRILLING FLUID	potable water		
DRILLING START DATE	10/17/2012	*DRILLING COMPLETION DATE*	10/17/2012

INSTALLATIONS

ELEVATION / DEPTH DATA

GROUND SURFACE ELEV.	NA
SURFACE PAD ELEV.	NA
HOLE DEPTH	18-feet
WELL DEPTH	18-feet
WELL RISER (TOP)	NA
PROTECTIVE CASING (TOP)	NA

BOREHOLE DIMENSIONS

DIAMETER	DEPTH INTERVAL
12-inches	0 to 18-feet

PROTECTIVE CASING

TYPE	NA
MATERIAL	NA
DIAMETER	NA
DEPTH INTERVAL	NA
SURFACE PAD DIMENSIONS	NA

OUTER CASING

MATERIAL	NA
DIAMETER	NA
JOINT TYPE	NA
DEPTH INTERVAL	NA

WELL RISER CASING

MATERIAL	Sch. 5 Stainless Steel
DIAMETER	6-inch
JOINT TYPE	Flush thread
DEPTH INTERVAL	+2 to 12-feet

WELL SCREEN

MATERIAL	Sch. 5 Stainless Steel
DIAMETER	6-inch
JOINT TYPE	Flush thread
OPENINGS	0.010 inch
DEPTH INTERVAL	12 to 16-feet

BLANK CASING

MATERIAL	Stainless Steel
DIAMETER	6-inch
JOINT TYPE	Flush thread
DEPTH INTERVAL	16 to 18-feet

BOTTOM CAP

MATERIAL	Stainless steel
TYPE	Flush thread
DEPTH	18-feet

ANNULAR GROUT

INSTALL. METHOD	Tremmie pipe
MATERIAL	Portland
MIX PROPORTIONS	Portland with 10% Bentonite
QUANTITIES	NA
DEPTH INTERVAL	0 to 8-feet

ANNULAR SEAL

INSTALL. METHOD	Pour
MATERIAL	Bentonite chips
QUANTITY	3-bags
DEPTH INTERVAL	8 to 10-feet

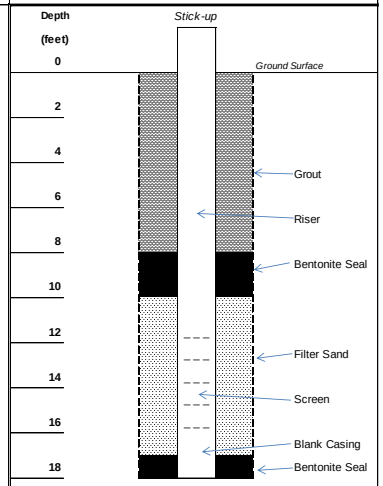
FILTER PACK

INSTALL. METHOD	Pour
MATERIAL	sand
QUANTITY	6-lbs
DEPTH INTERVAL	10 to 17-feet

DEVELOPMENT

METHOD	Pump
TIME	NA
Purge Volume	NA

WELL CONSTRUCTION SKETCH



RW-19

Not to Scale

ADDITIONAL INFORMATION

South Area DNAPL Well Construction & Boring Log

URS

Project: Detrex DNAPL Recoverability Study
Project Location: 1100 State Road, Ashtabula, OH
Project Number: 13816274.11401

Log of Boring RW-19 (GP60)

Sheet 1 of 2

Date(s) Drilled	10/12/12 and 10/17/12	Logged By	C. Siegel / A. Heitger	Checked By	M. Schmidt
Drilling Method	Direct Push / Sonic	Drill Bit Size/Type	2" Dual Tube Sampler and 12" Sonic Barrel	Total Depth of Borehole	24.0 feet
Drill Rig Type	Geoprobe 6620 DT / Versa Drill Versa-Sonic	Drilling Contractor	Frontz Drilling	Surface Elevation	636.14 (ft msl)
Groundwater Level and Date Measured	Approximately 14.0' bgs ATD and 6.80' on 11/14/12	Sampling Method(s)	4' Dual Tube Sampler and 4" Soil Core Sampler	Backfill	Refer to Well Detail
Boring Location	Refer to Site Plan (GP60 drilled with Geoprobe and RW-19 Drilled with Sonic Drill Rig in same location)				

Elevation, feet	Depth, feet	SAMPLES Type	Number	Recovery, inches	Headspace, ppm	Graphic Log	MATERIAL DESCRIPTION	Well details	FIELD NOTES AND WELL DETAILS
636	0						Medium stiff, moist, brown, CLAY, with silt, sand, and gravel [FILL]		
	1								
634	2		DP-1	45	N/A		Stiff, moist, brown, CLAY, with silt		Cement Grout (10% Bentonite)
	3								
632	4								
	5						moisture decreases, with gray mottling, fine sand, trace wet sand seams, trace iron and manganese staining		
630	6		DP-2	39	N/A				6-inch SCH 5 Stainless Steel Riser
	7						Medium dense, wet, brown and gray, clayey sandy SILT, trace DNAPL sheen 1/2-inch seam, medium dense, wet, brown, fine to medium silty SAND, with trace DNAPL sheen		
628	8						1/2-inch seam, medium dense, wet, brown, fine to medium silty SAND, with trace DNAPL sheen 1-inch layer, medium dense, wet, brown, fine to medium silty SAND, with trace DNAPL sheen and ganglia		
	9						1-inch layer, medium dense, wet, brown, fine to medium silty SAND, trace DNAPL sheen		Bentonite Chips
626	10		DP-3	44	N/A				
	11						Medium dense, moist to dry, clayey sandy SILT with dry, orange brown, silty Sand		#7 Filter sand
624	12						Medium stiff, moist, gray, lean CLAY, with silt varving, trace fine sand and gravel [LACUSTRINE] 1/2-inch seam wet, gray, silty SAND, trace DNAPL sheen		
	13								
622	14		DP-4	41	N/A		1-inch layer, wet, gray, sandy SILT, with trace DNAPL sheen and ganglia		6-inch SCH 5 Stainless Steel 0.010-Slotted Screen
	15								

URS

Project: Detrex DNAPL Recoverability Study
Project Location: 1100 State Road, Ashtabula, OH
Project Number: 13816274.11401

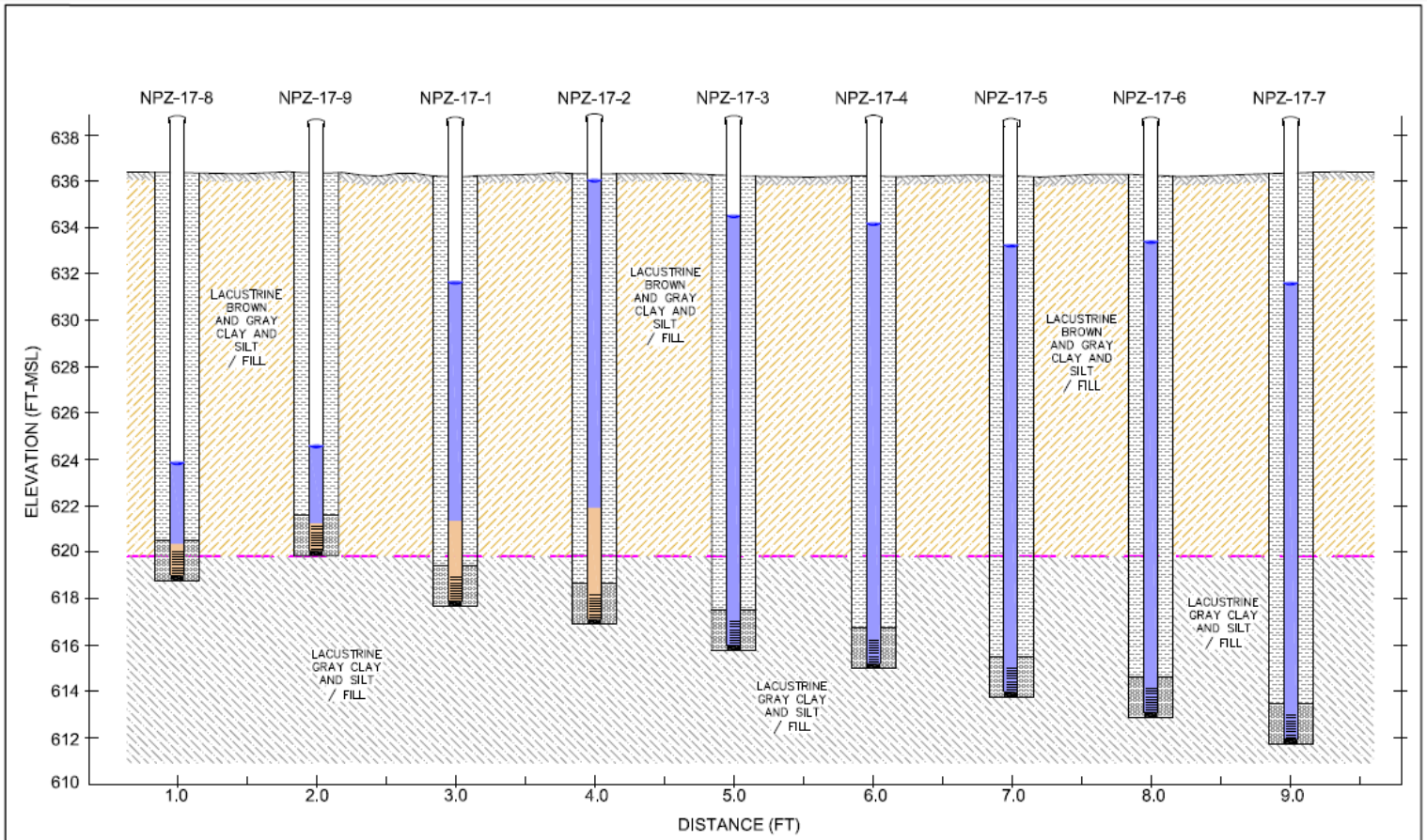
Log of Boring RW-19 (GP60)

Sheet 2 of 2

Elevation, feet	Depth, feet	SAMPLES Type	Number	Recovery, inches	Headspace, ppm	Graphic Log	MATERIAL DESCRIPTION	Well details	FIELD NOTES AND WELL DETAILS
	15								6-inch SCH 5 Stainless Steel 0.010-Slotted Screen
			DP-4	41	N/A		Soft, wet, brown, sandy CLAY, with DNAPL ganglia and seeps, DNAPL sheen within the gray Clay		
620	16						1/2-inch seam, medium dense, moist, gray, fine SAND		
	17						1/2-inch seam, medium dense, moist, gray, fine SAND		#7 Filter sand
618	18		DP-5	39	N/A				Bentonite Chips
	19						wet, gray, SILT		
616	20								
	21								Natural Soil
614	22		DP-6	49	N/A		Stiff, moist, gray, CLAY, with silt, sand, and gravel [TILL]		
	23								
612	24						End of Boring at 24´ bgs.		
	25								
610	26								
	27								
608	28								
	29								
606	30								
	31								
604	32								

URS

North Area Observed DNAPL Thickness X-Section (Pre-Testing)



NOTES:

1) WATER LEVEL AND DNAPL LEVEL MEASUREMENTS COLLECTED AFTER WELL DEVELOPMENT (11/14/12)

2) GENERALIZED LITHOLOGY FROM ADJACENT RECOVERY WELL RW-17

0 3 6

VERTICAL SCALE 1" = 6'
HORIZONTAL SCALE 1" = 1'

LEGEND

NESTED PIEZOMETER AND SCREENED INTERVAL (1.0 FOOT)

GROUNDWATER COLUMN

DNAPL COLUMN

APPROXIMATE GEOCONTACT

URS

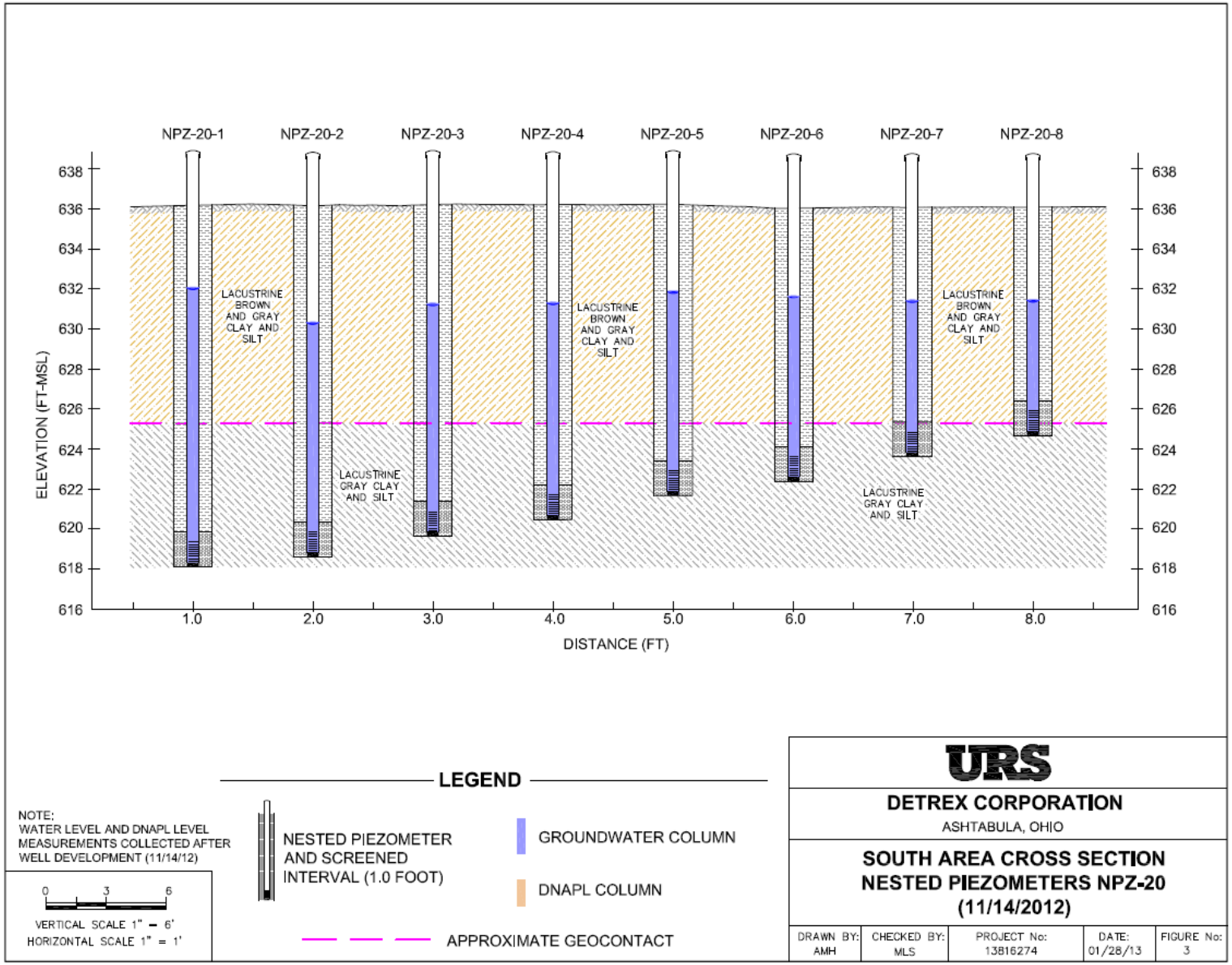
DETREX CORPORATION

ASHTABULA, OHIO

NORTH AREA CROSS SECTION NESTED PIEZOMETERS - NPZ-17 (11/14/2012)

DRAWN BY:	CHECKED BY:	PROJECT No:	DATE:	FIGURE No:
AMH	MLS	13816274	01/28/13	1

South Area Observed DNAPL Thickness X-Section (Pre-Testing)



URS

Work Completed (cont.)

- Enhanced DNAPL Recovery Testing
  - Procedure #1 – Water or DNAPL only
  - Procedure #2 – Dual-phase extraction (DPE) / Dual pumps
  - Procedure #3 – DPE / Total Fluids
  - Procedure #4 – Applied vacuum / DNAPL only recovery
- Data Evaluation
  - Evaluation ongoing
  - Preliminary results presented herein
- Detrex/USEPA Meeting

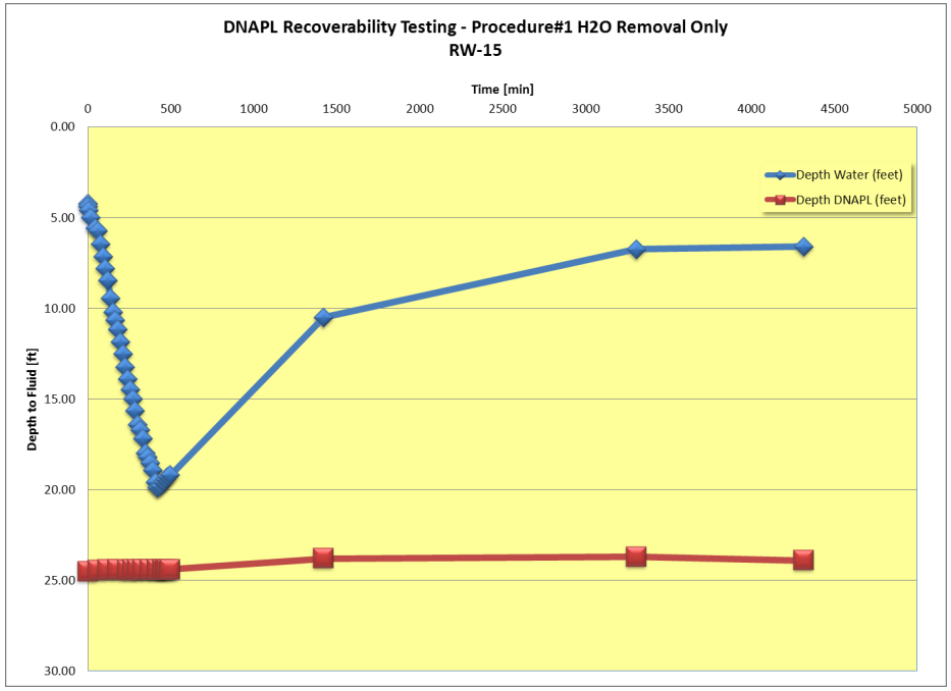
DATA SUMMARY

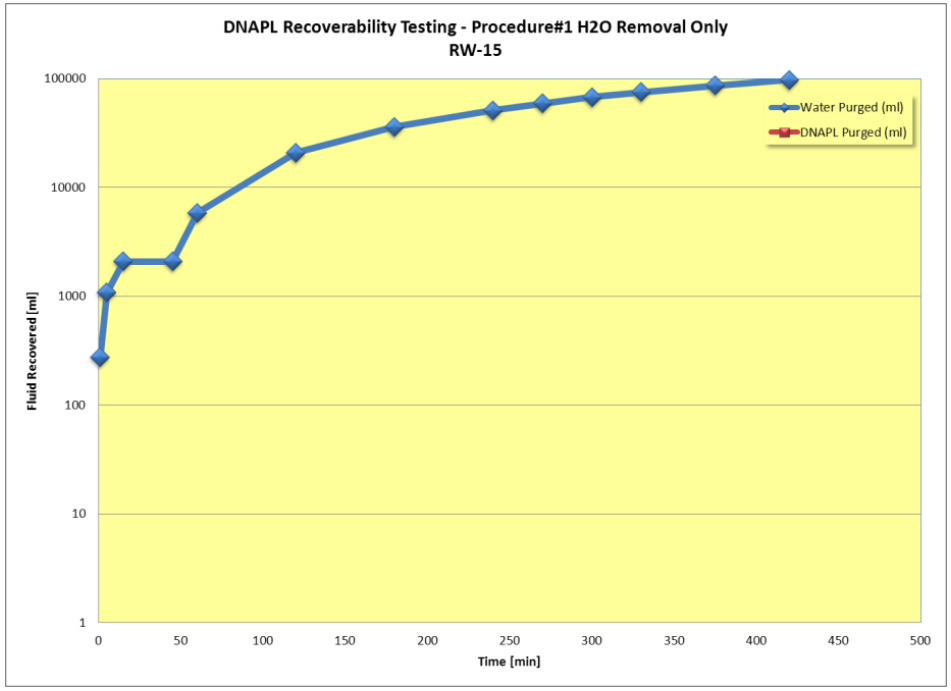
Data Summary – Procedure #1 (Water or DNAPL Only)

URS

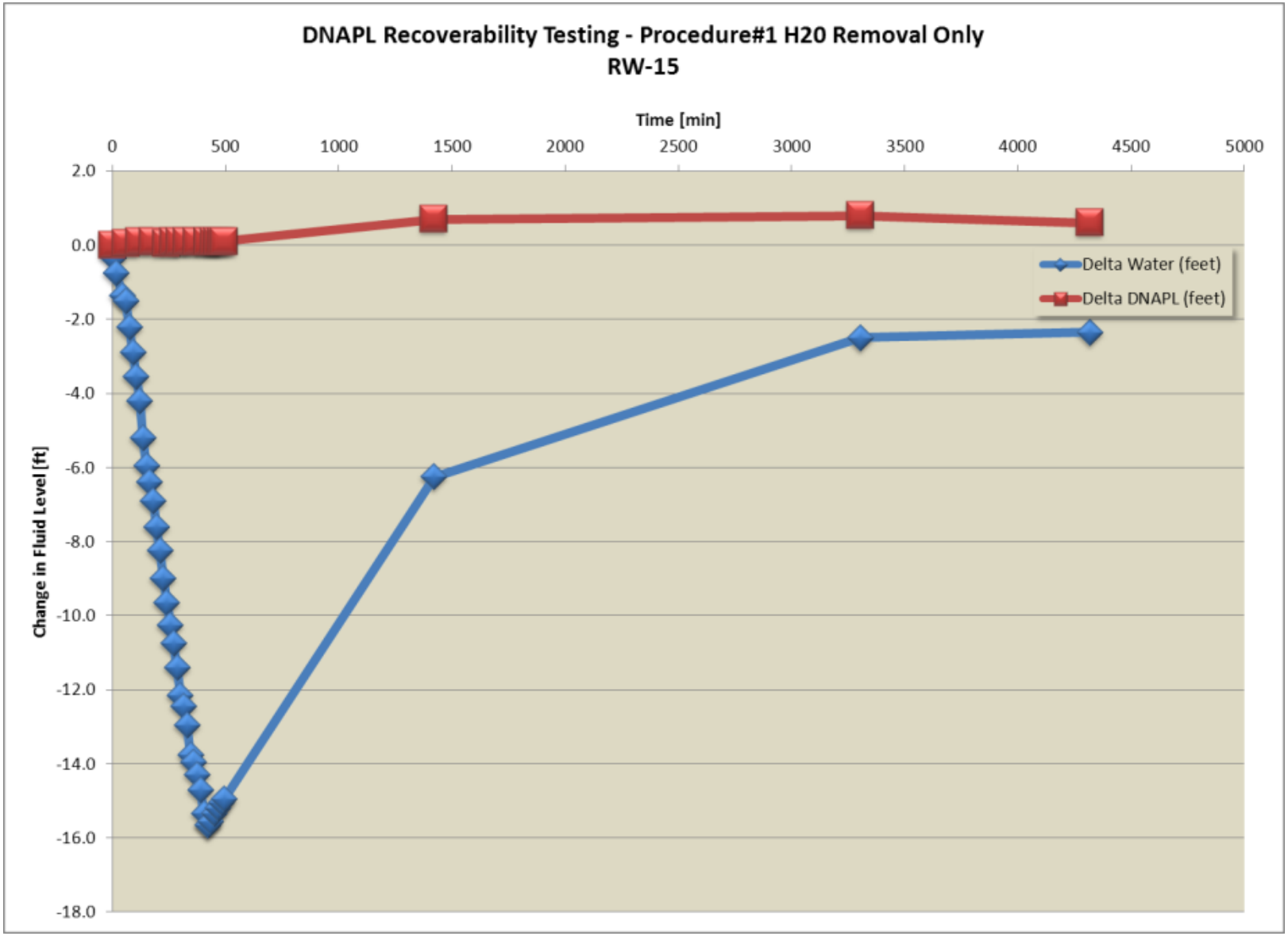
- Procedure #1
  - Individual RWs tested
    - Pumping H2O or DNAPL only
  - Utilized peristaltic pump
  - Data recorded
    - Depth to H2O
    - Depth to DNAPL
    - Fluid Recovery Rate (H2O or DNAPL)
    - Cumulative Fluid Recovery (H2O or DNAPL)

Procedure #1 (RW-15 H2O Only)

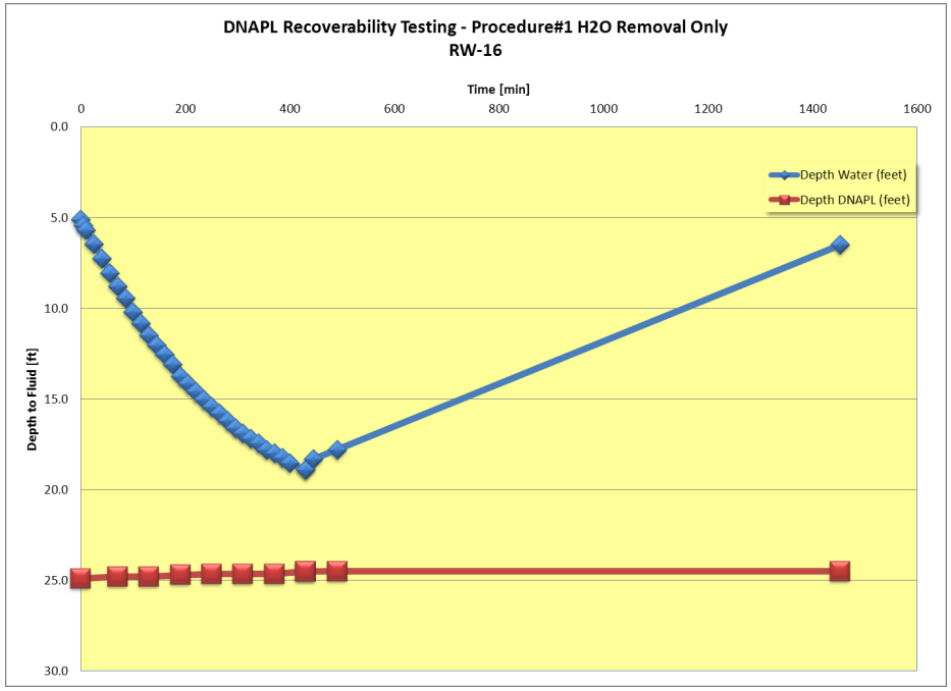


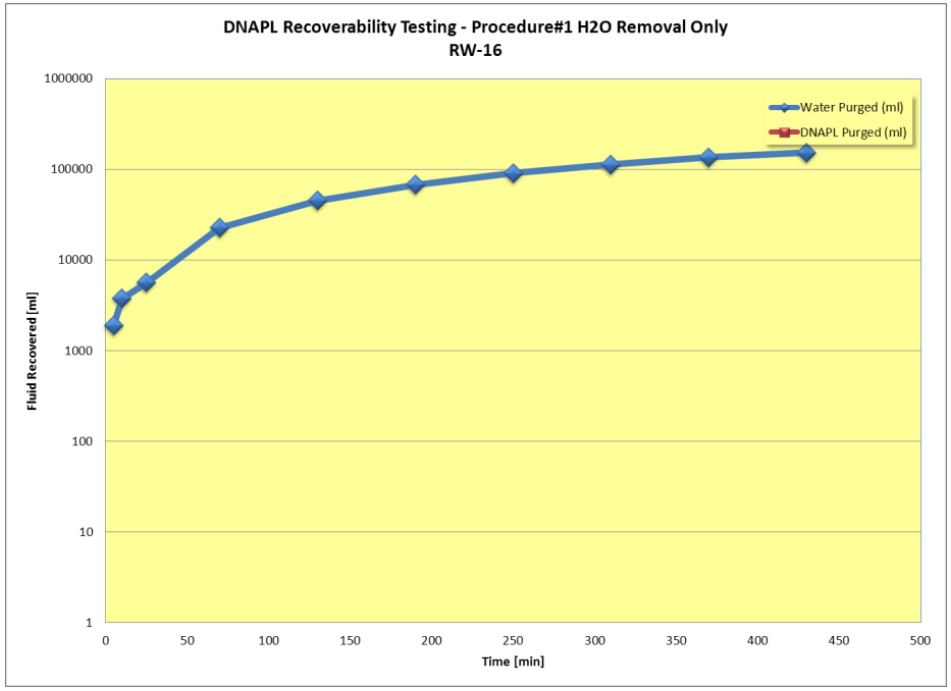


Procedure #1 (RW-15 H2O Only)



Procedure #1 (RW-16 H2O Only)





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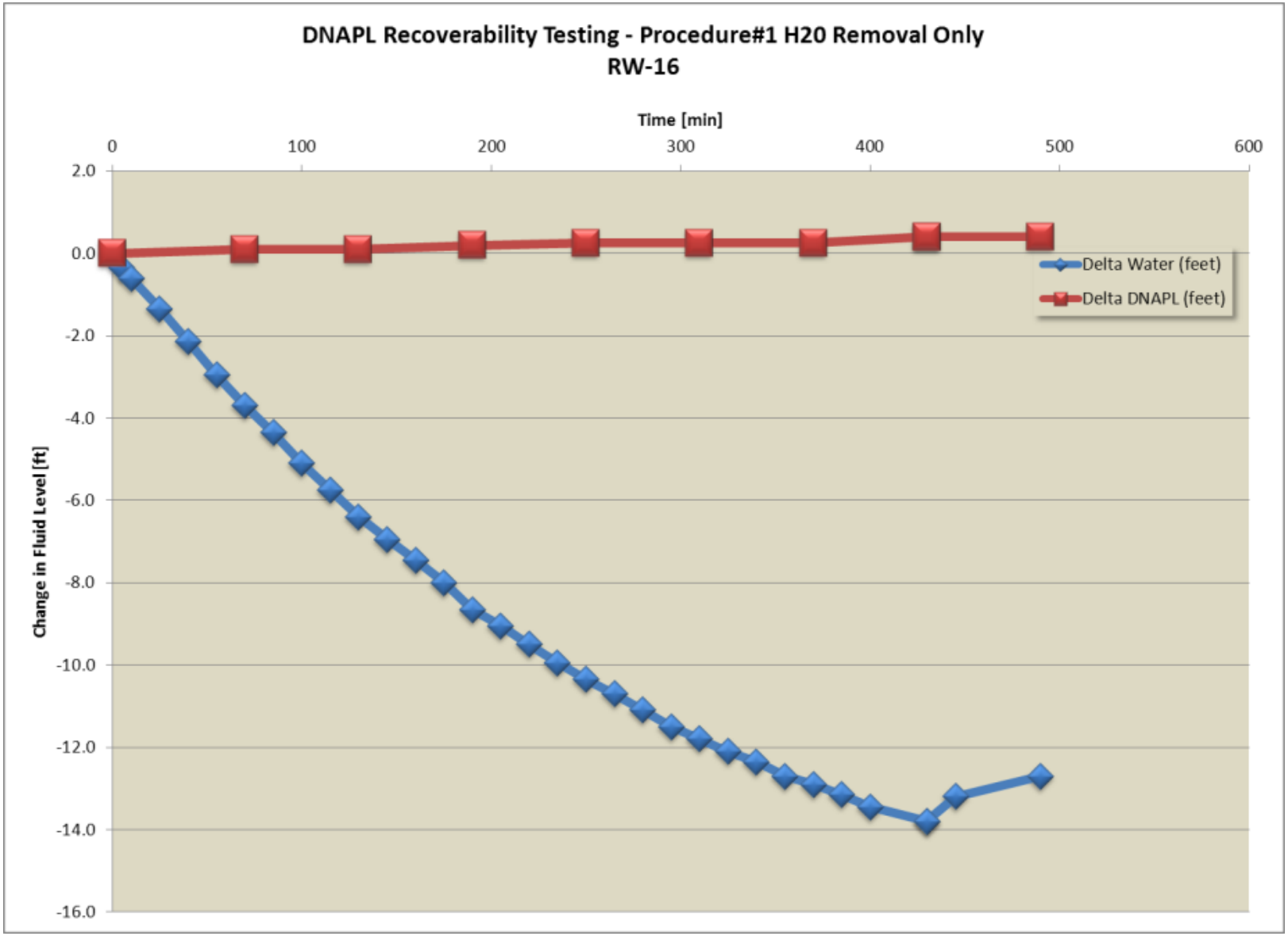

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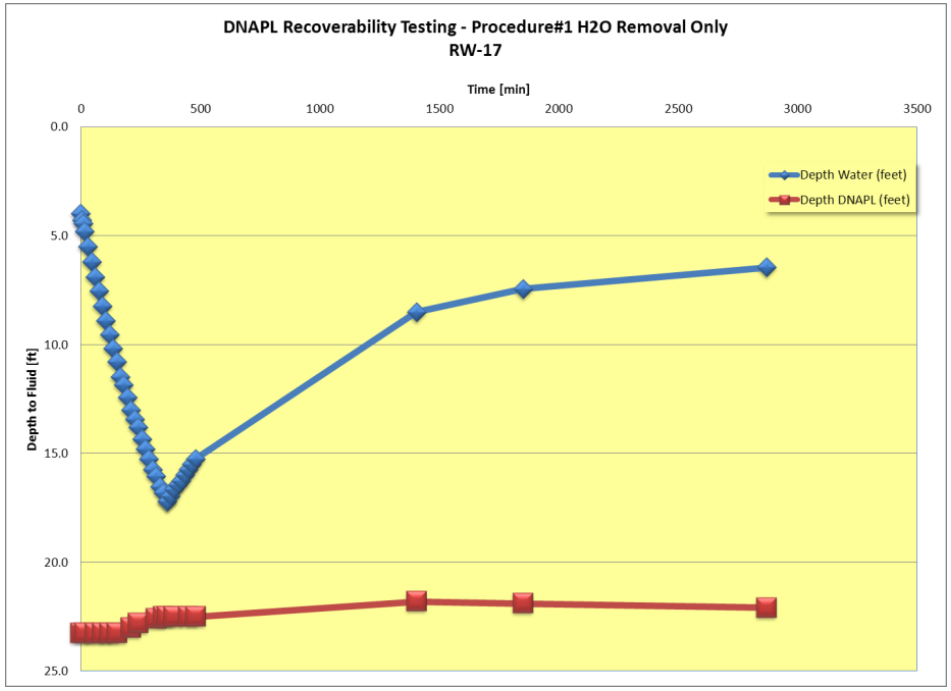

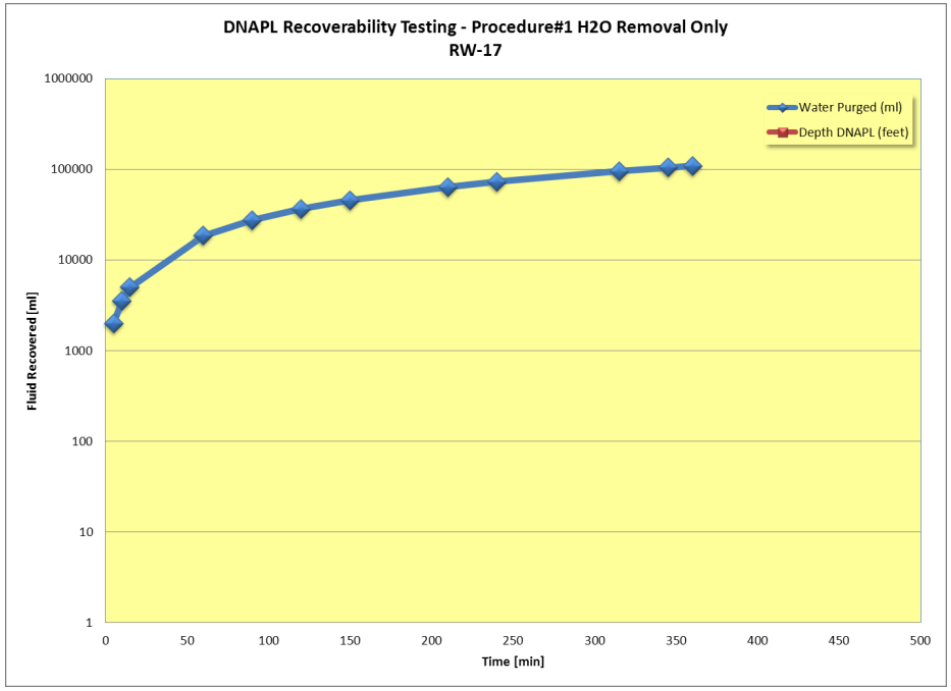

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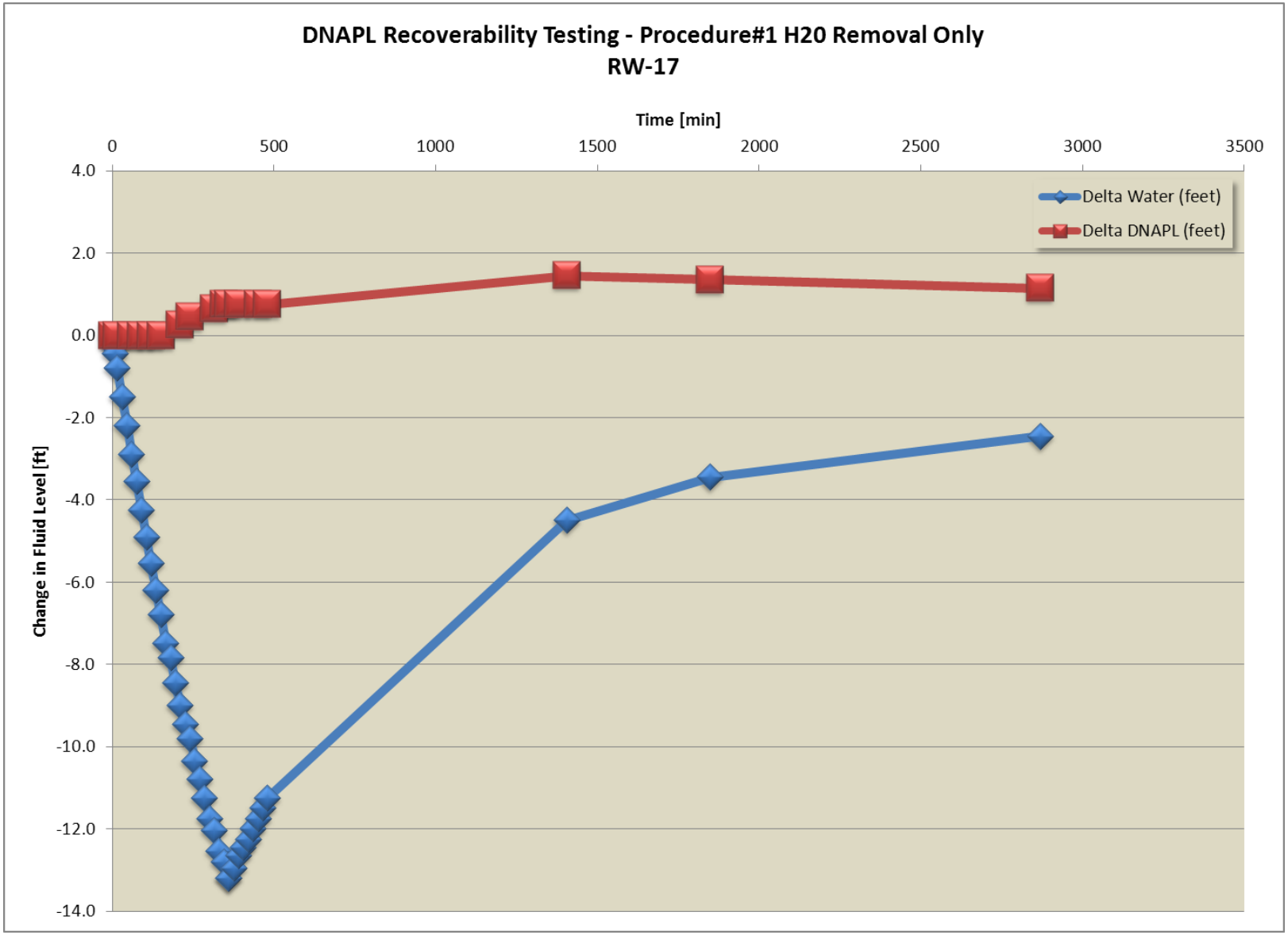

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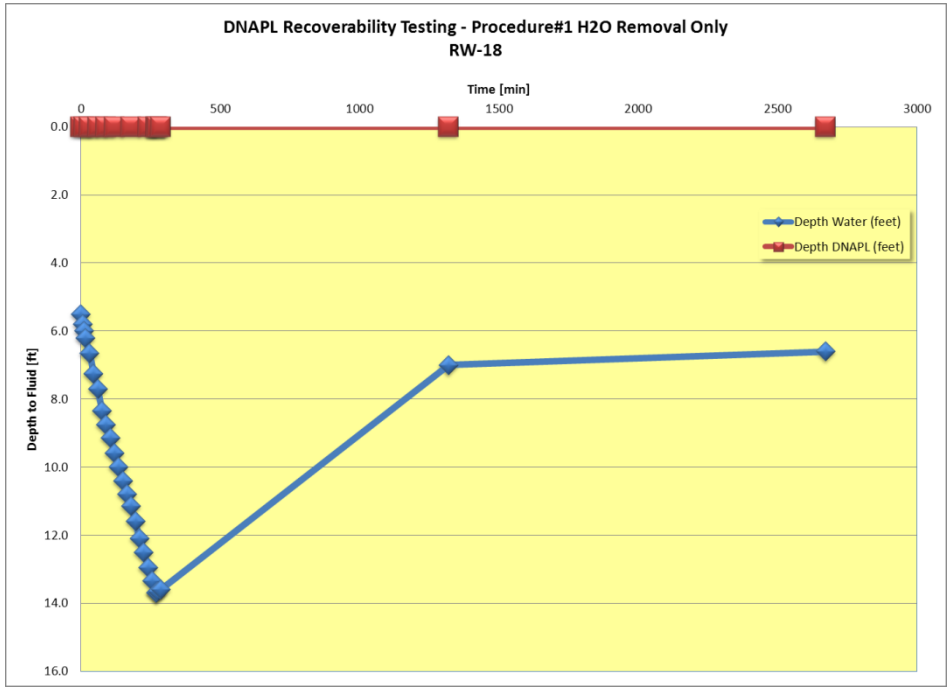
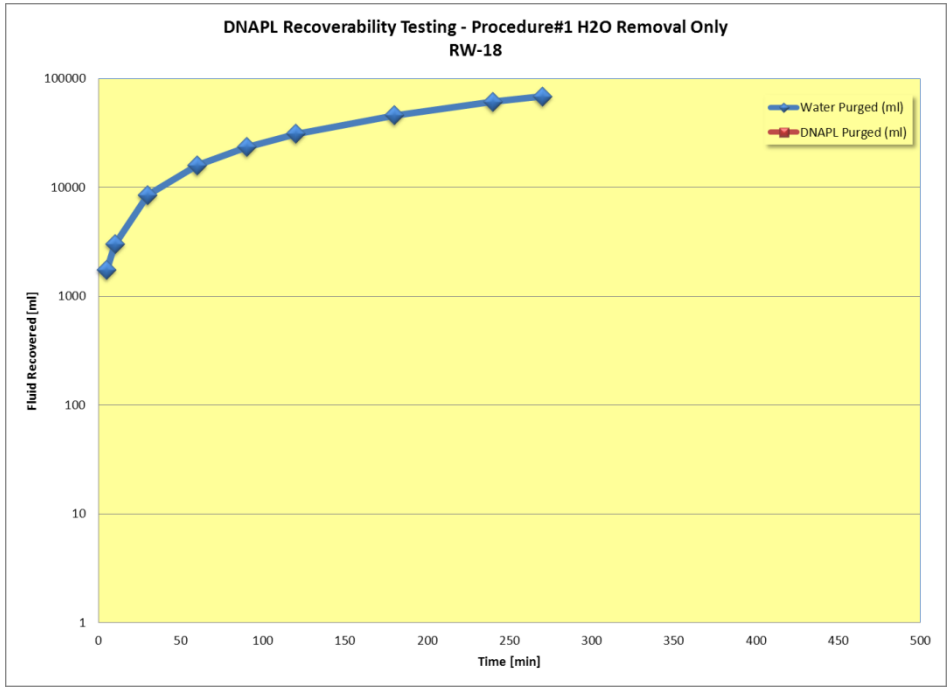
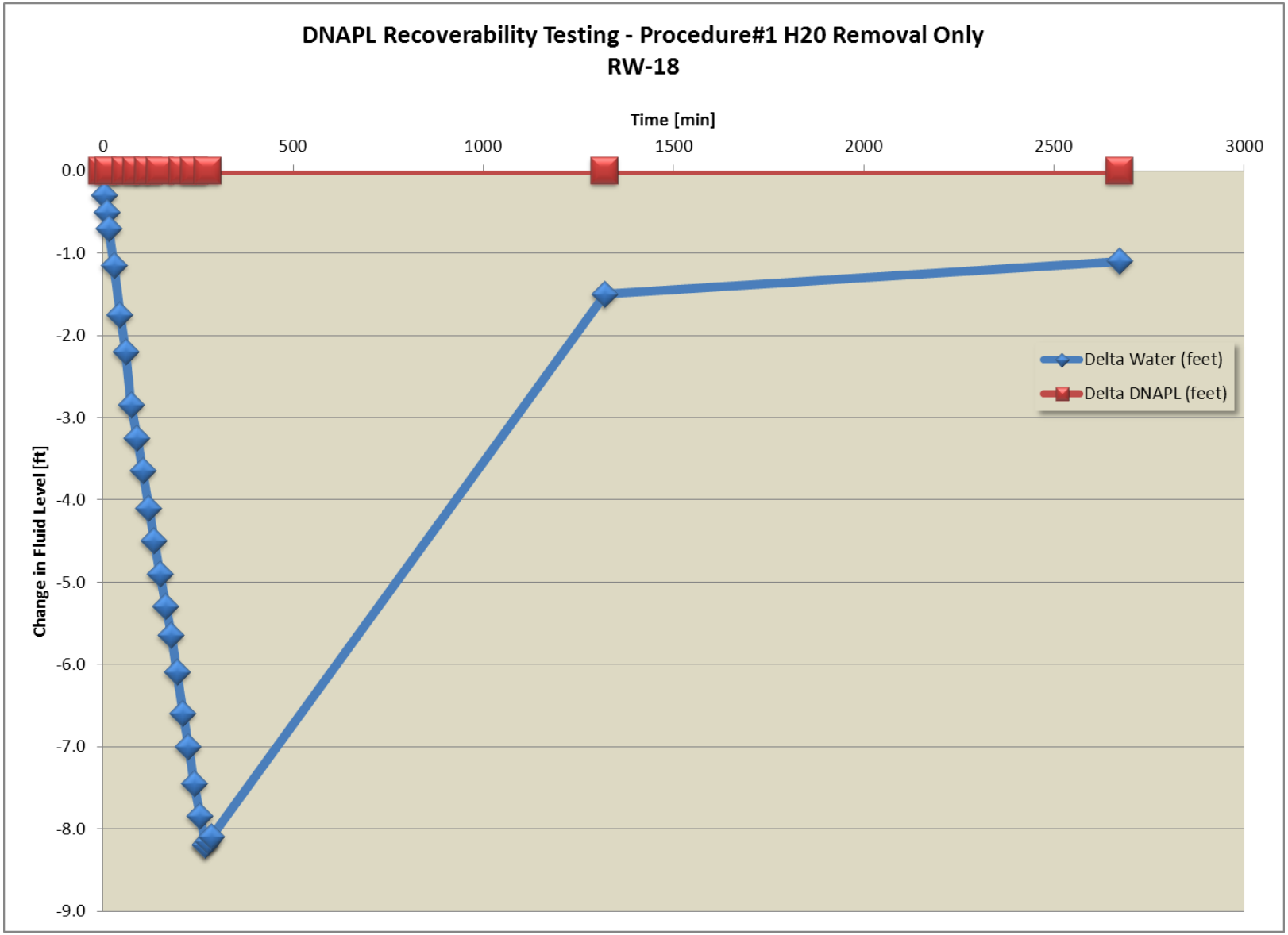
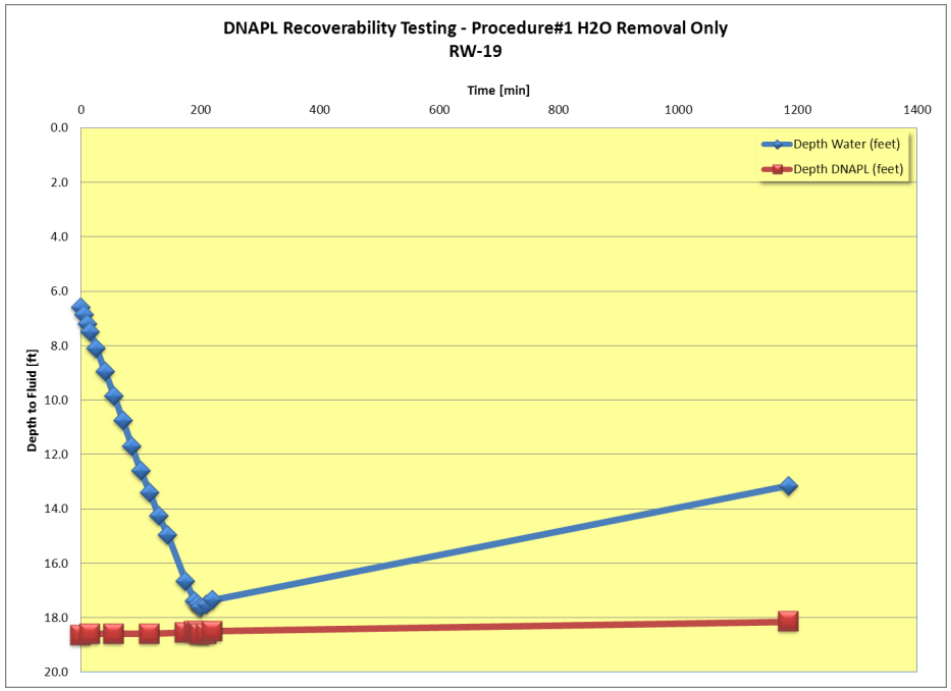


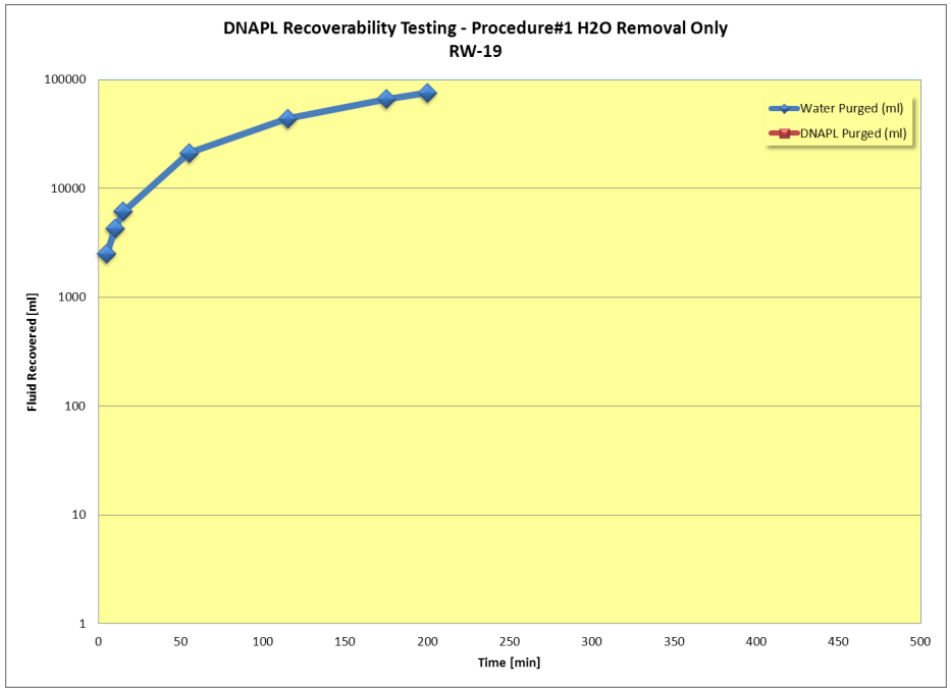


Procedure #1 (RW-18 H2O Only)

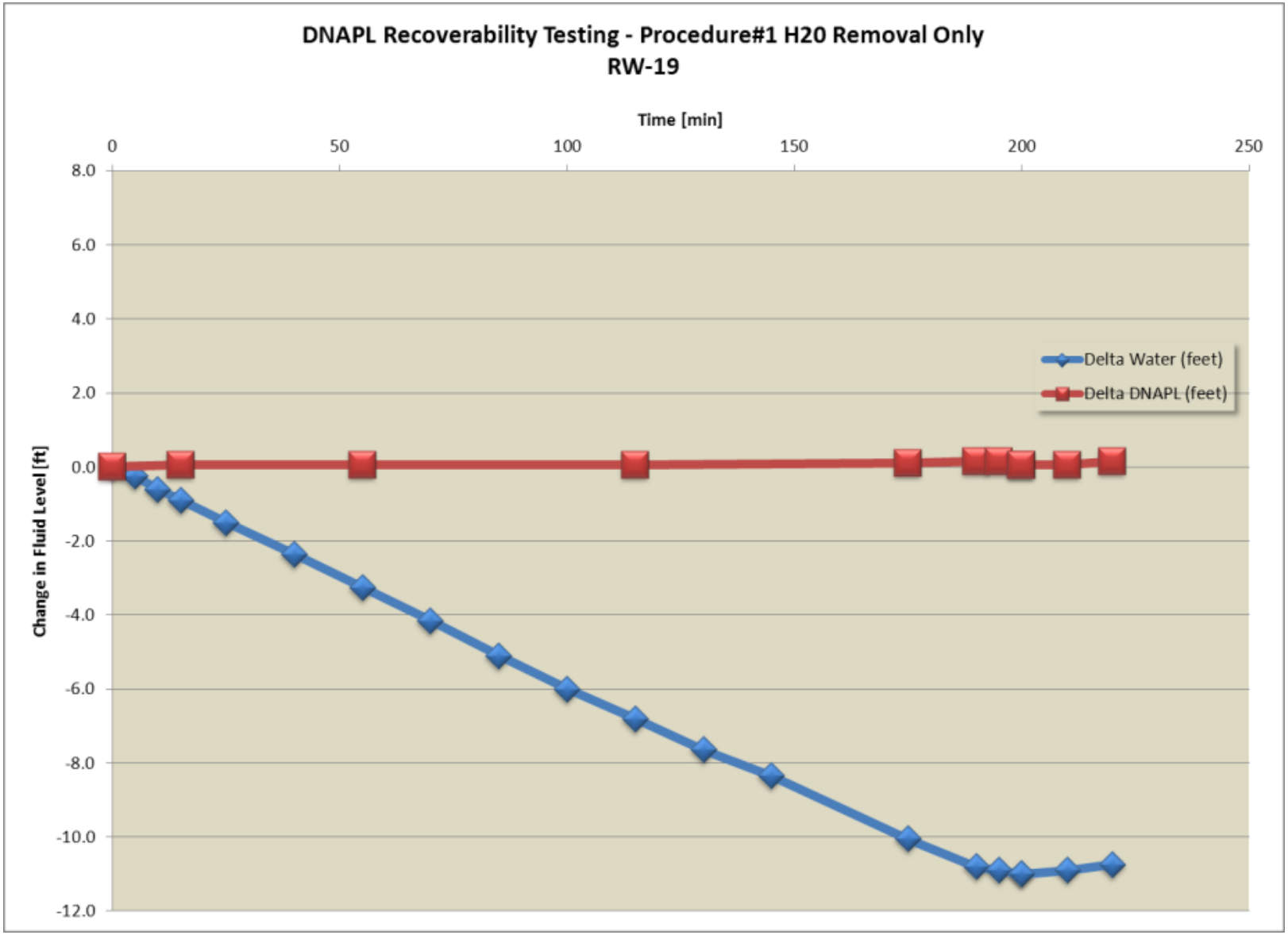


Procedure #1 (RW-19 H2O Only)





Procedure #1 (RW-19 H2O Only)



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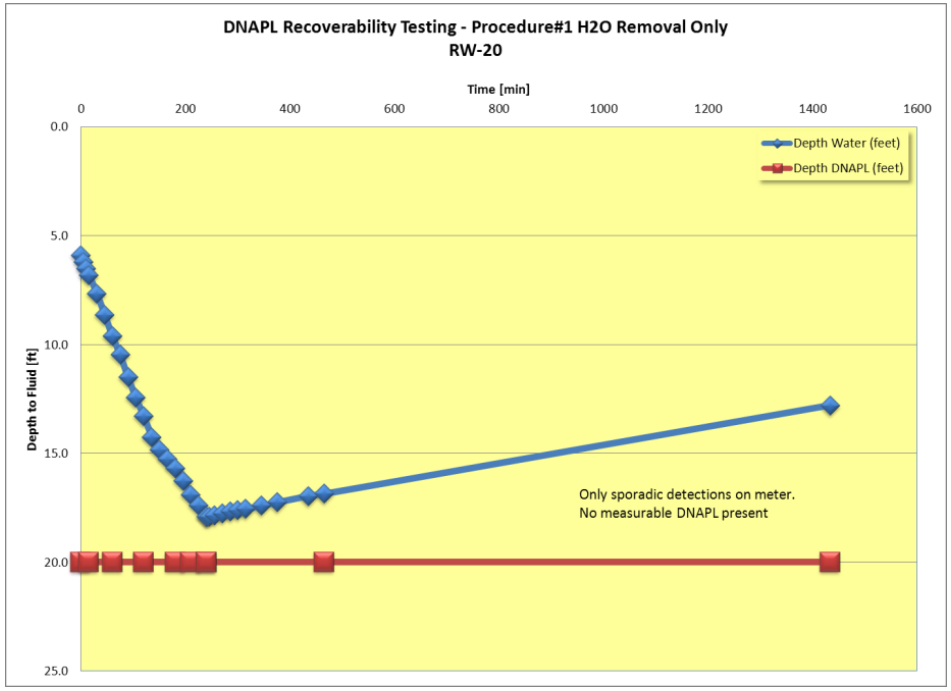
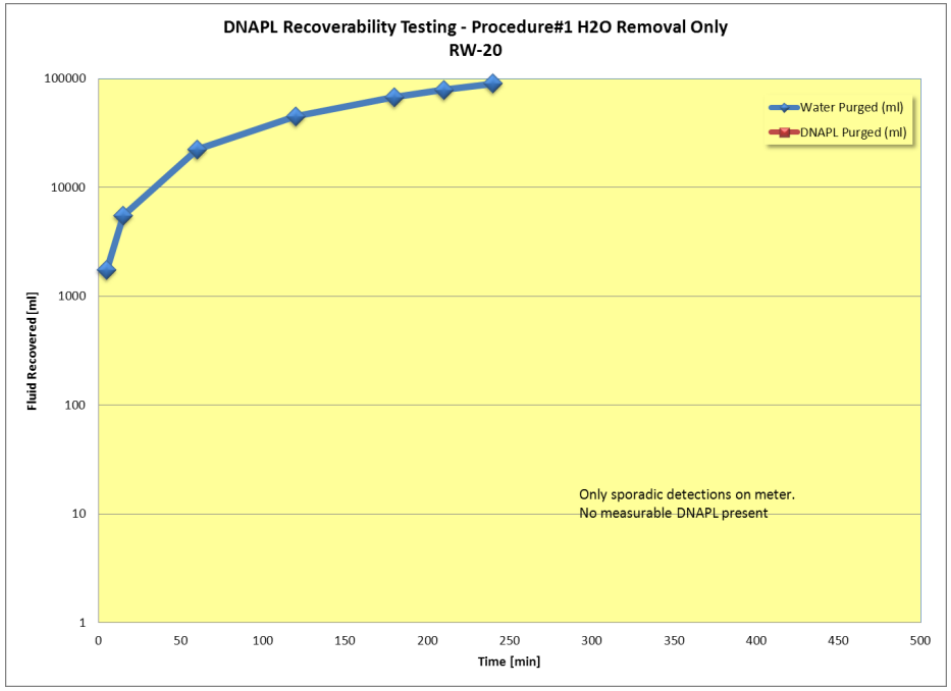
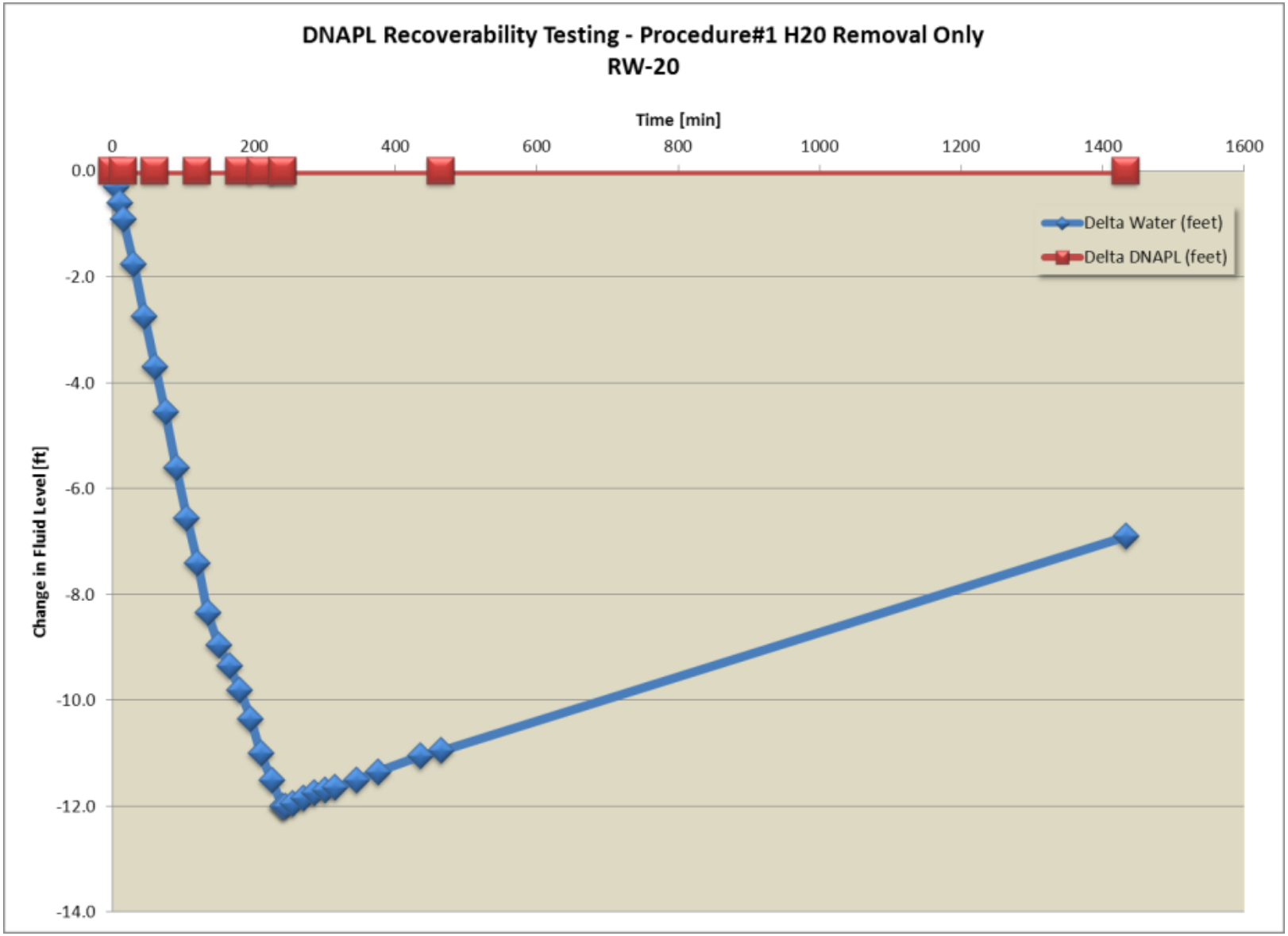
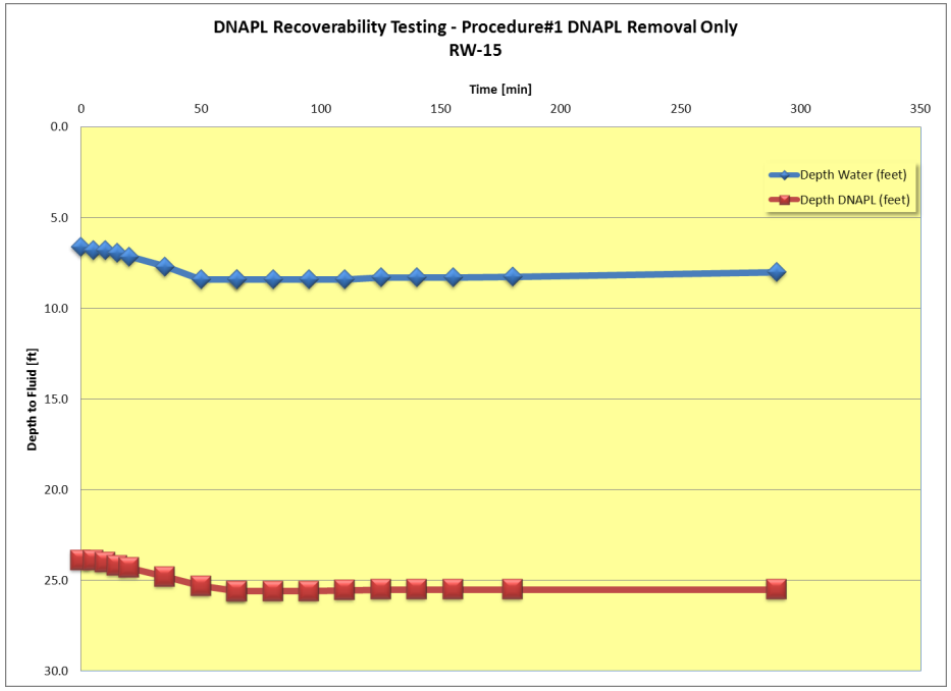


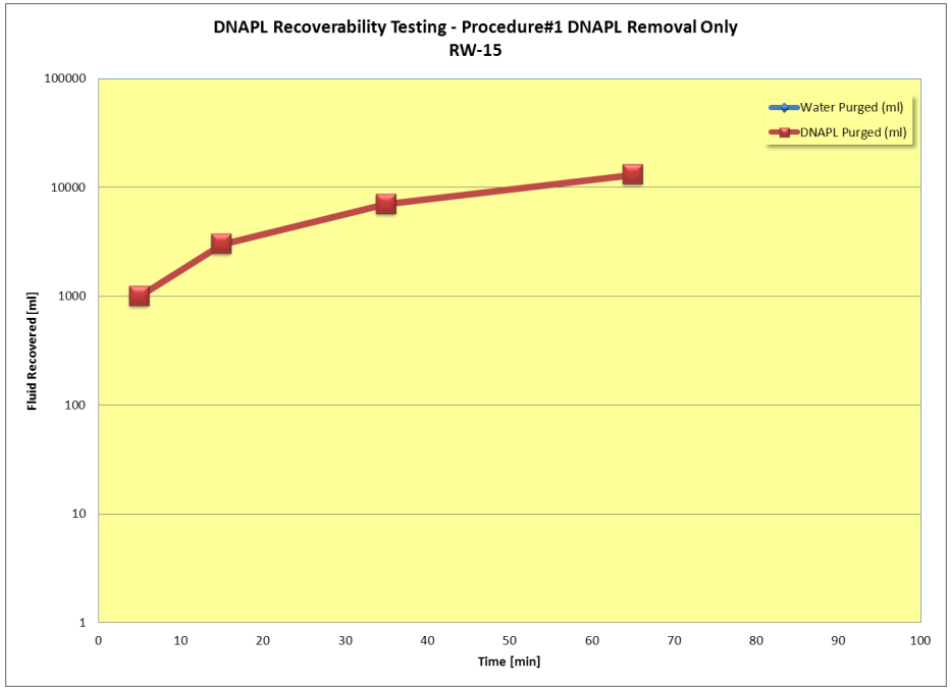


Procedure #1 (RW-20 H2O Only)

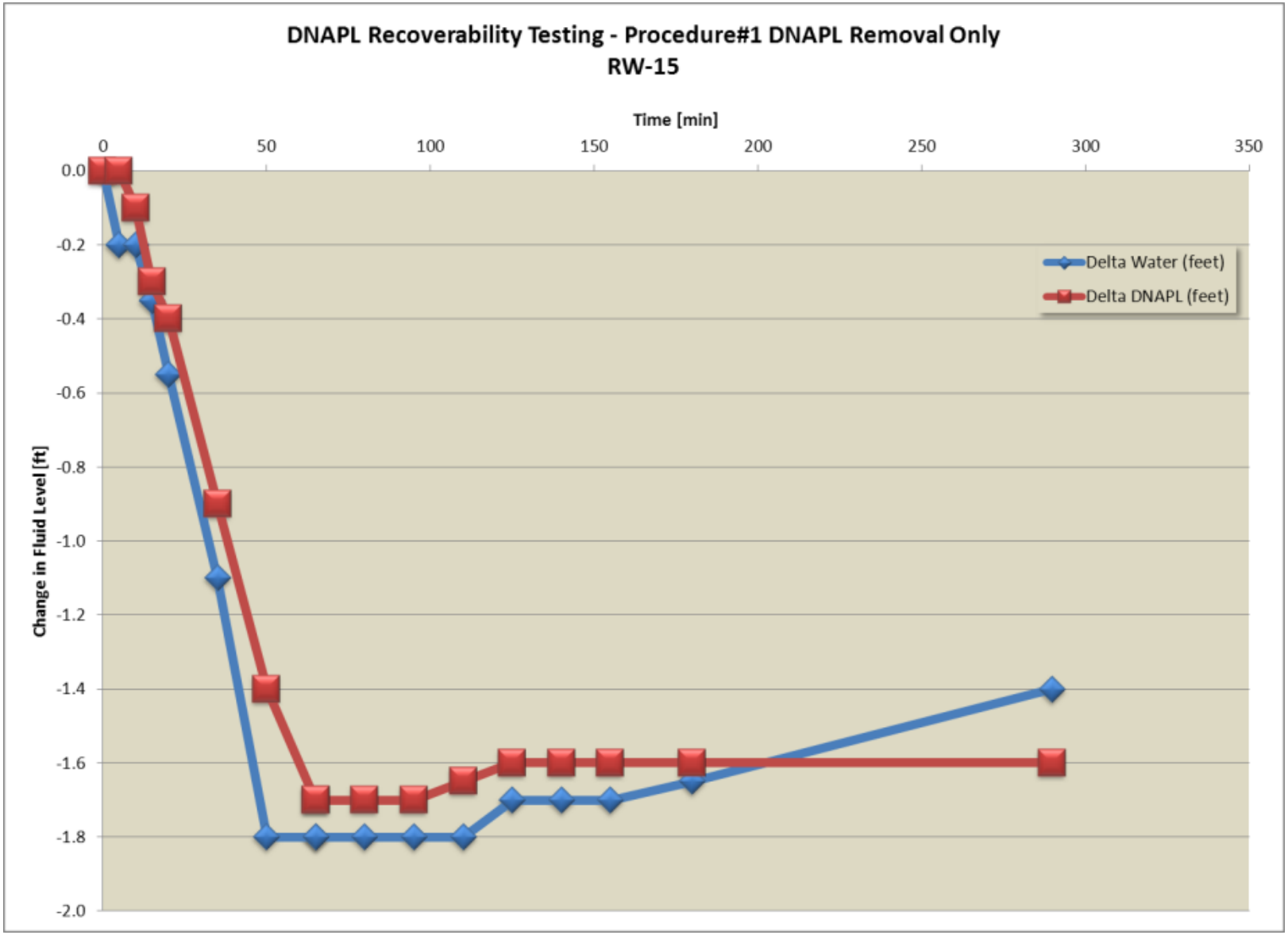


Procedure #1 (RW-15 DNAPL Only)

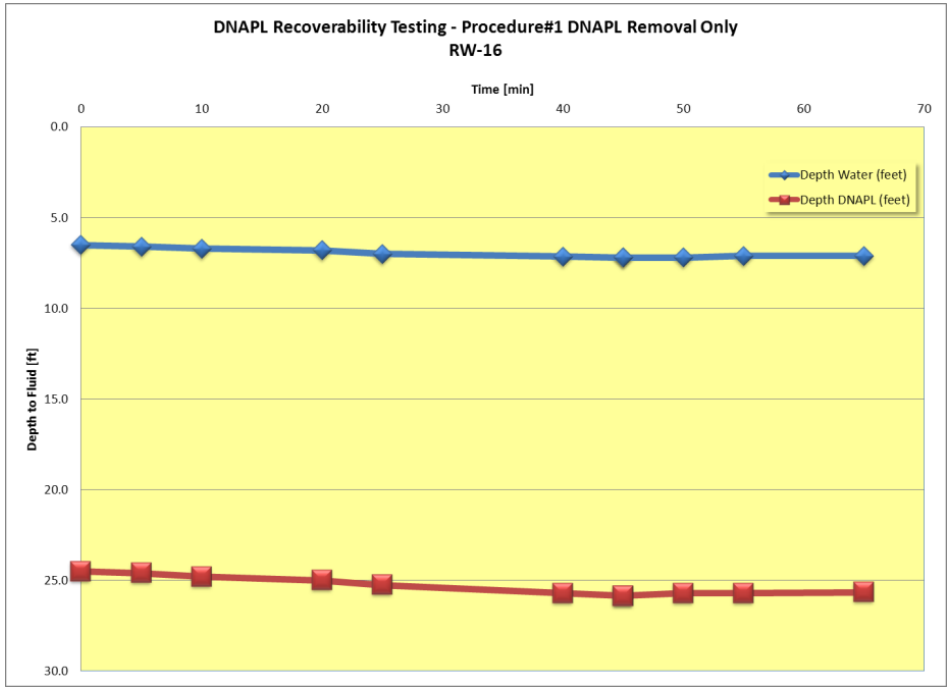


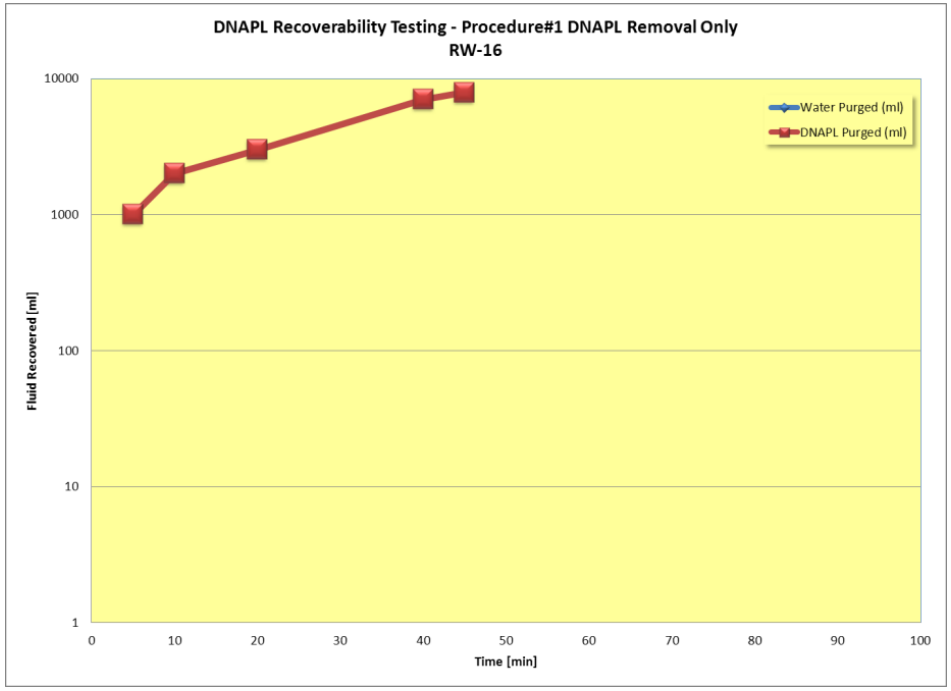


Procedure #1 (RW-15 DNAPL Only)

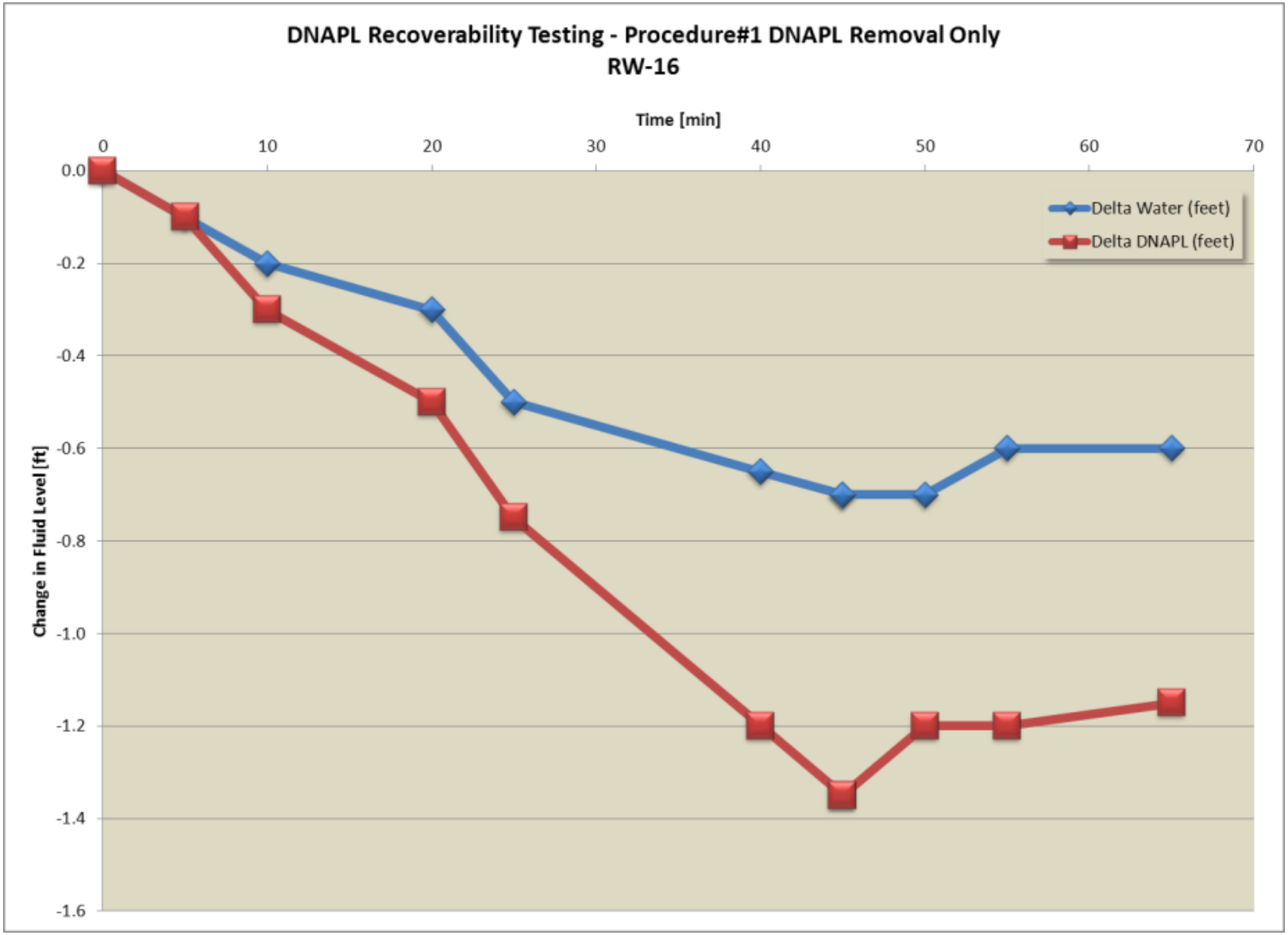


Procedure #1 (RW-16 DNAPL Only)

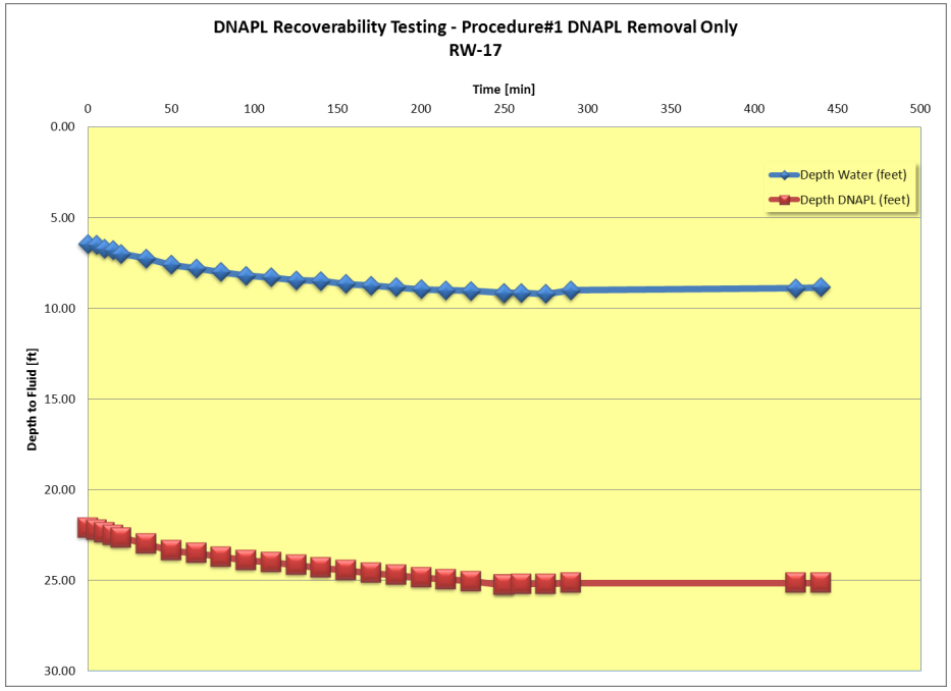


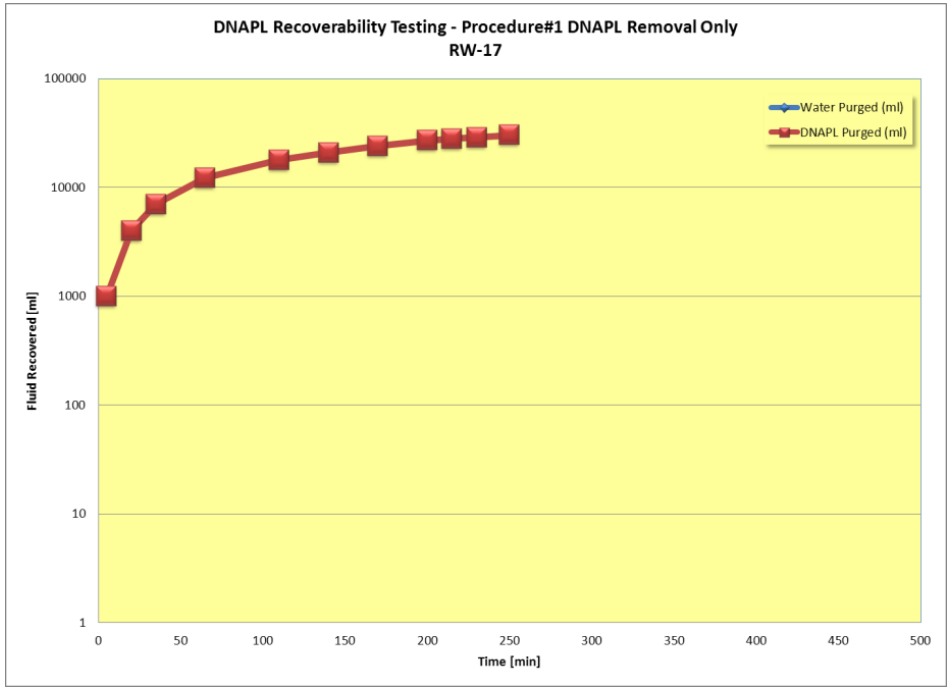


Procedure #1 (RW-16 DNAPL Only)

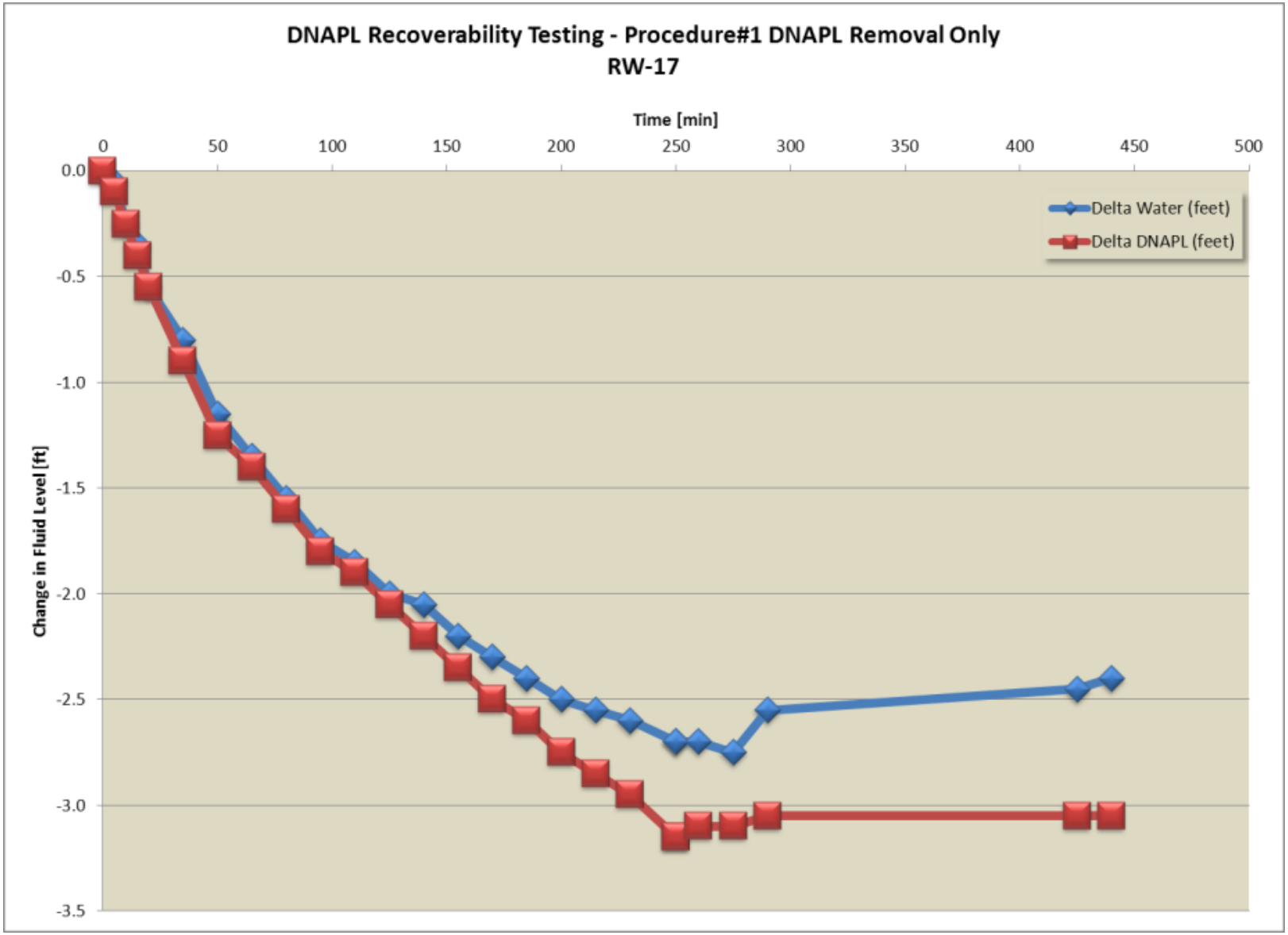


Procedure #1 (RW-17 DNAPL Only)

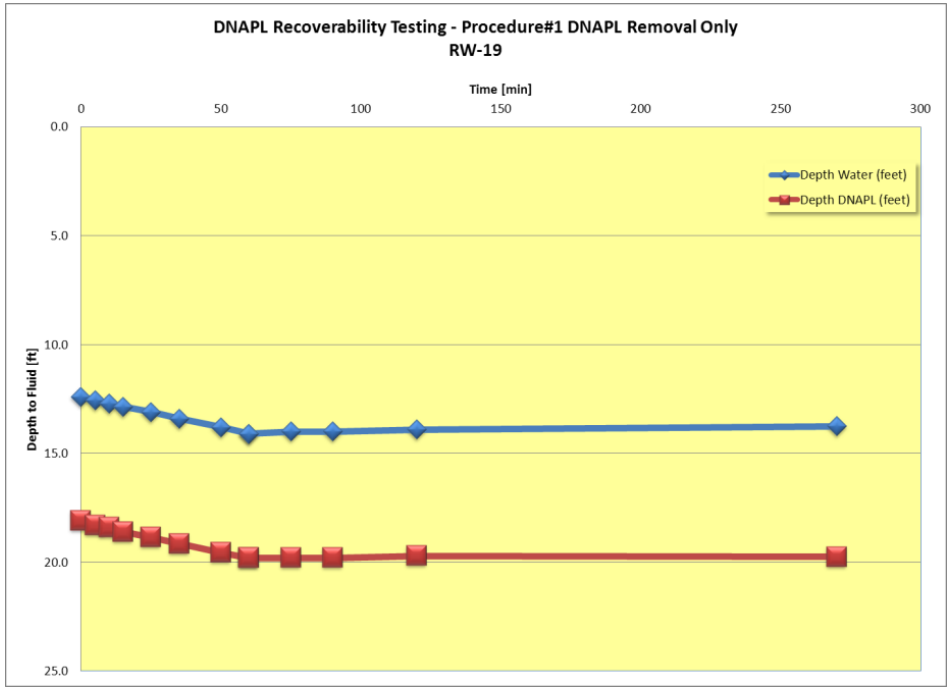


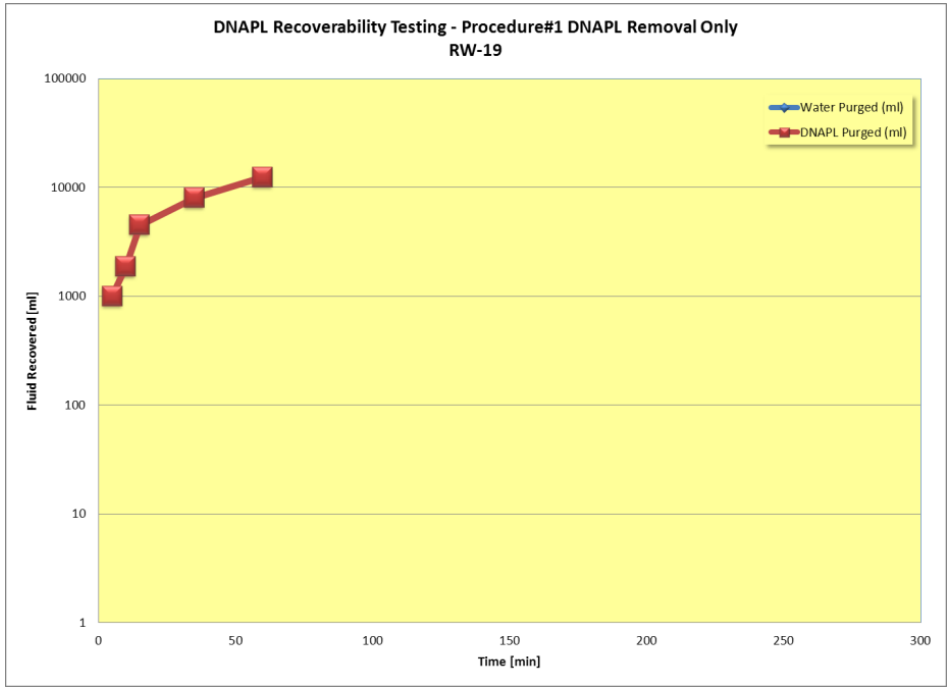


Procedure #1 (RW-17 DNAPL Only)

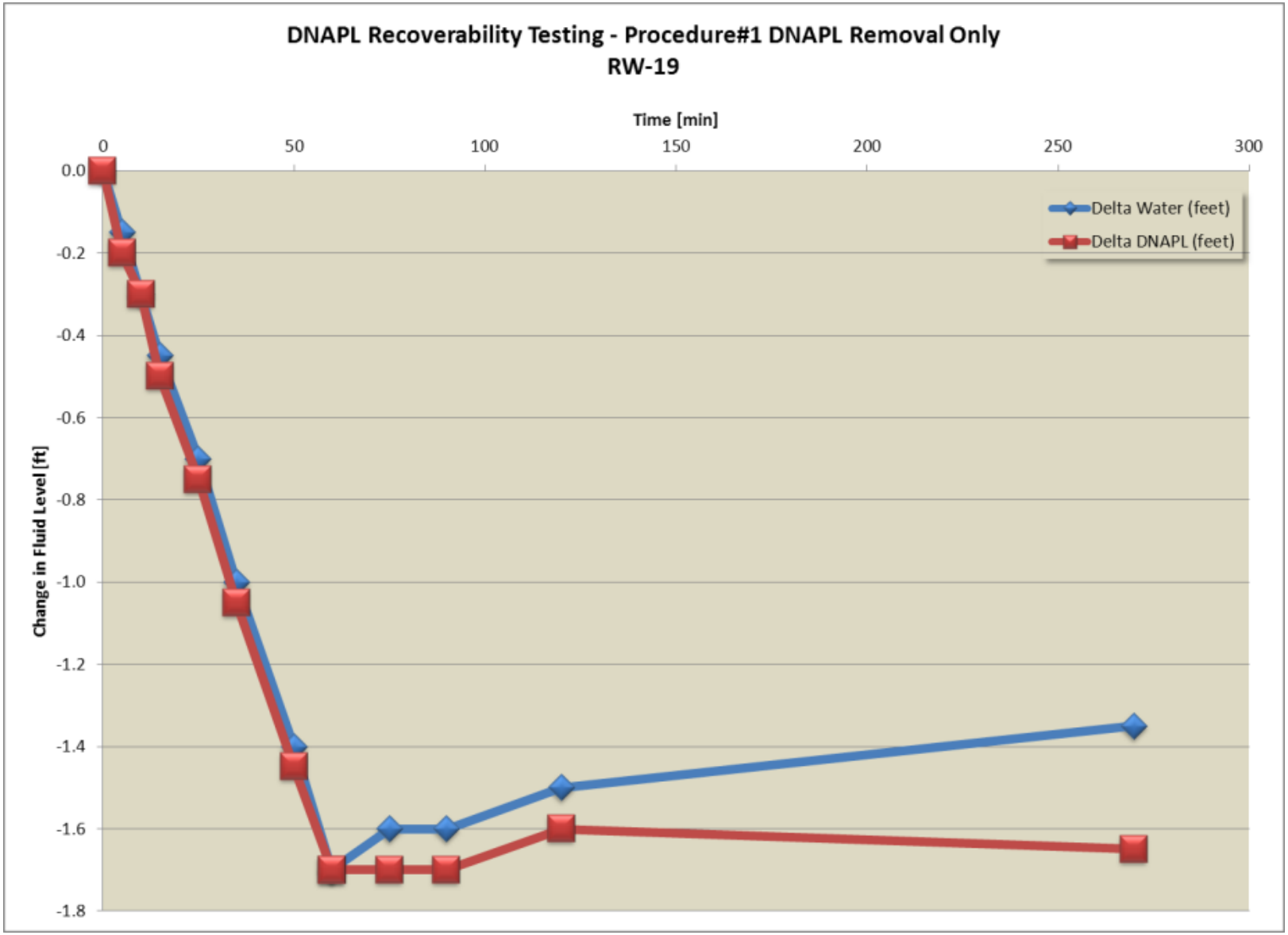


Procedure #1 (RW-19 DNAPL Only)





Procedure #1 (RW-19 DNAPL Only)



Data Summary – Procedure #1 (Water or DNAPL Only)

URS

- Testing did not result in substantial DNAPL thickness changes in recovery wells
- H2O or DNAPL extraction rates not significant
  - **H2O Only Tests:** H2O recharge rates ranged from: 0.0005 – 0.04 gpm
  - **H2O Only Tests:** DNAPL thickness changes ranged from: 0 – 0.8 ft
  - **H2O Only Tests:** Greatest change in DNAPL thickness @ RW-17 (0.8 ft)
  - **DNAPL Only Tests:** DNAPL recharge rates ranged from: 0 – 0.01 gpm
  - **DNAPL Only Tests:** H20 thickness decreases ranged from: 0.6 – 2.7 ft
  - **DNAPL Only Tests:** Highest DNAPL recharge rate @ RW-15 (0.01 gpm)
- Additional details in Procedure #1 Summary PDF (11x17 handout)

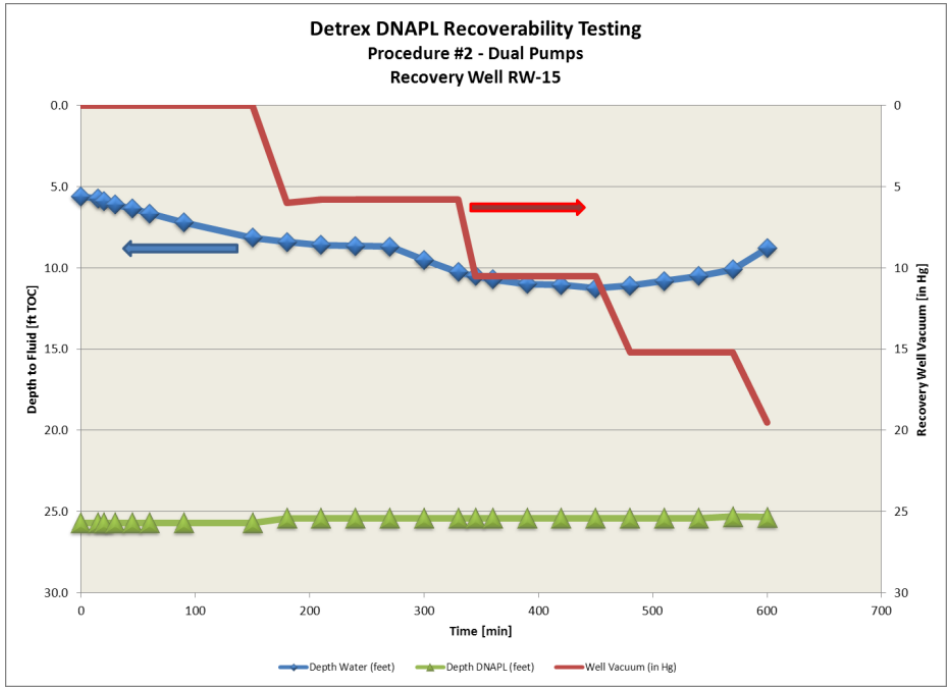
Go to PDF

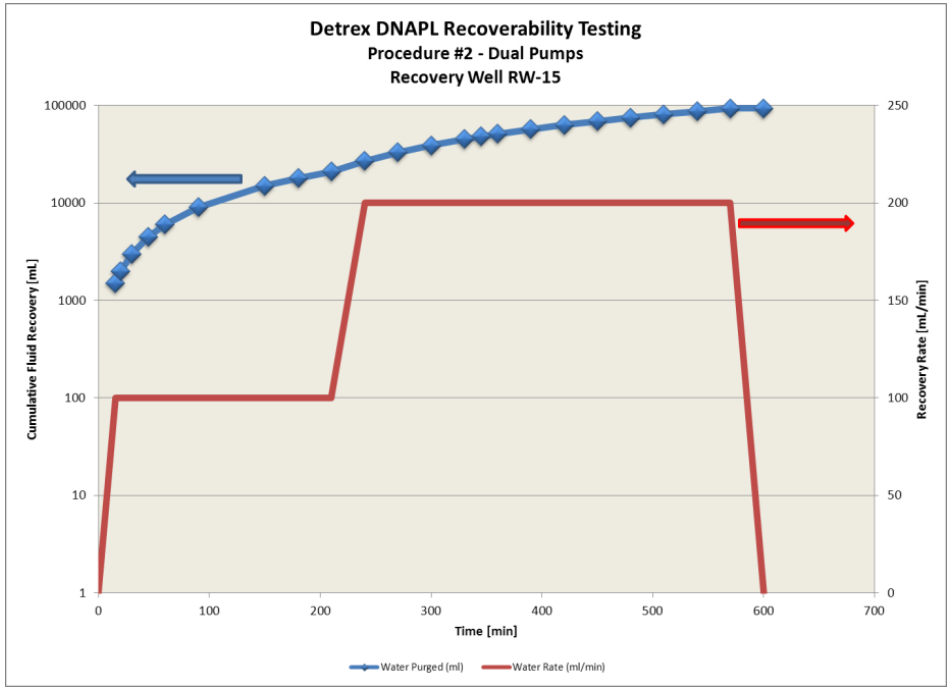
Data Summary – Procedure #2 (DPE / Dual Pumps)

URS

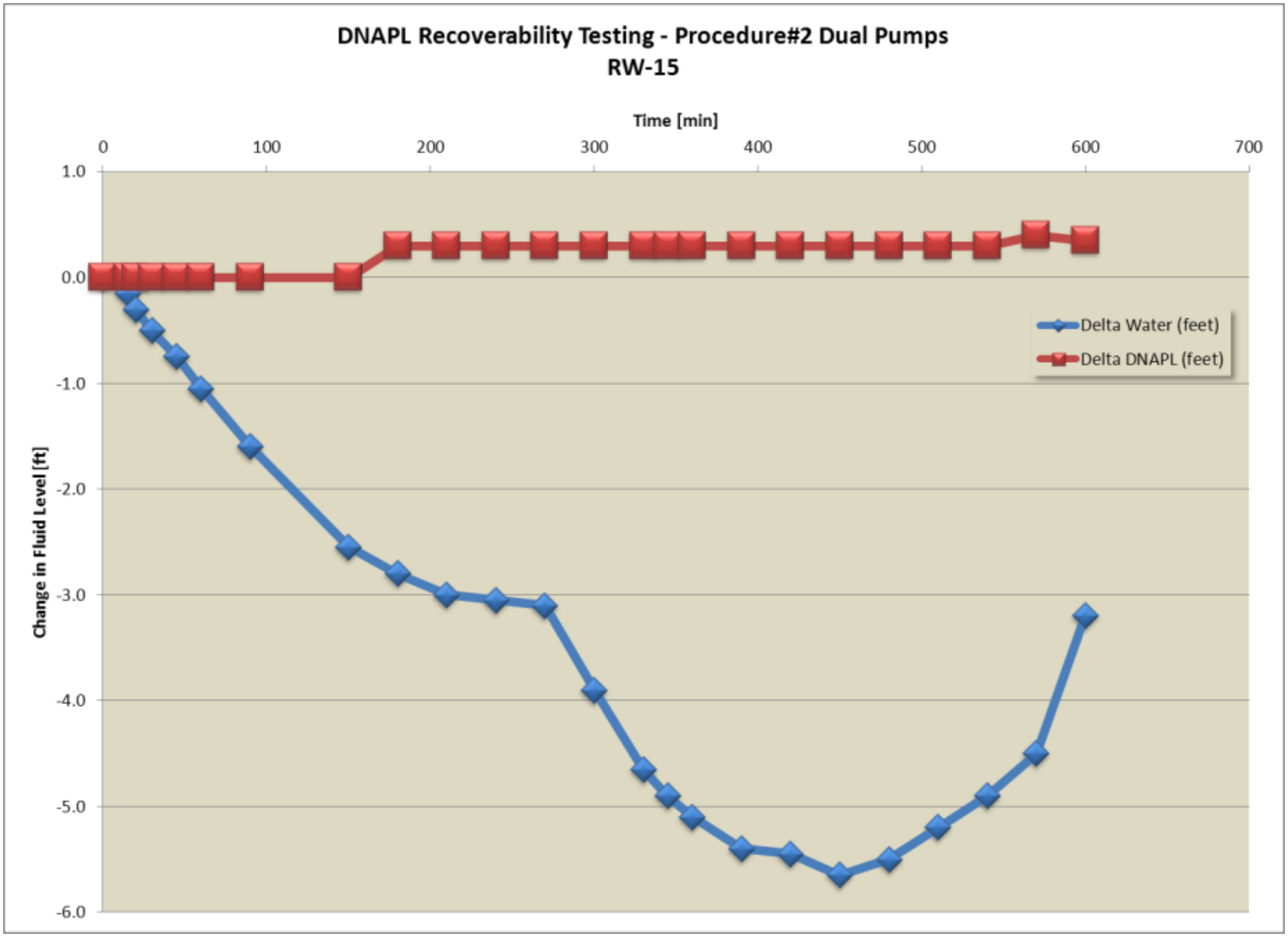
- Procedure #2
  - Individual RWs tested
    - Dual-phase extraction – variable vacuum stages
    - Pumping H2O and DNAPL using dual pump system
    - North Area RWs completed
    - South Area RWs not completed; no DNAPL except for limited amount in RW-19
  - Data recorded
    - DPE Vacuum
    - Observation Well Vacuum
    - Air Flow
    - Depth to H2O
    - Depth to DNAPL
    - Fluid Recovery Rates (H2O & DNAPL)
    - Cumulative Fluid Recovery (H2O & DNAPL)

Procedure #2 (RW-15 Vacuum)

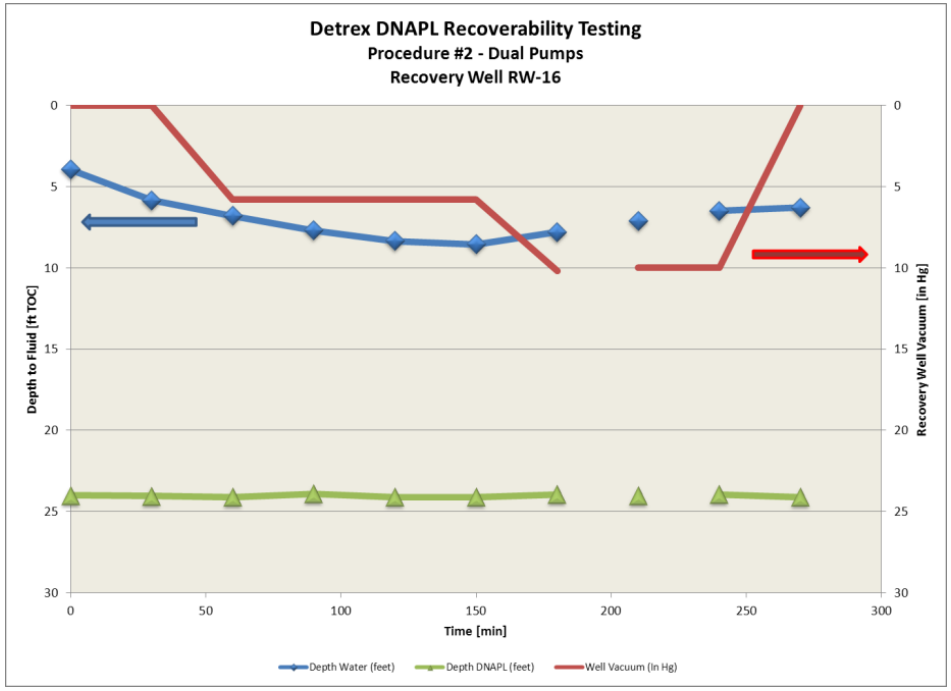


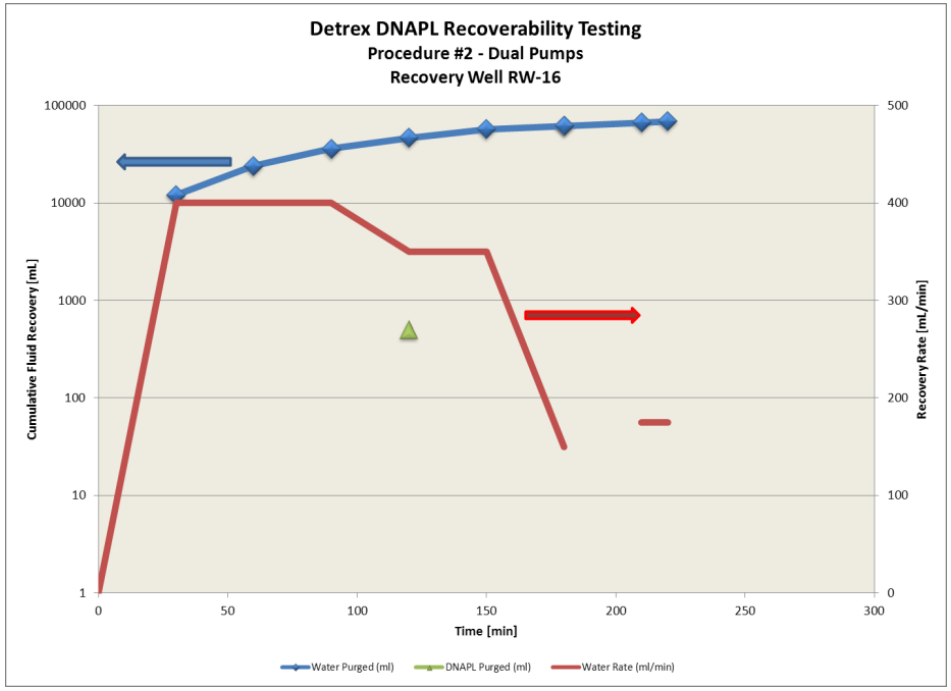


Procedure #2 (RW-15 Vacuum)

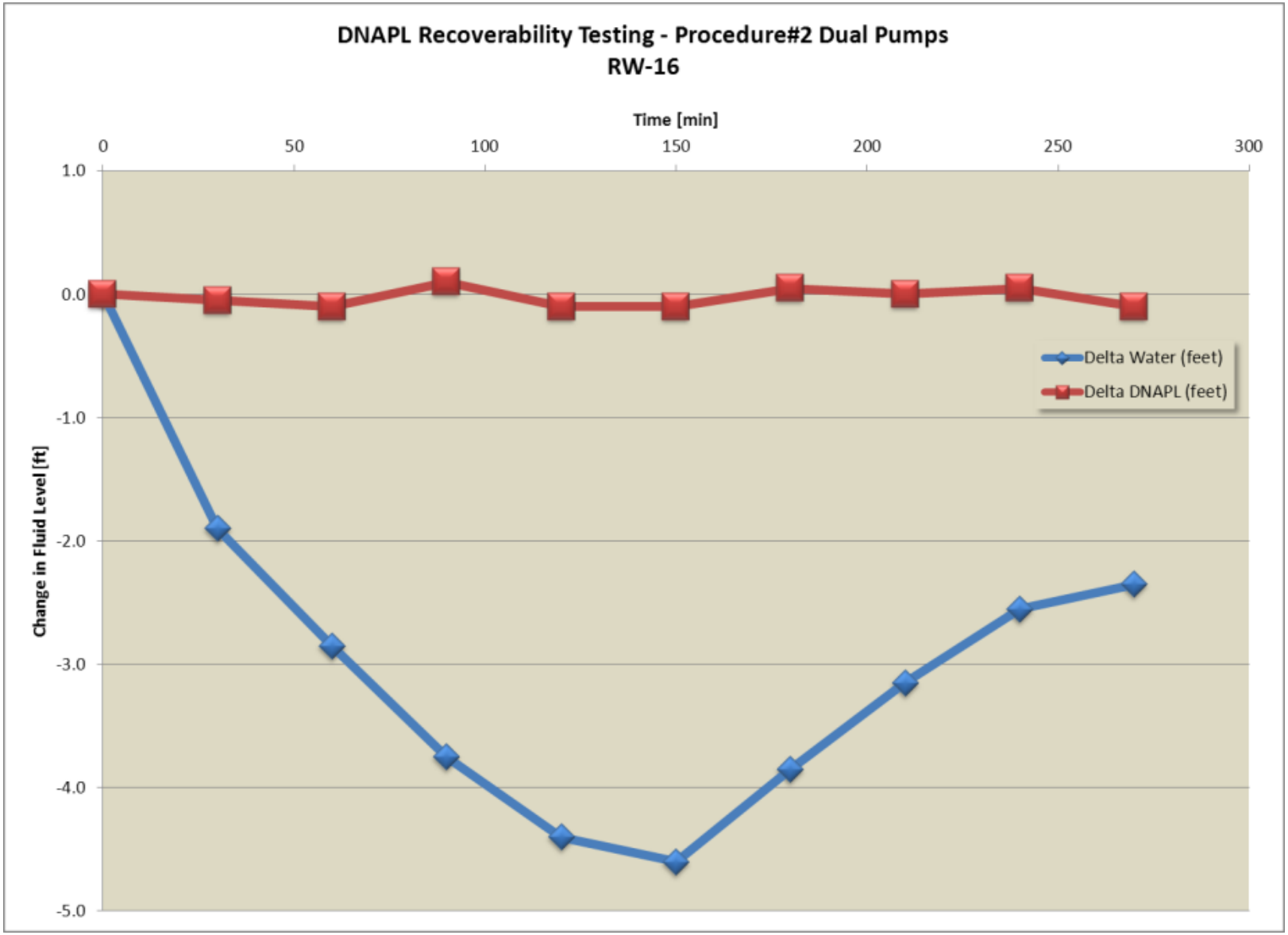


Procedure #2 (RW-16 Vacuum)

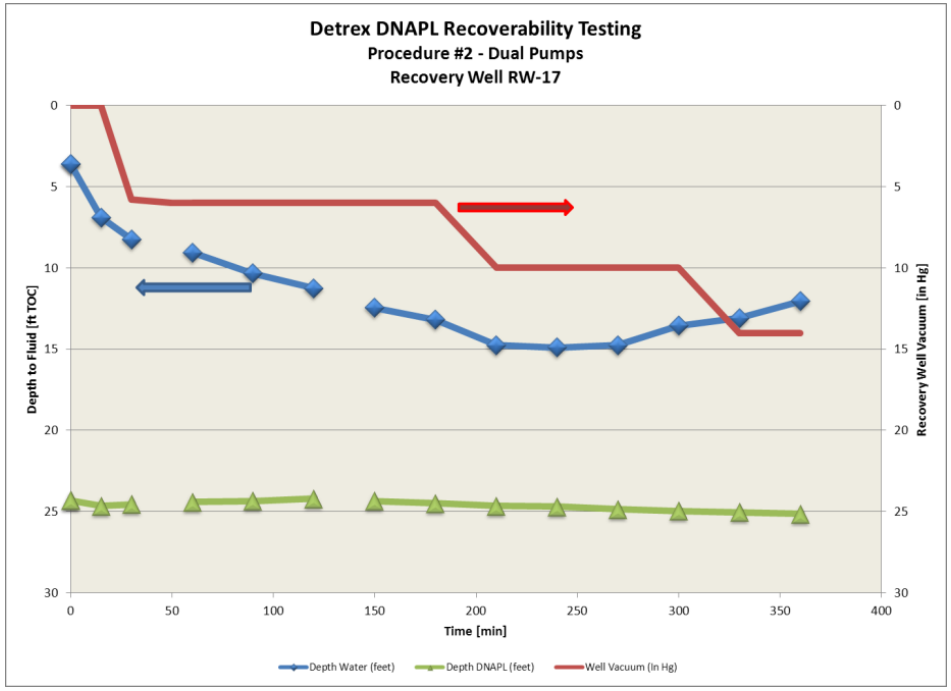


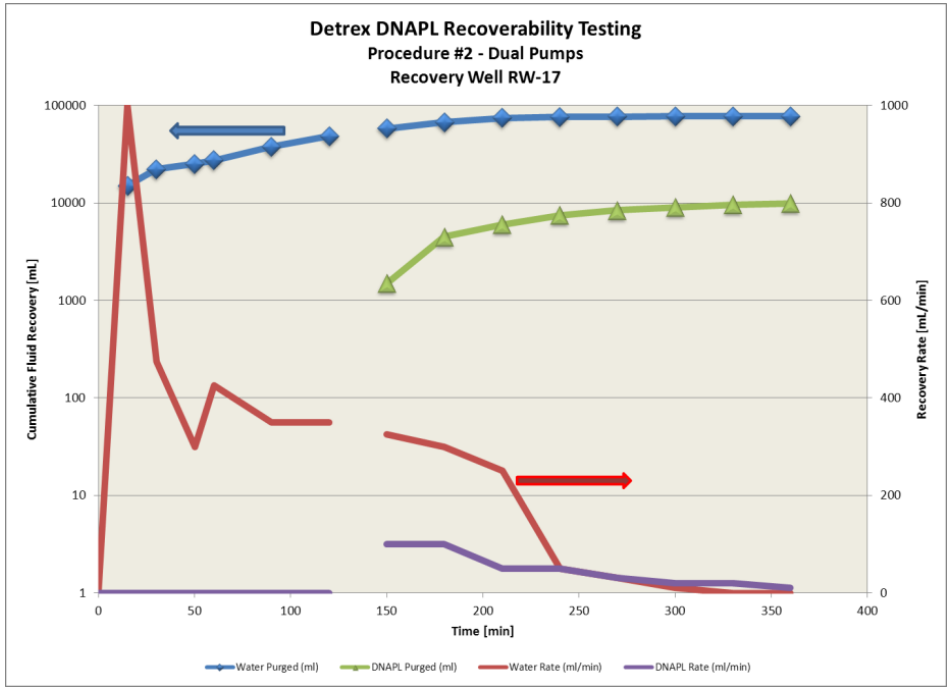


Procedure #2 (RW-16 Vacuum)

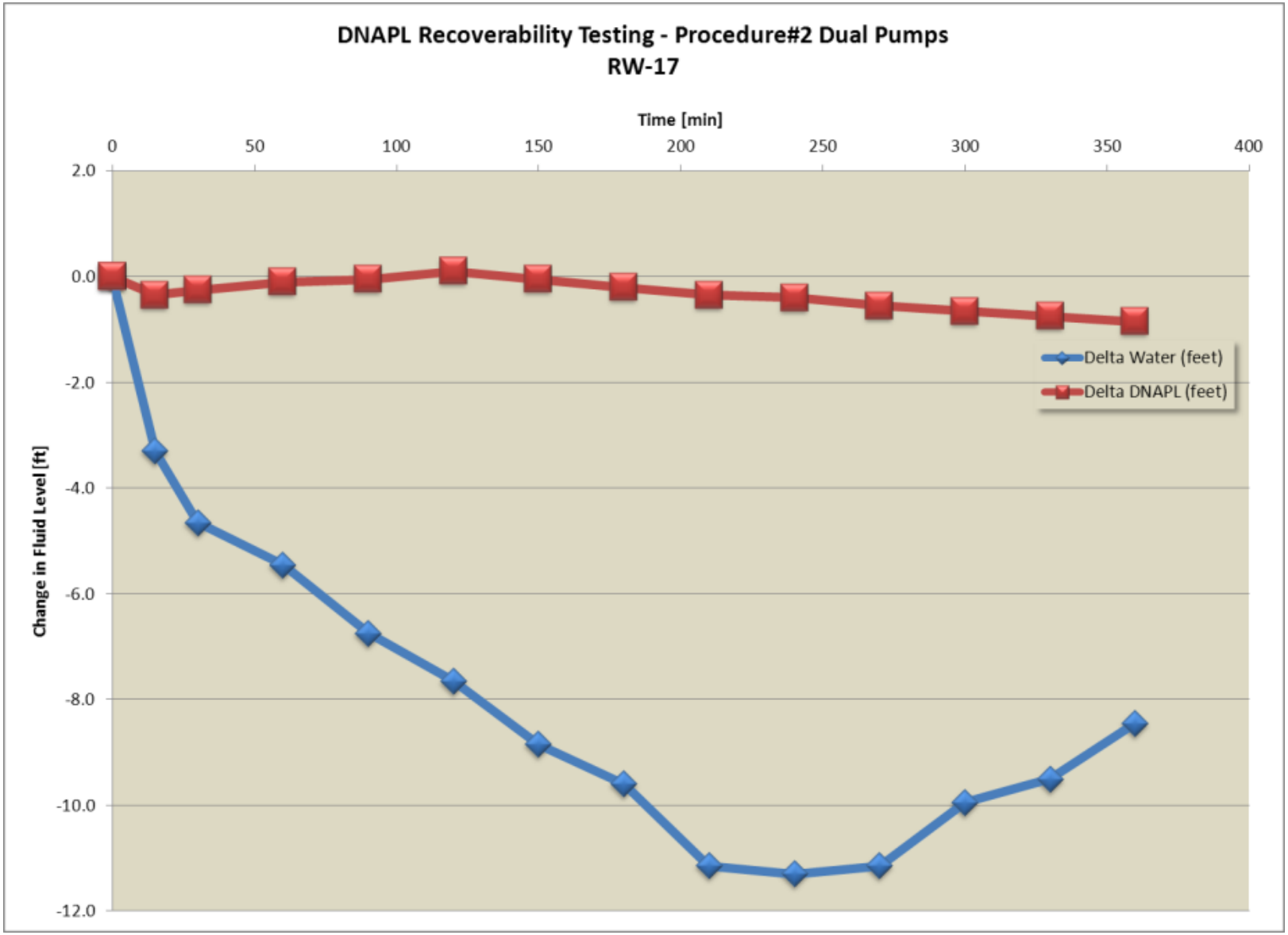


Procedure #2 (RW-17 Vacuum)

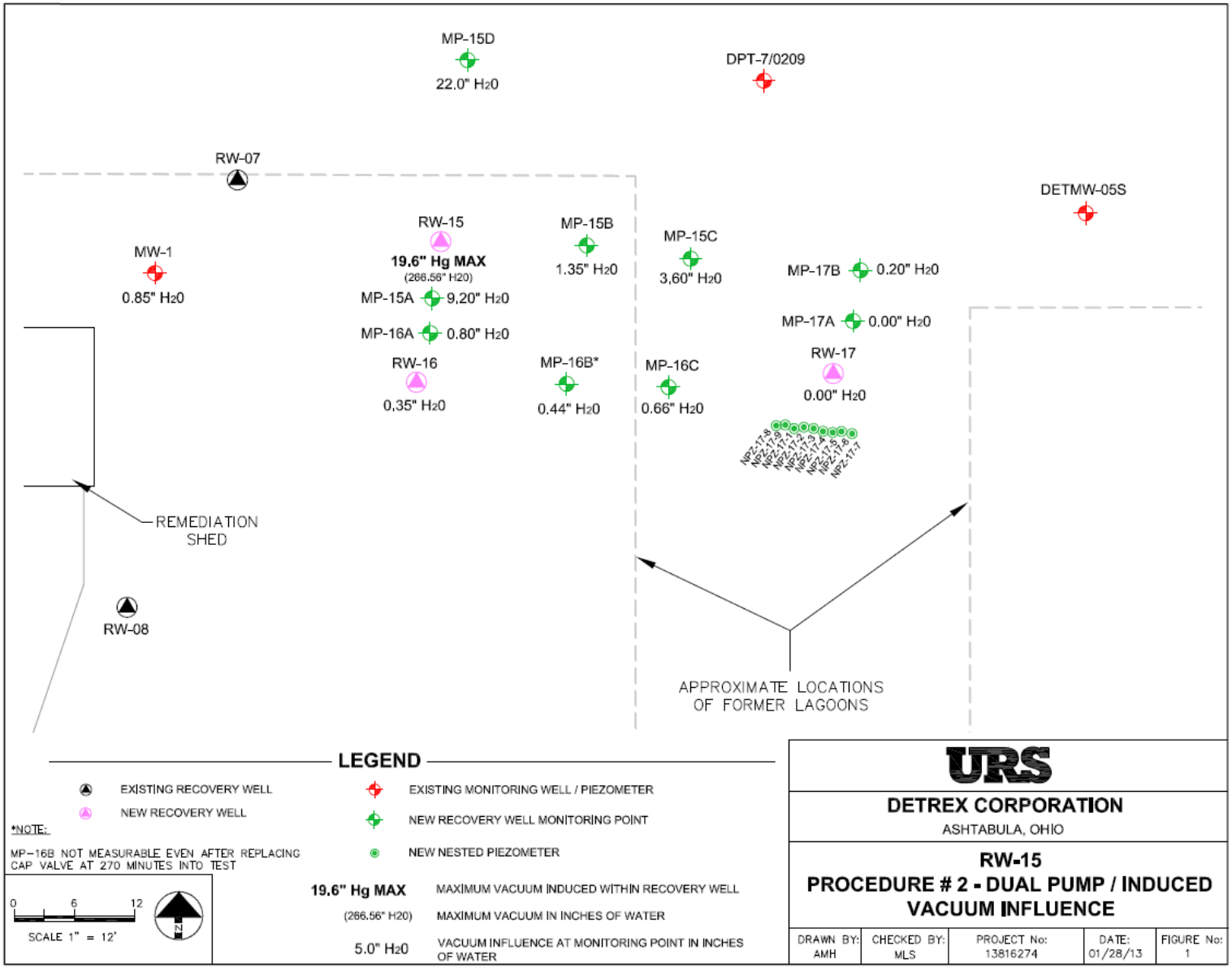




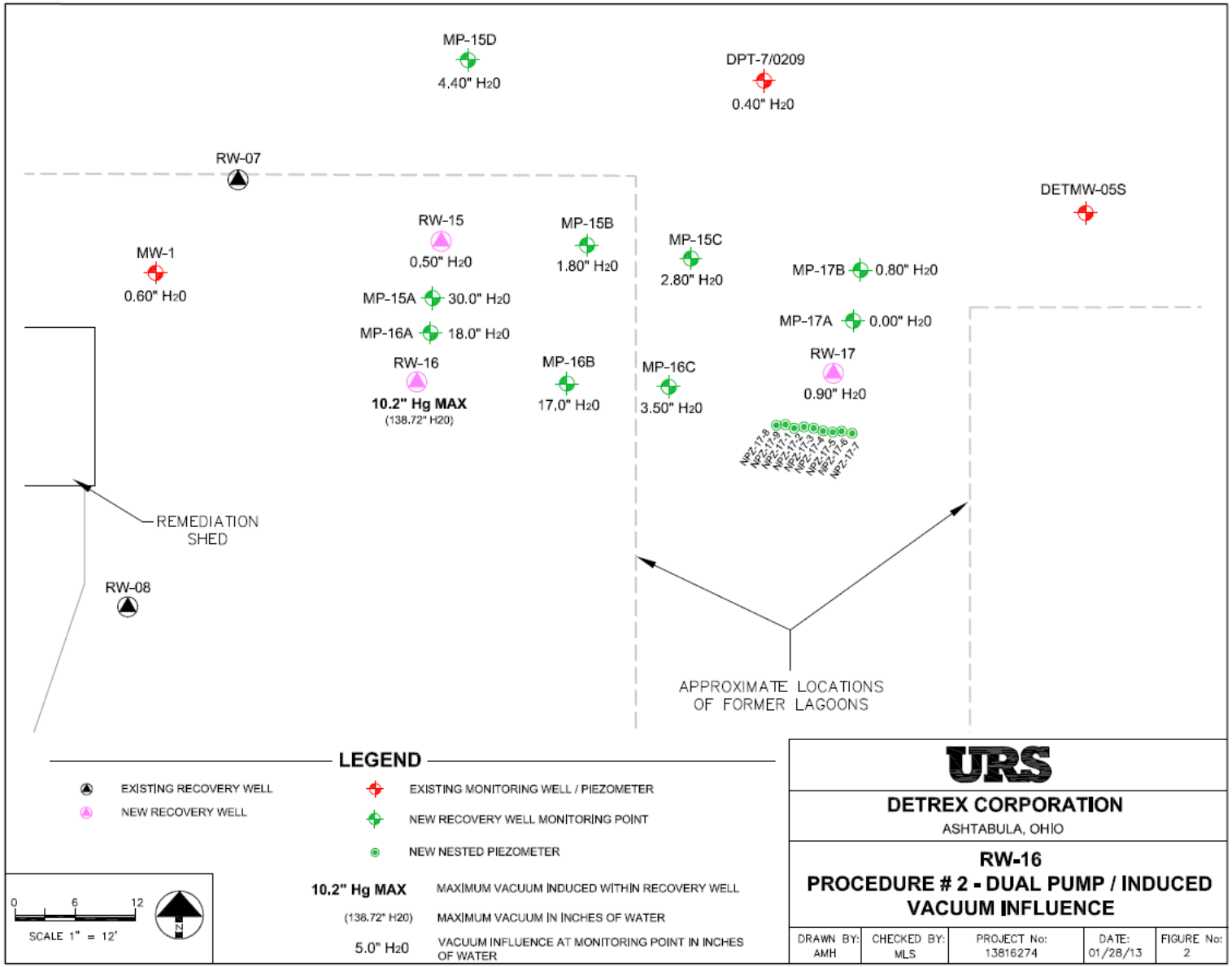
Procedure #2 (RW-17 Vacuum)



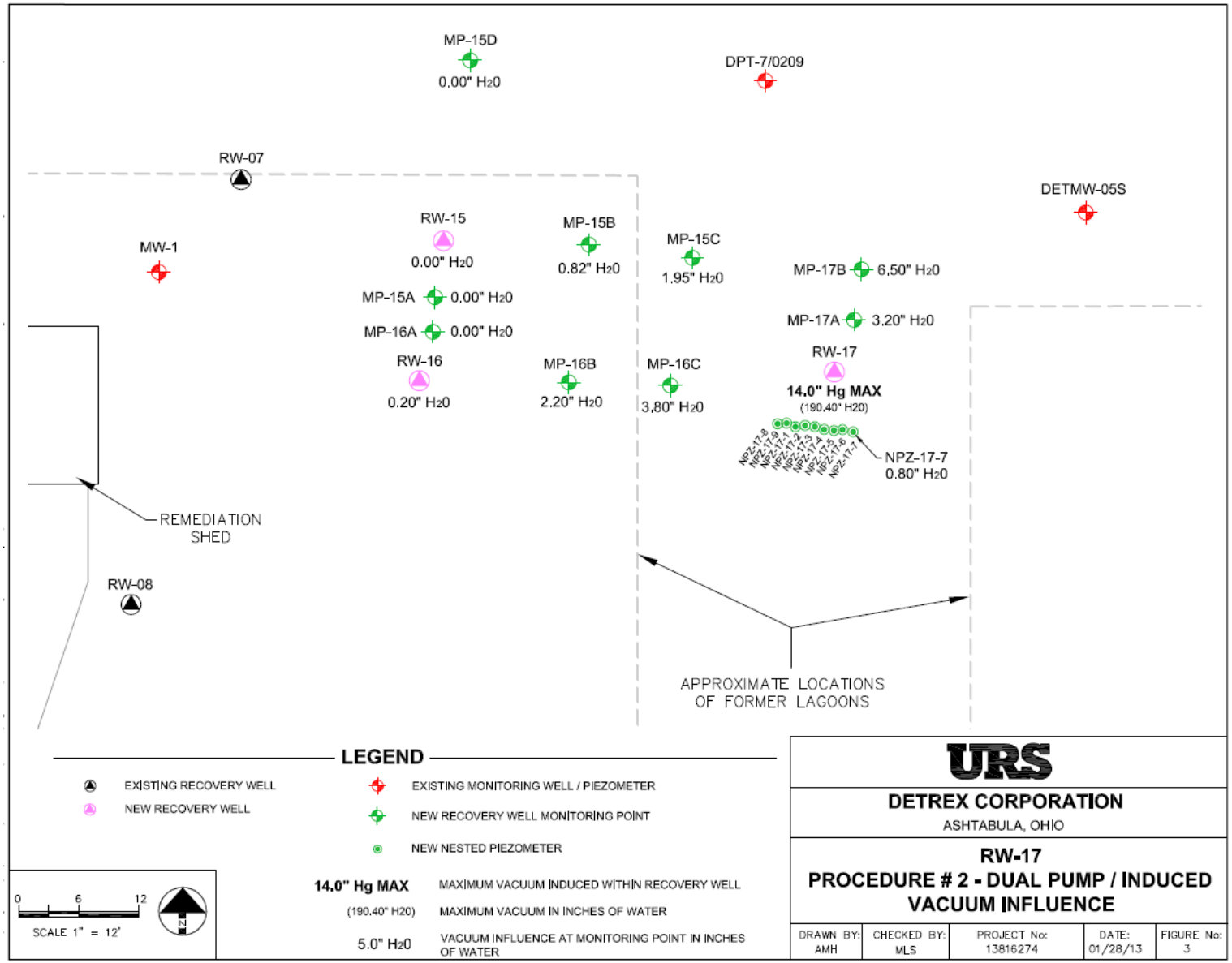
Procedure #2 (RW-15 Vacuum Influence)



Procedure #2 (RW-16 Vacuum Influence)



Procedure #2 (RW-17 Vacuum Influence)



Data Summary – Procedure #2 (DPE / Dual Pumps)

URS

- Testing did not result in significant DNAPL thickness or recovery rate changes in recovery wells
- DNAPL recovery rates not significant
  - **RW-15 Test:** DNAPL recovery rate – .0006 gpm
  - **RW-16 Test:** DNAPL recovery rate - 0 gpm
  - **RW-17 Test:** DNAPL recovery rate – 0.005 gpm
  - **RW-18 and RW-20 Tests:** No DNAPL present
  - **RW-19 Test:** Pump failures test not completed
- No measureable airflow through System during any test
- Additional details in Procedure #2 Summary PDF (11x17 handout)

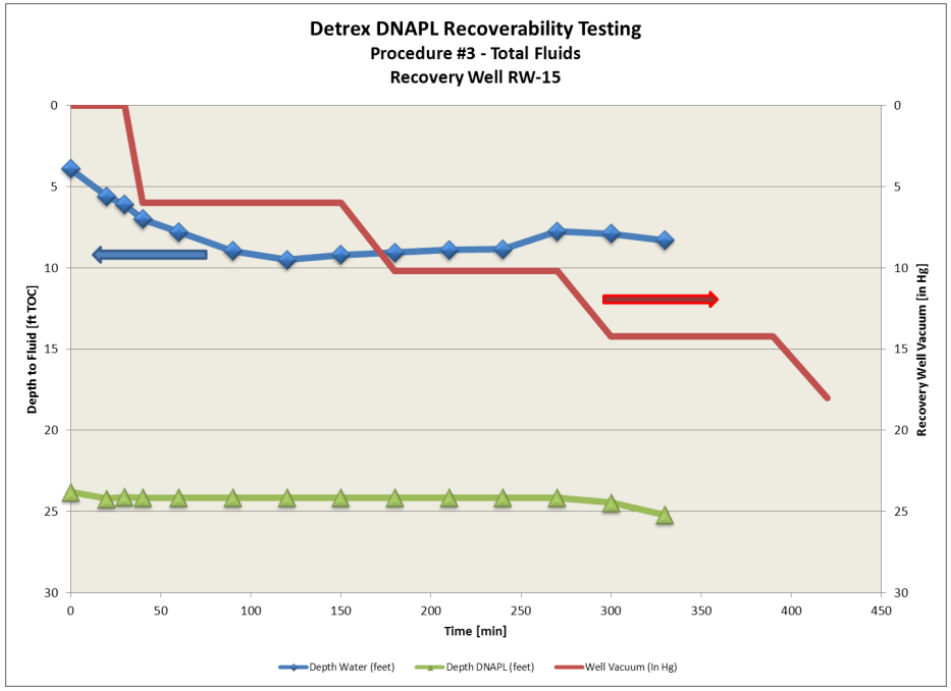
Go to PDF

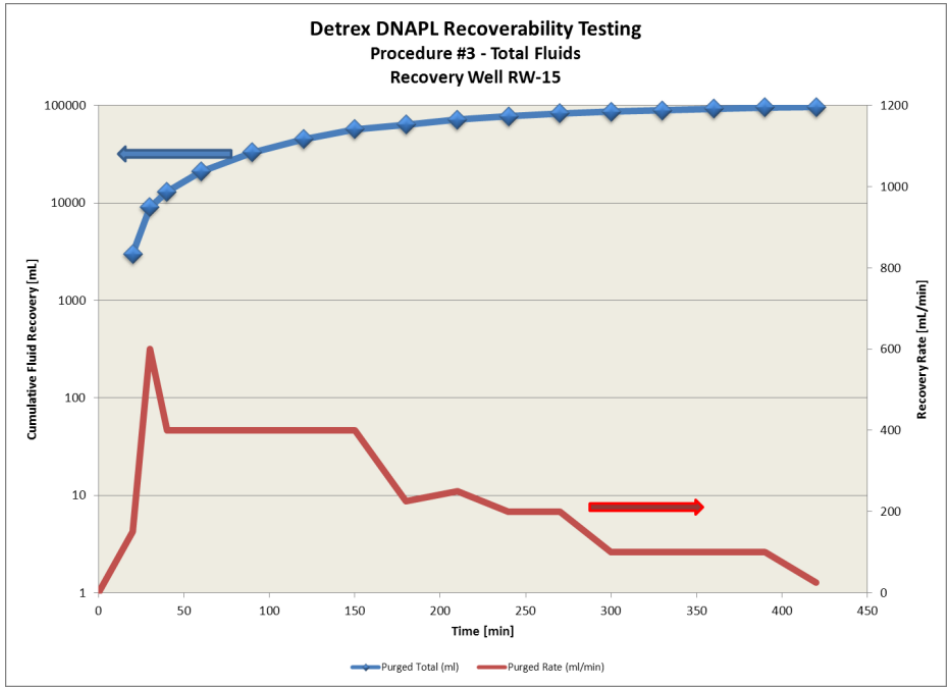
Data Summary – Procedure #3 (DPE / Total Fluids)

URS

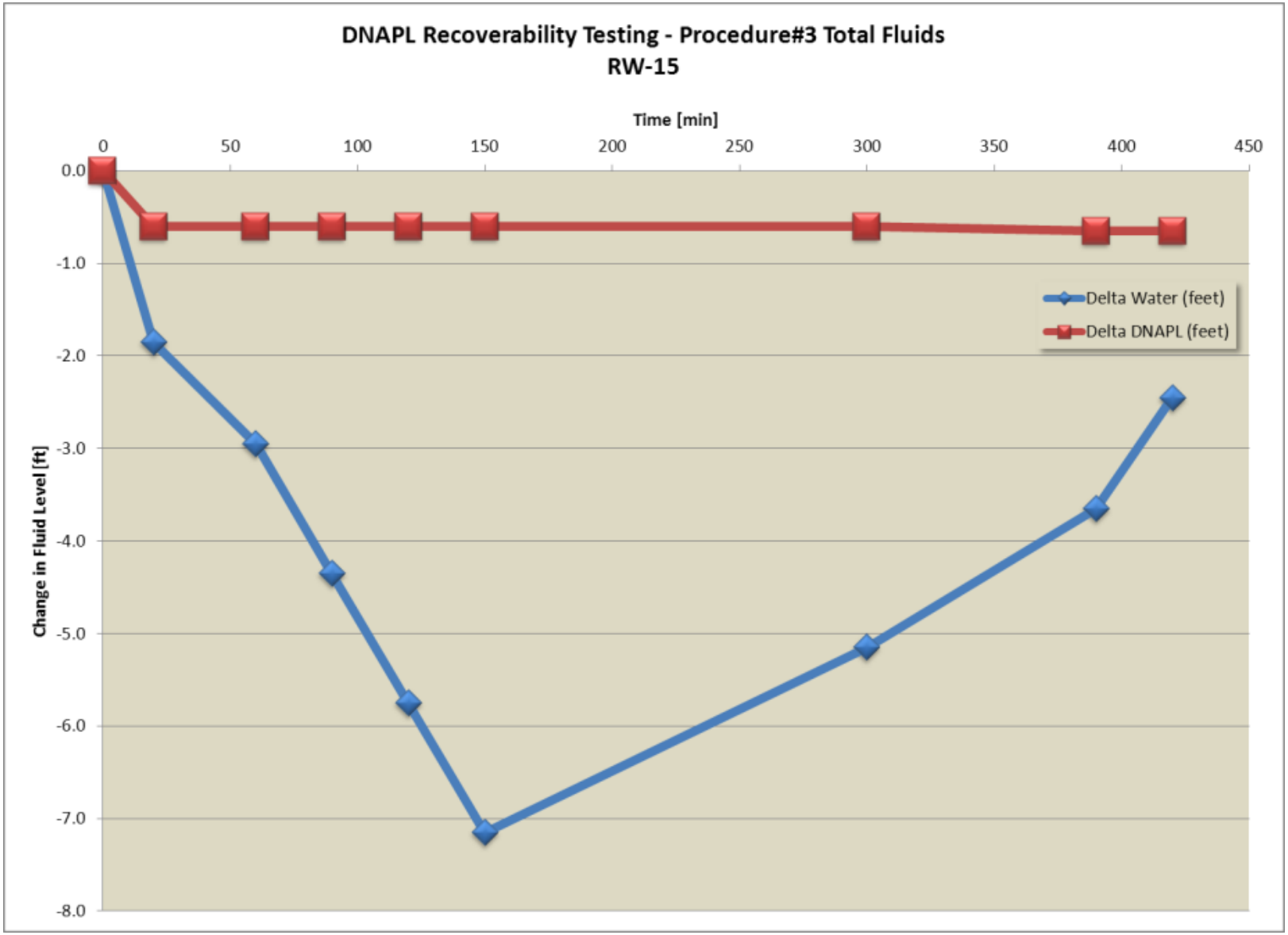
- Procedure #3
  - Individual RWs tested
    - Dual-phase extraction – variable vacuum stages
    - Pumping H2O and DNAPL as total fluids recovery
    - North & South Area RWs completed
  - Data recorded
    - DPE Vacuum
    - Observation Well Vacuum
    - Air Flow
    - Depth to H2O
    - Depth to DNAPL
    - Fluid Recovery Rates (H2O & DNAPL)
    - Cumulative Fluid Recovery (H2O & DNAPL)

Procedure #3 (RW-15 Vacuum)

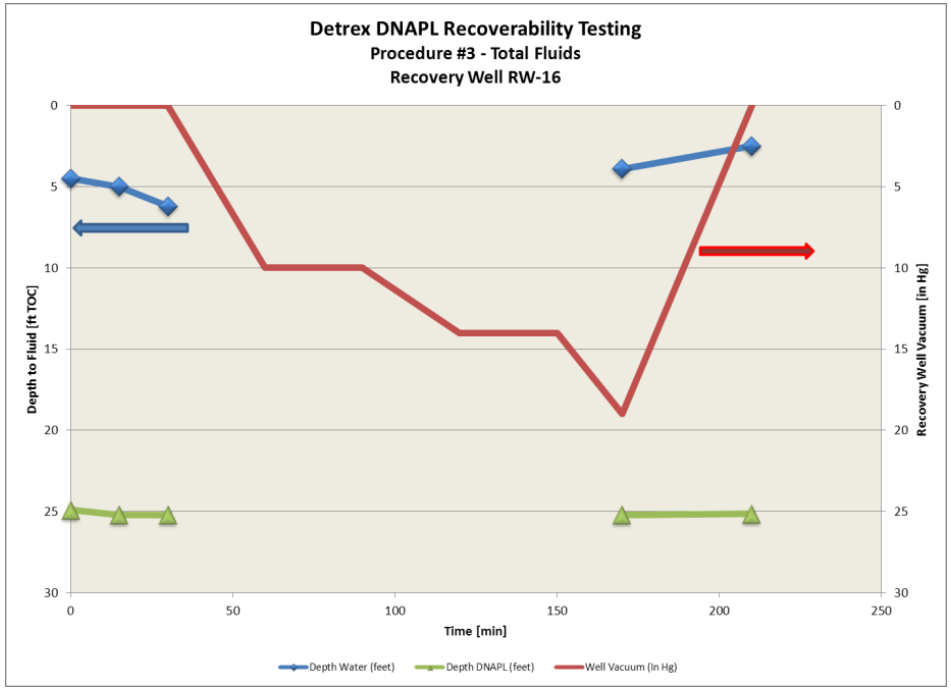


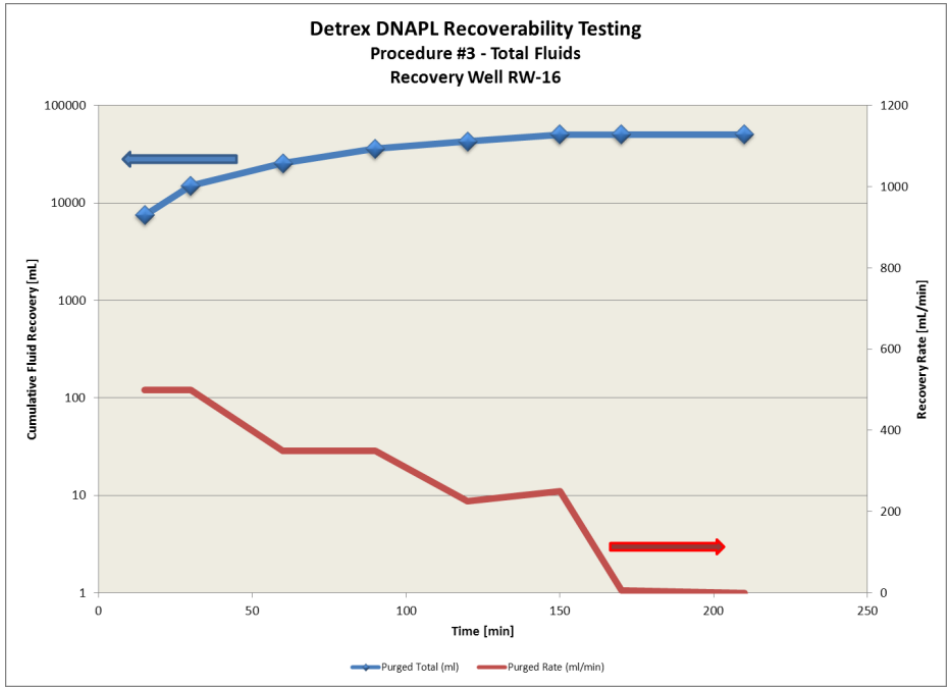


Procedure #3 (RW-15 Vacuum)

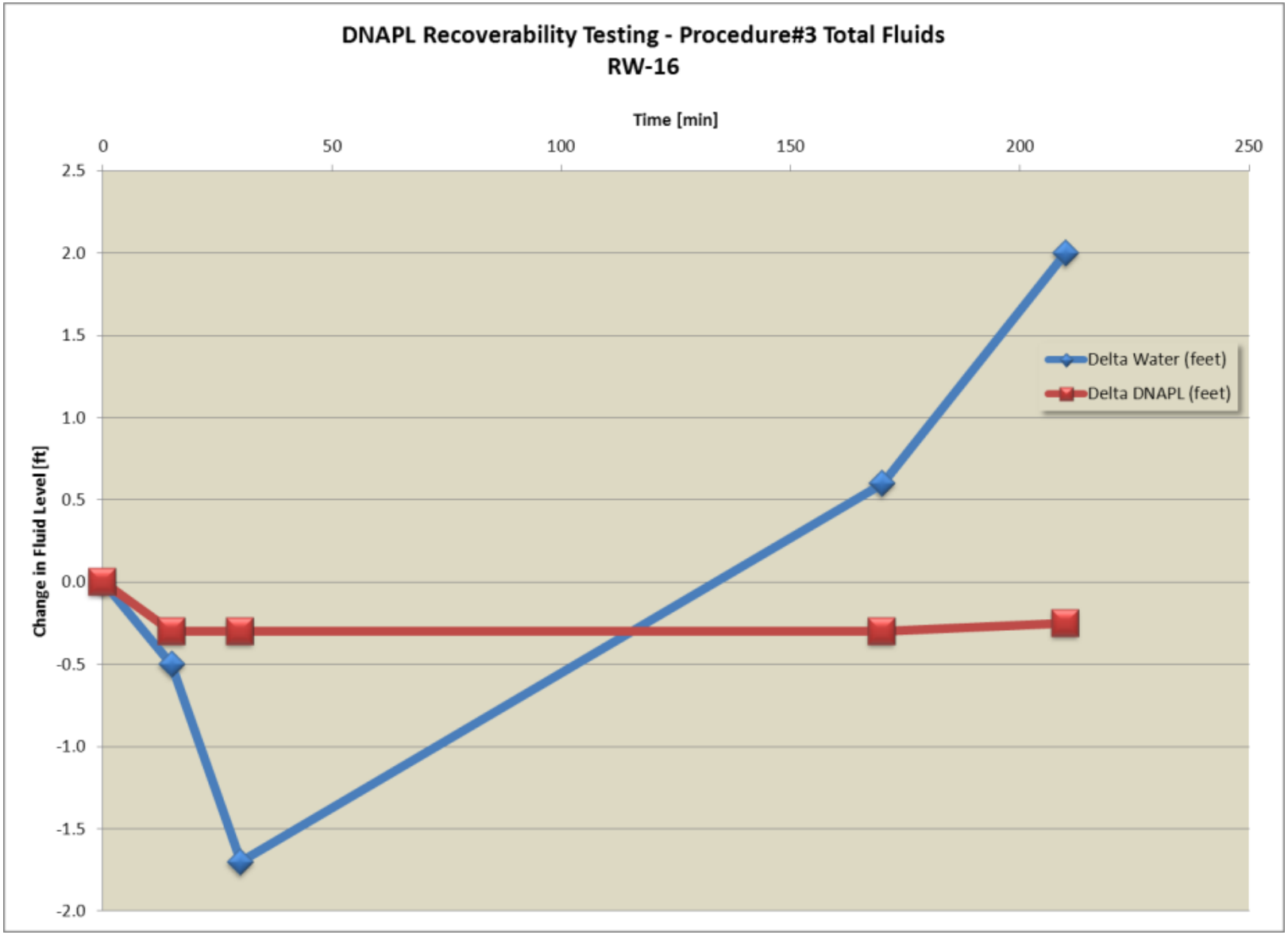


Procedure #3 (RW-16 Vacuum)

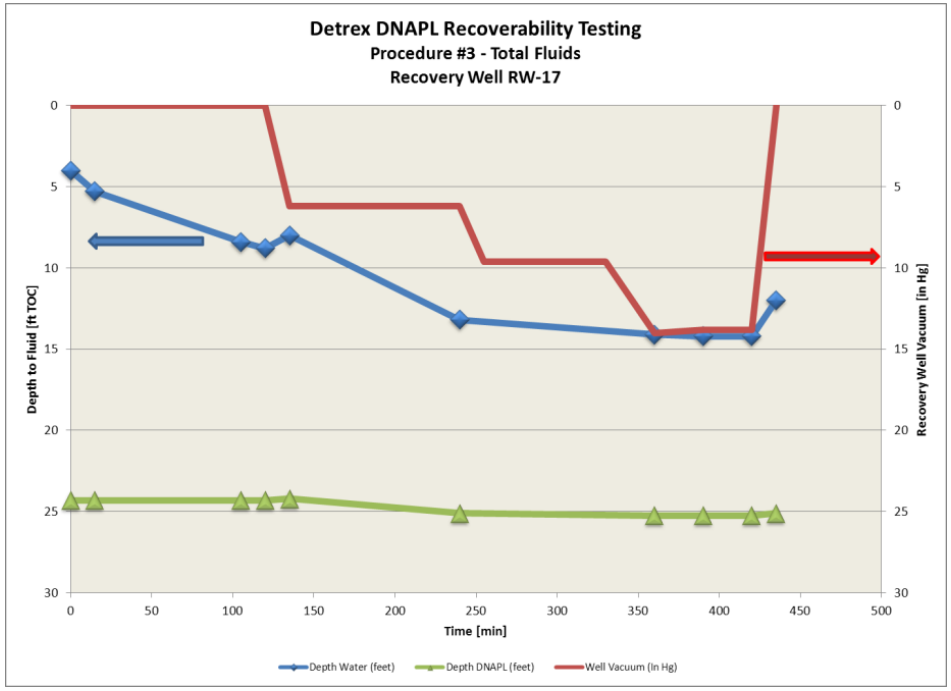


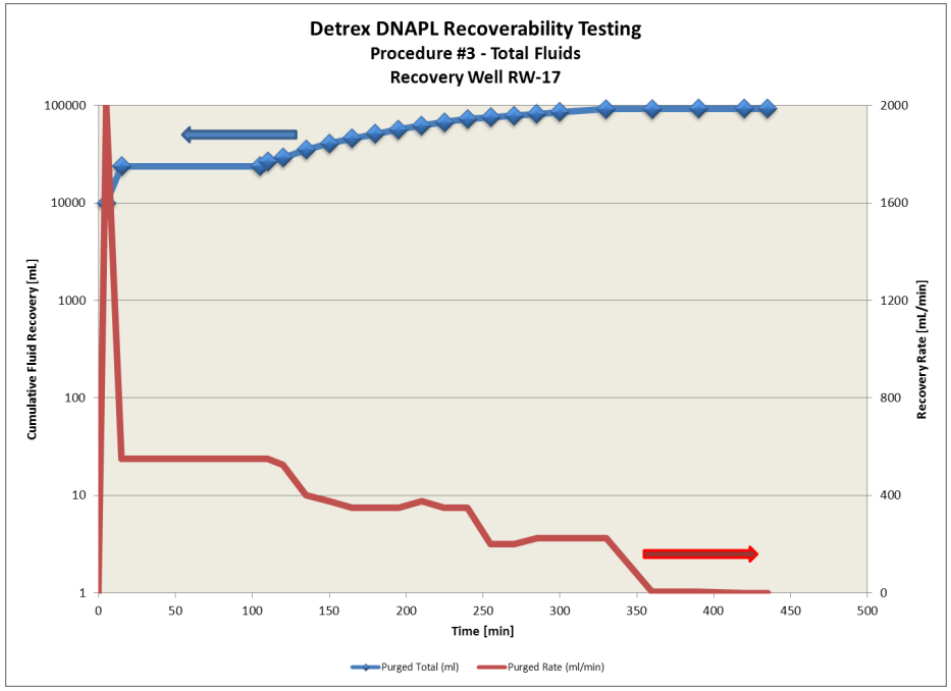


Procedure #3 (RW-16 Vacuum)

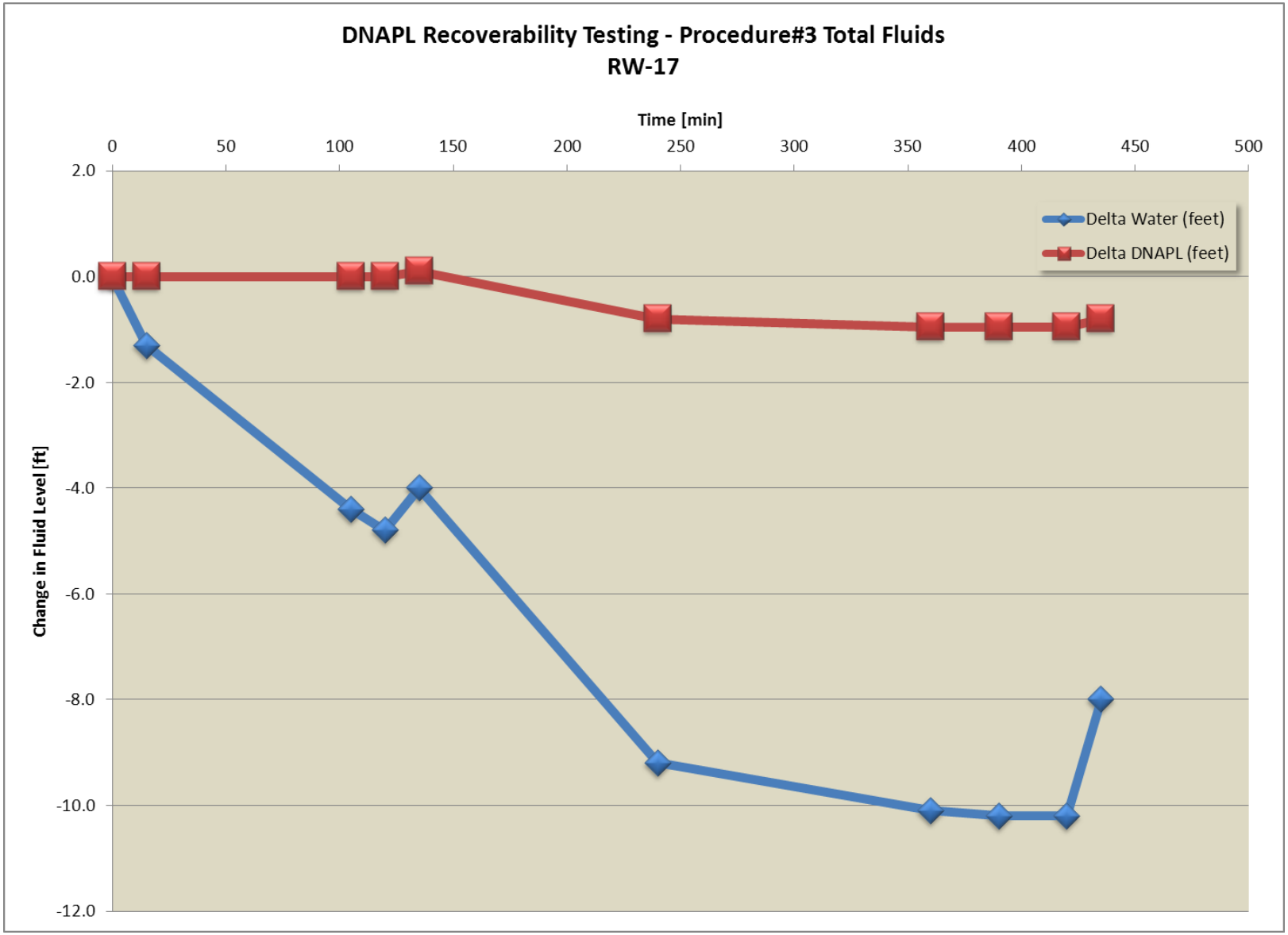


Procedure #3 (RW-17 Vacuum)

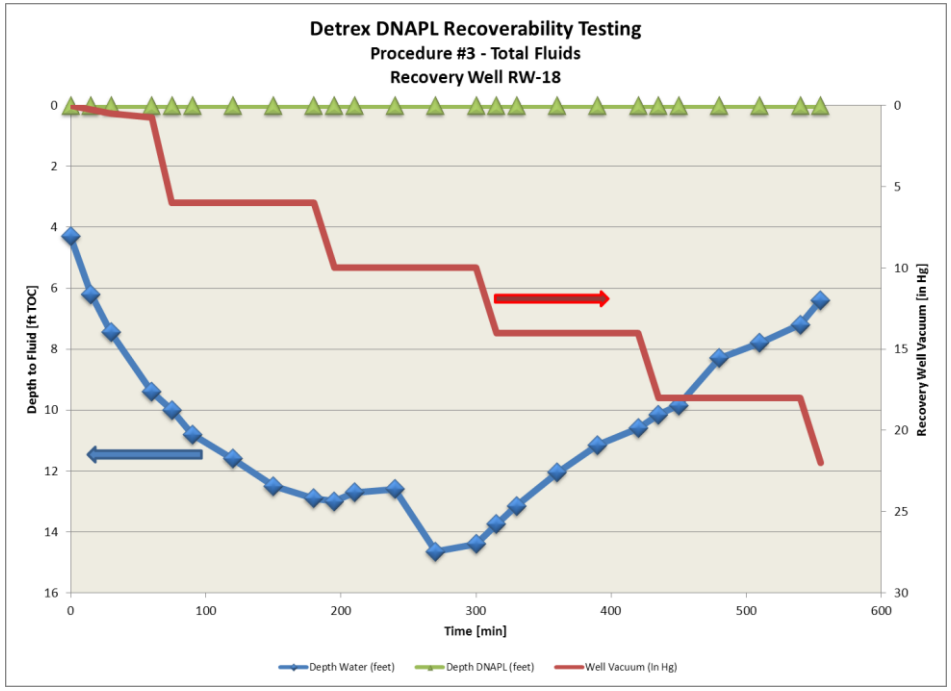


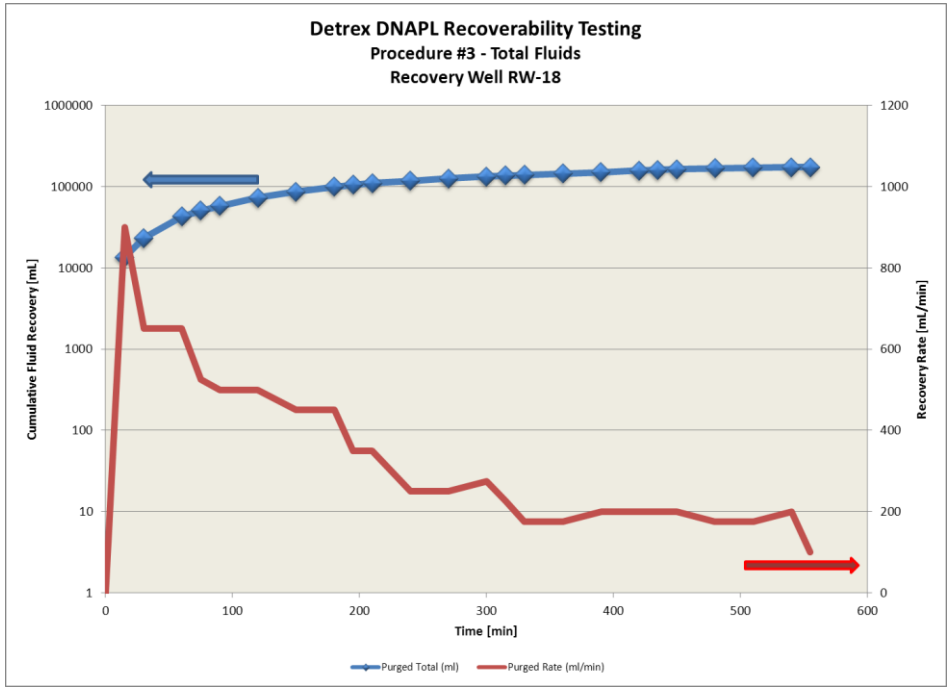


Procedure #3 (RW-17 Vacuum)

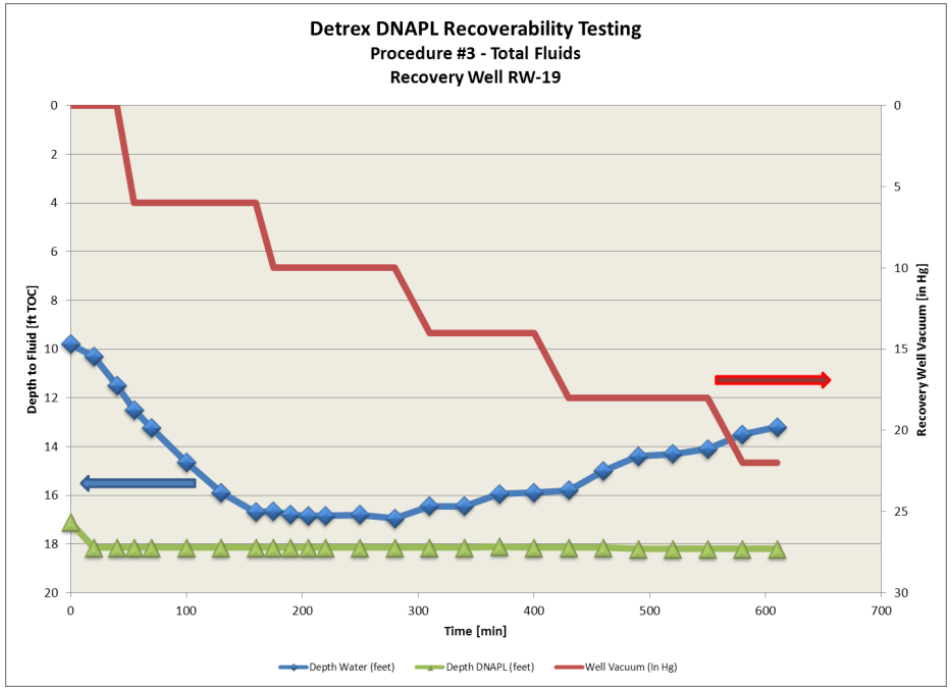


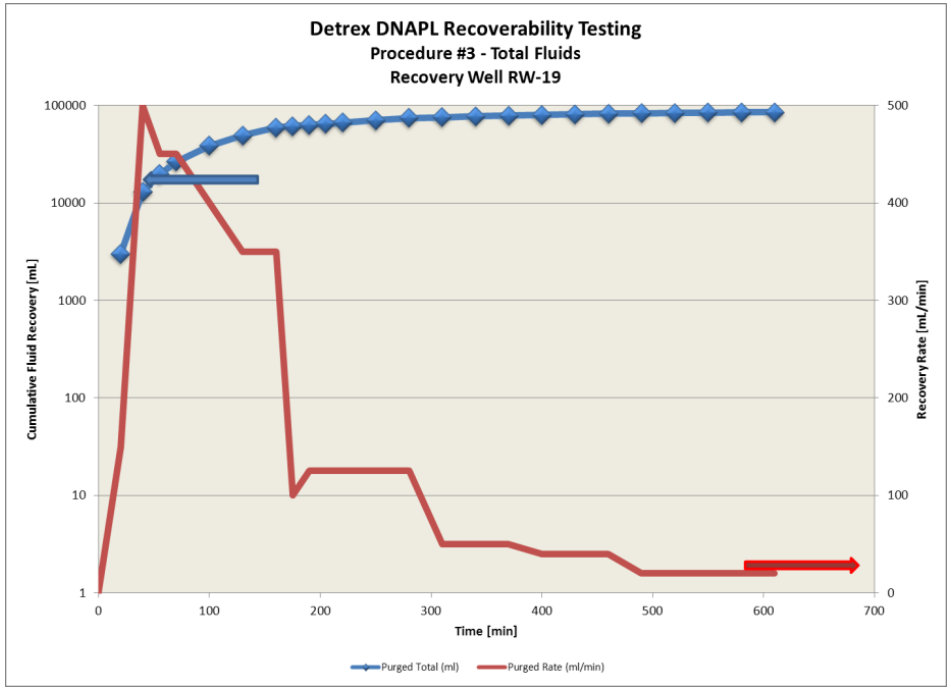
Procedure #3 (RW-18 Vacuum)



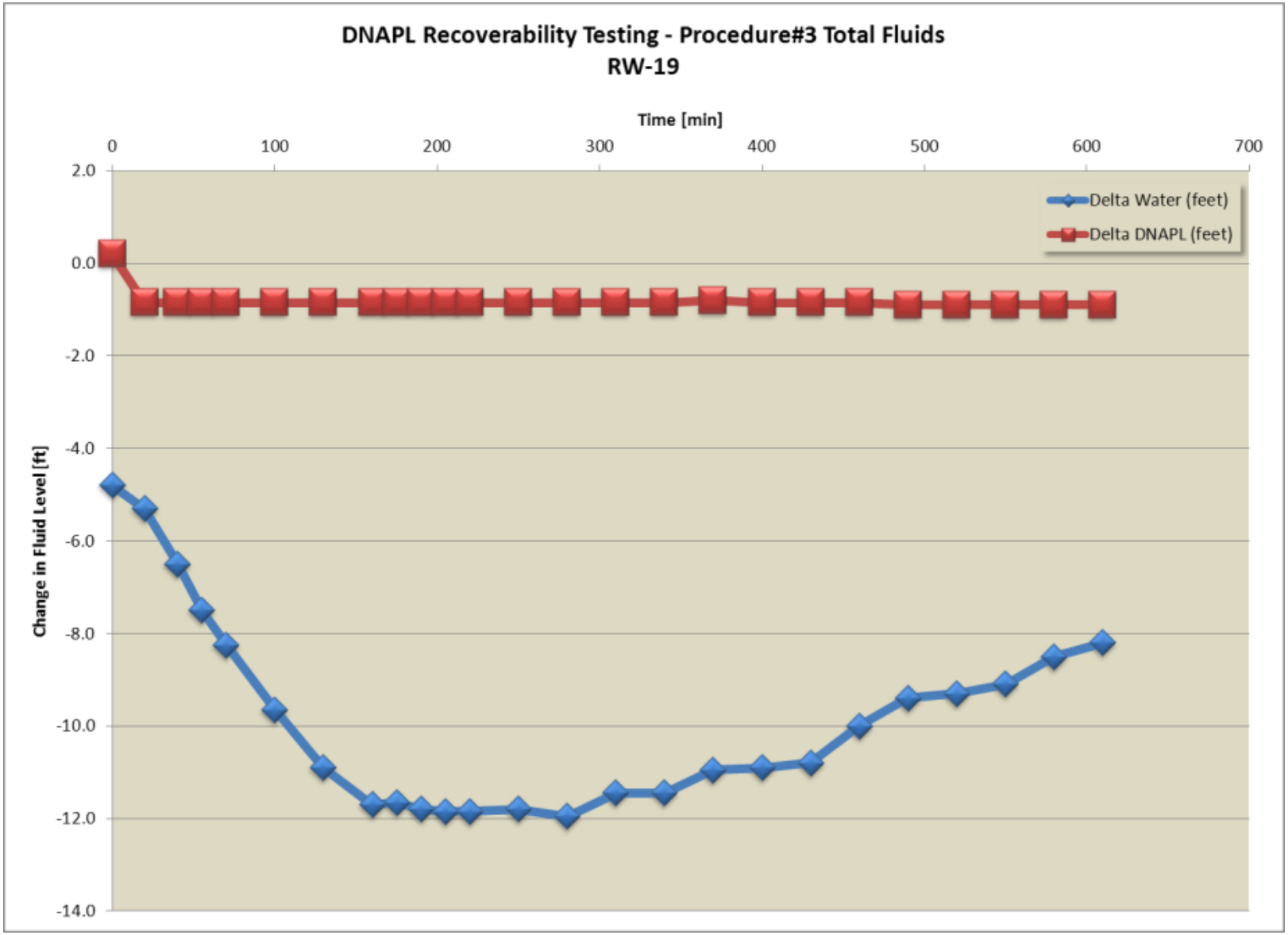


Procedure #3 (RW-19 Vacuum)

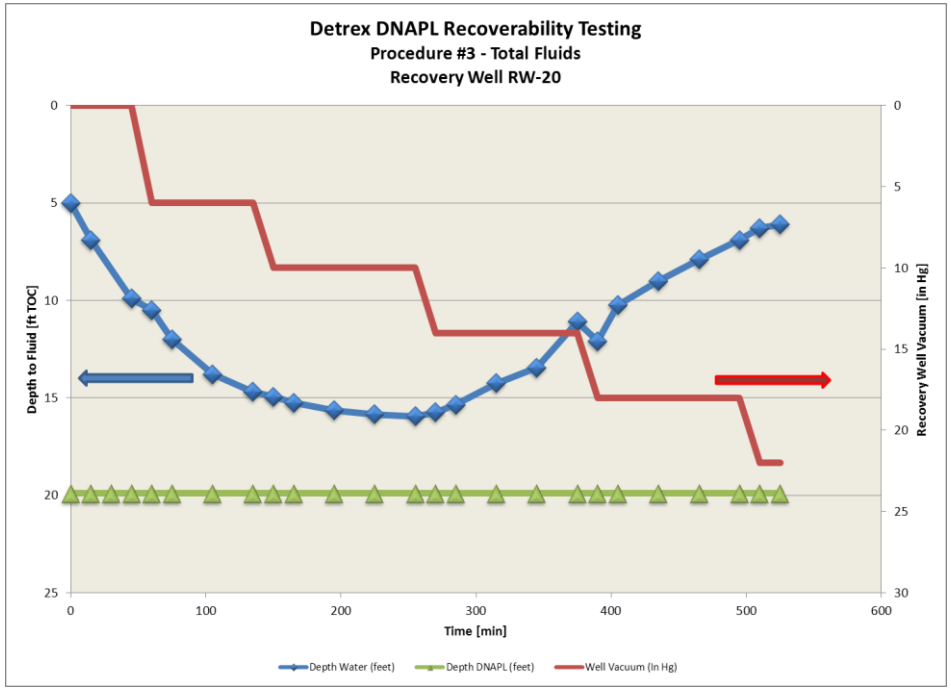


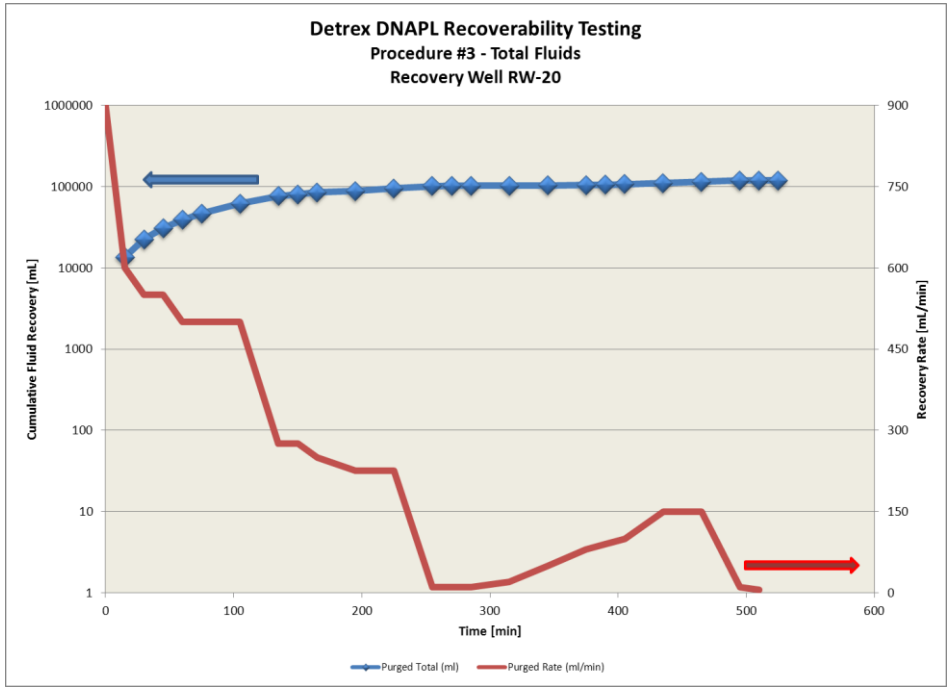


Procedure #3 (RW-19 Vacuum)

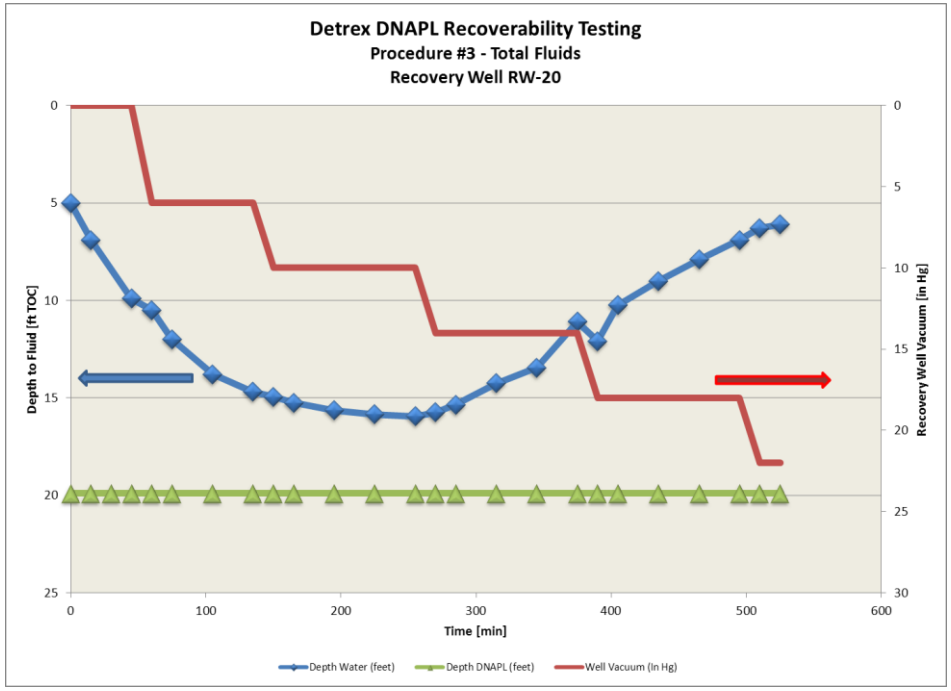


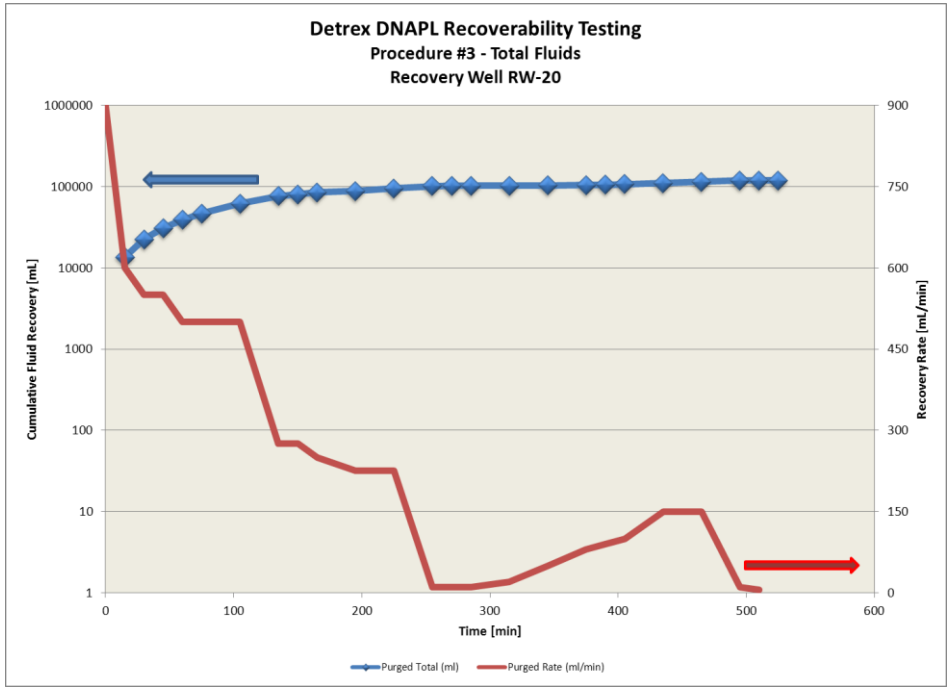
Procedure #3 (RW-20 Vacuum)



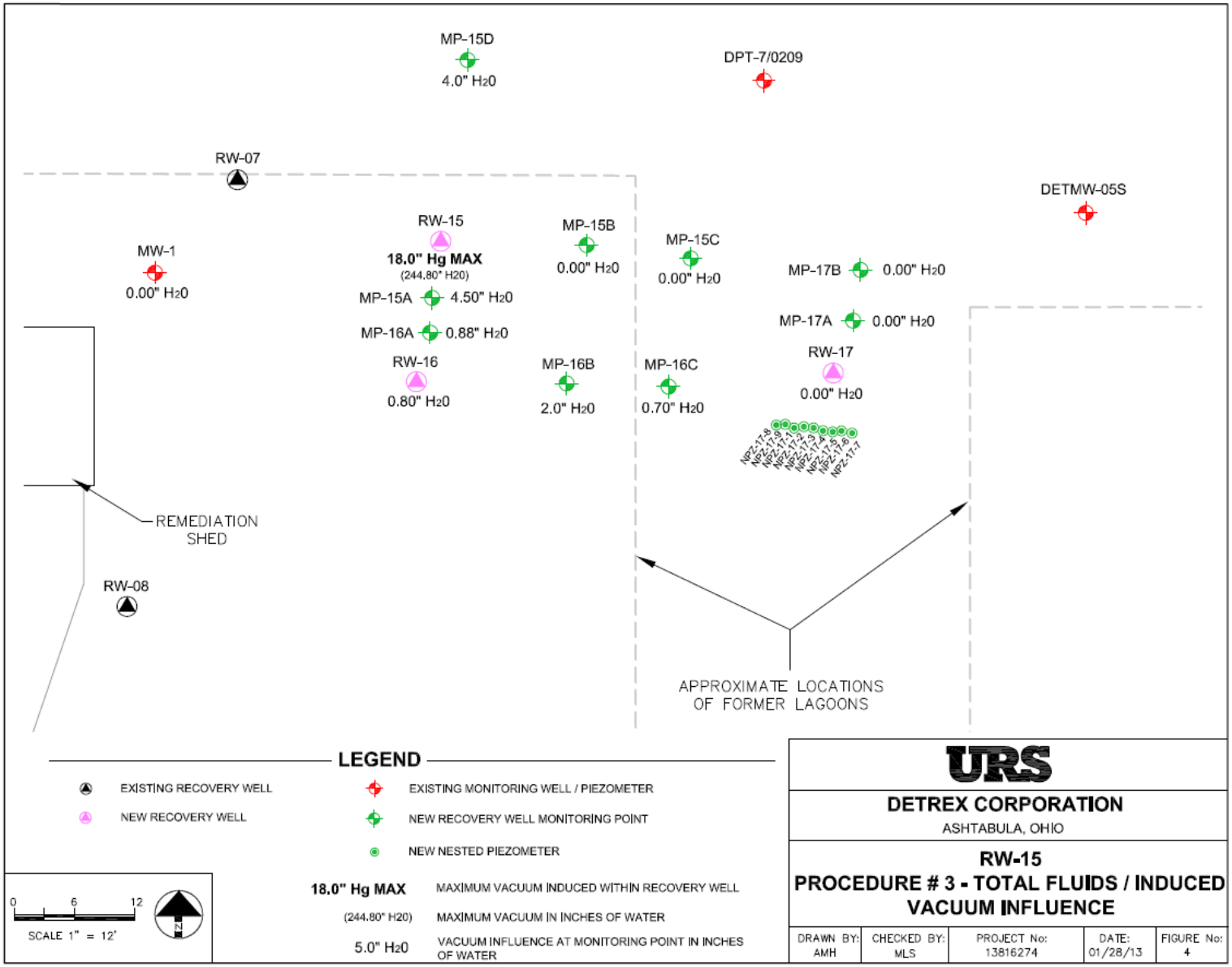


Procedure #3 (RW-20 Vacuum)

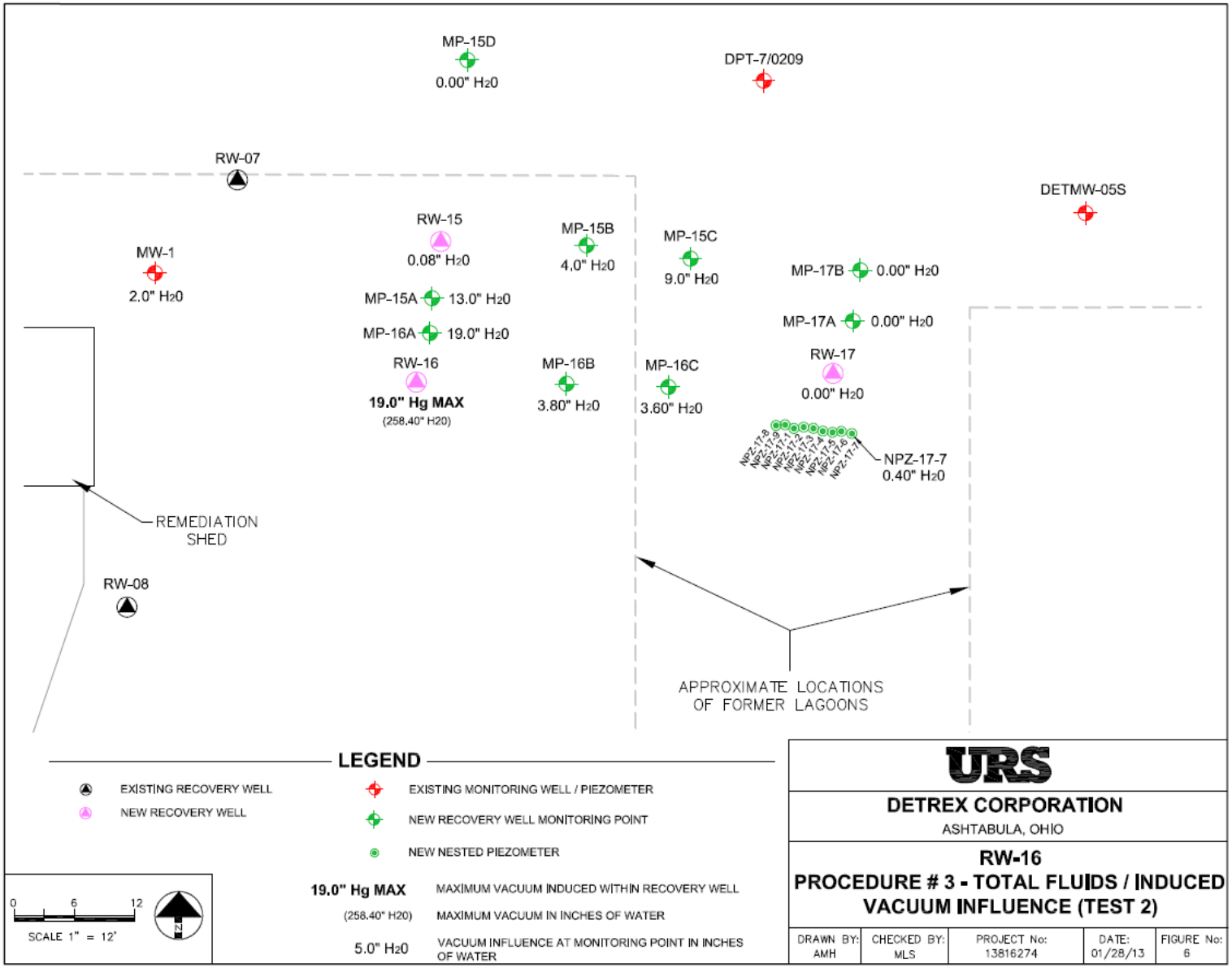




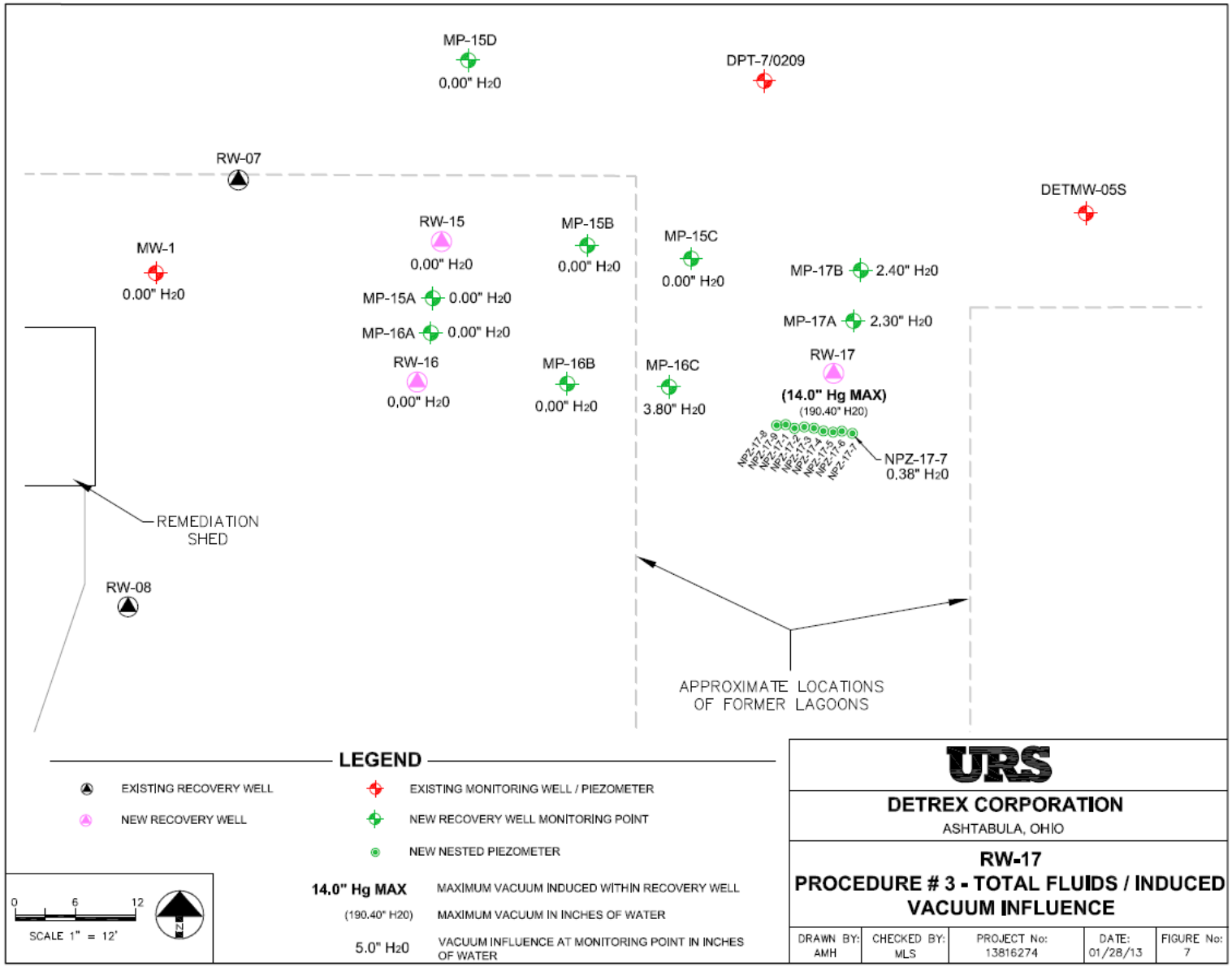
Procedure #3 (RW-15 Vacuum Influence)



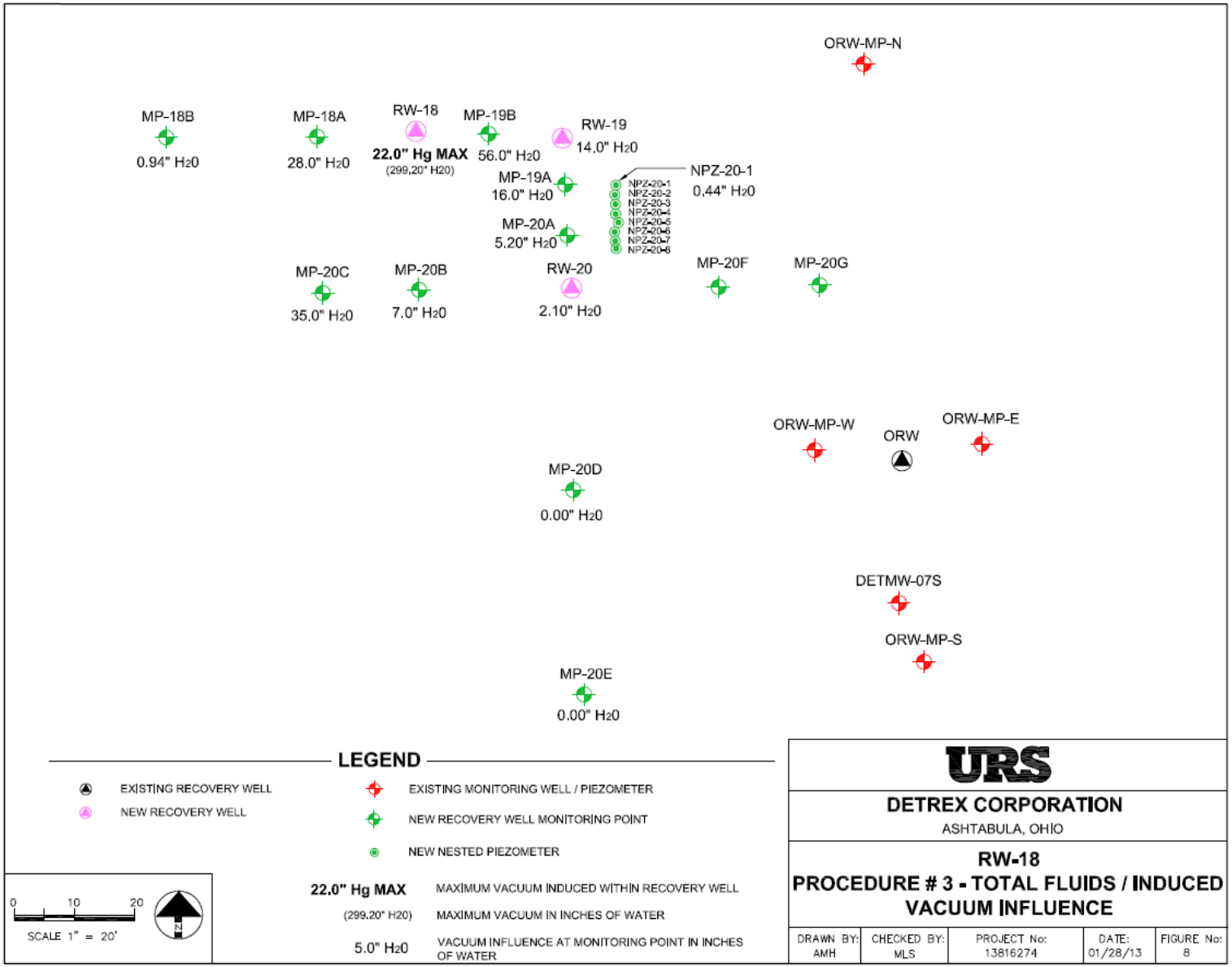
Procedure #3 (RW-16 Vacuum Influence)



Procedure #3 (RW-17 Vacuum Influence)



Procedure #3 (RW-18 Vacuum Influence)



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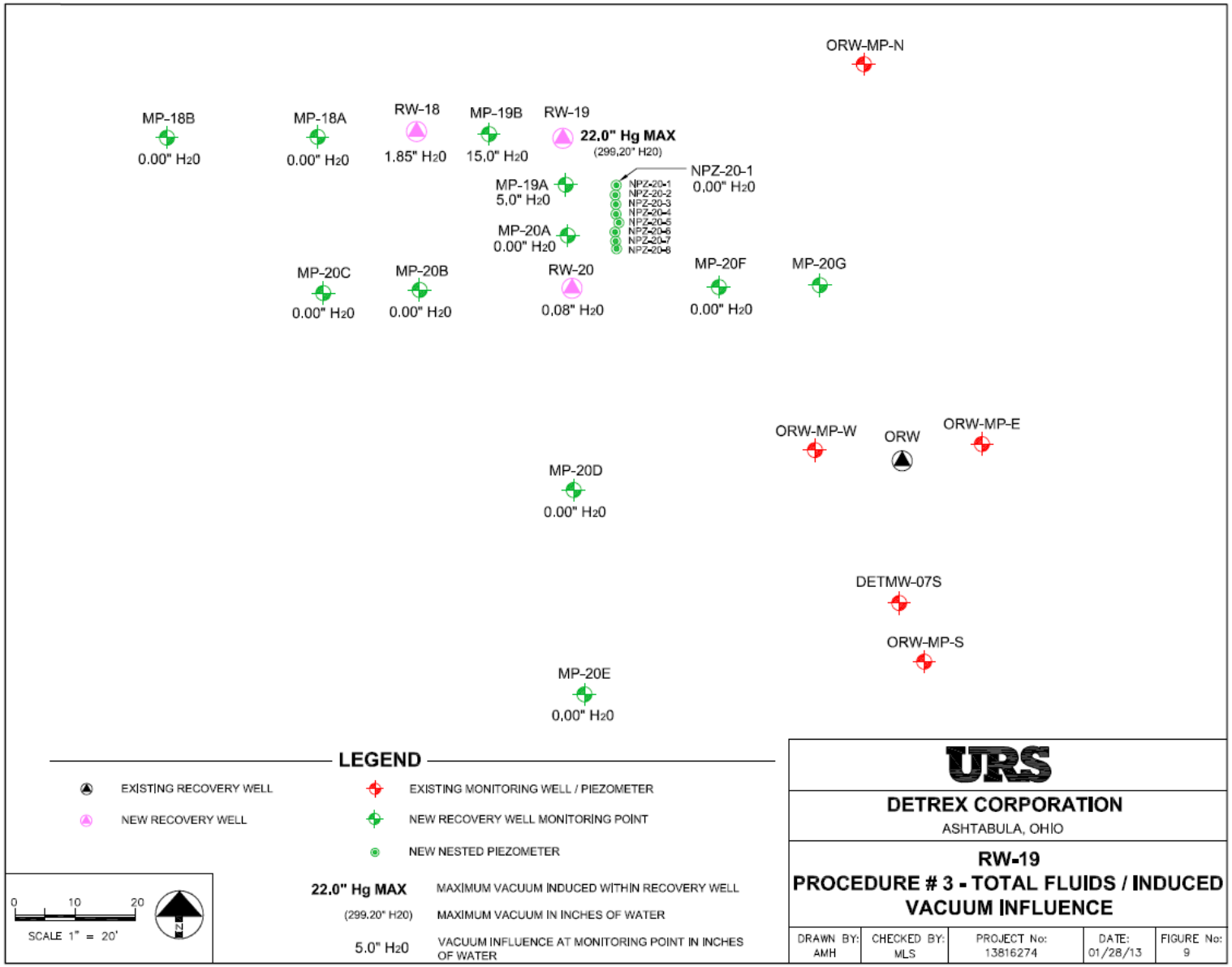

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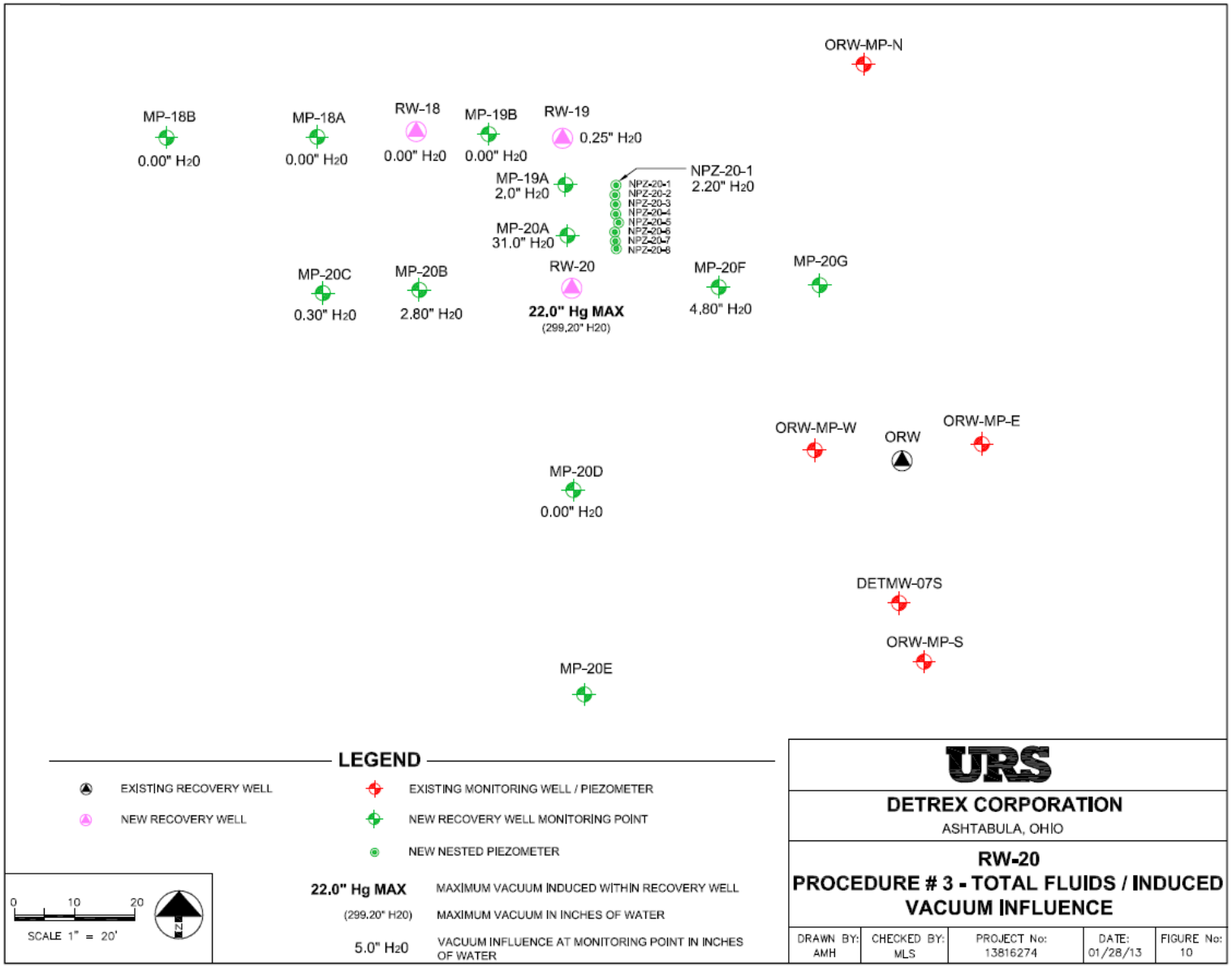


Data Summary – Procedure #3 (DPE / Total Fluids)

URS

- Testing did not result in any substantial DNAPL thickness or recovery rate changes in recovery wells
- DNAPL recovery rates not significant
  - **RW-15:** DNAPL recovery rate – 0.006 gpm
  - **RW-16a&b:** DNAPL recovery rate – 0.01 & 0.003 gpm
  - **RW-17:** DNAPL recovery rate – 0.008 gpm
  - **RW-18:** DNAPL recovery rate – 0 gpm
  - **RW-19:** DNAPL recovery rate – 0.002 gpm
  - **RW-20:** DNAPL recovery rate – 0 gpm
- No measureable air flow from recovery well
- Additional details in Procedure #3 Summary PDF (11x17 handout)

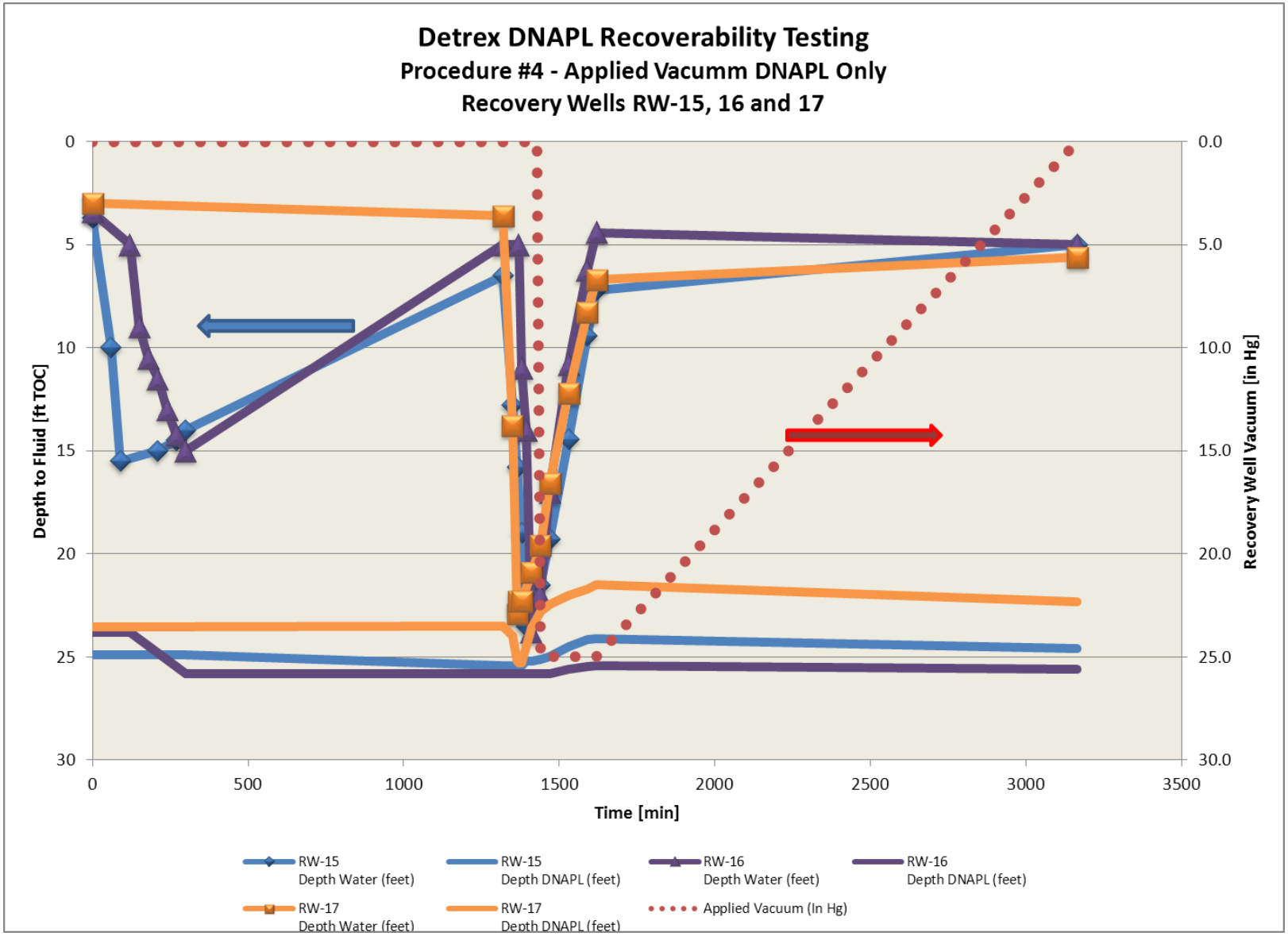
Go to PDF

Data Summary – Procedure #4 (Applied Vacuum / DNAPL)

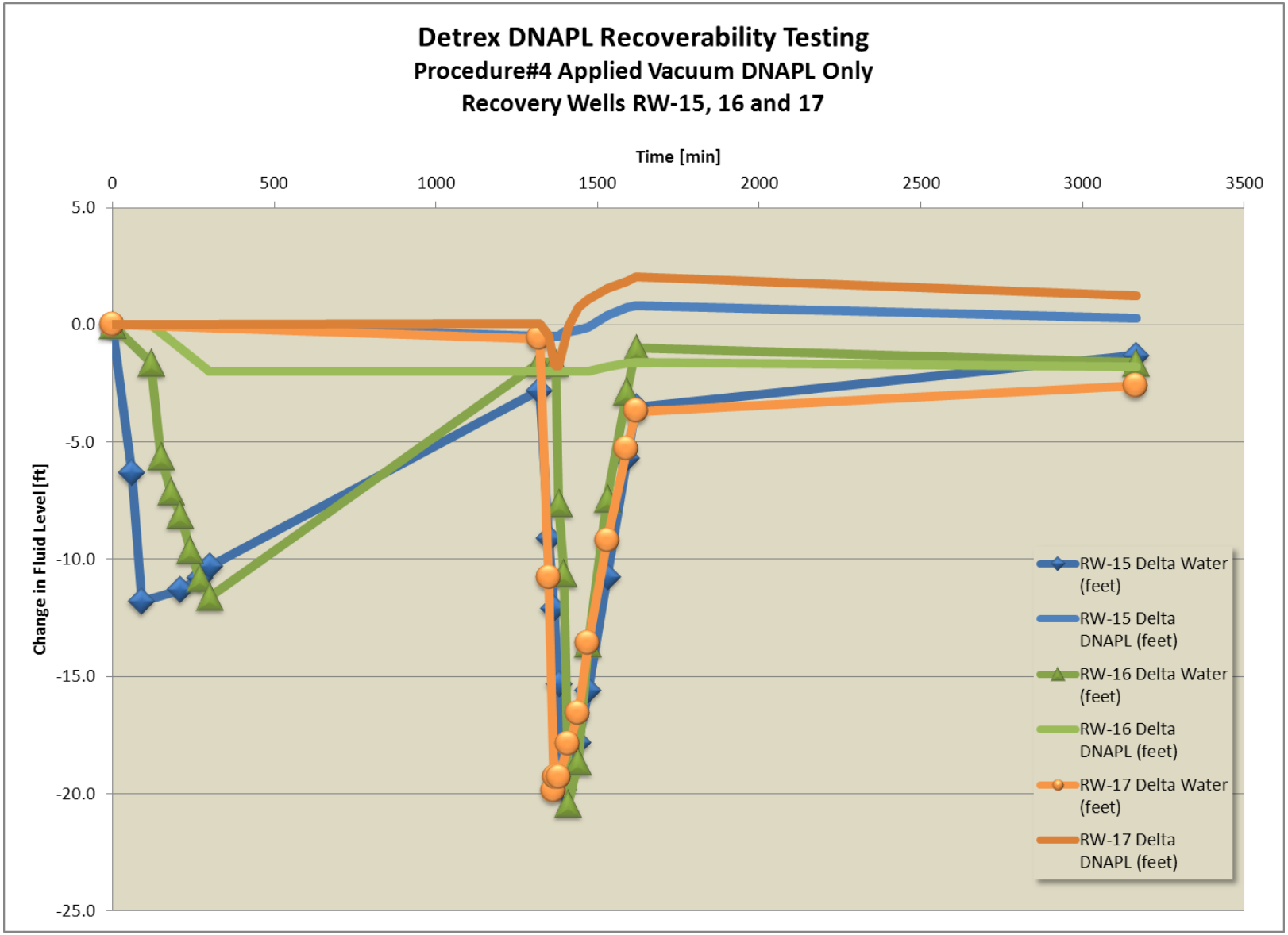
URS

- Procedure #4
  - Grouped RWs tested
    - Dual-phase extraction – set vacuum applied for 4 hrs.
    - Peristaltic pump used for DNAPL only recovery
    - North & South Area RWs completed
  - Data recorded
    - DPE Vacuum
    - Observation Well Vacuum
    - Depth to H2O
    - Depth to DNAPL
    - Fluid Recovery Rate (DNAPL)
    - Cumulative Fluid Recovery (DNAPL)

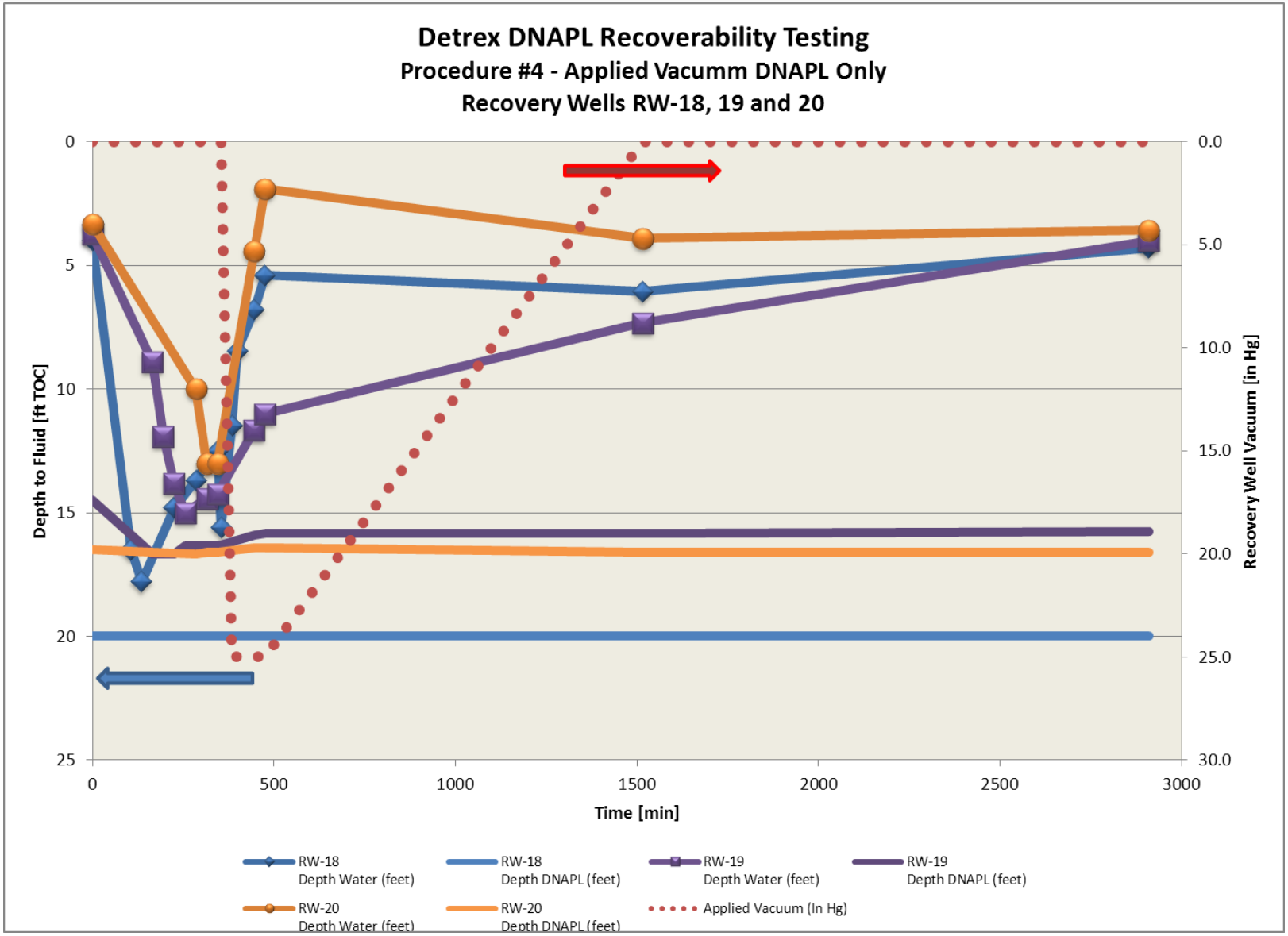
Procedure #4 (North Area Applied Vacuum)



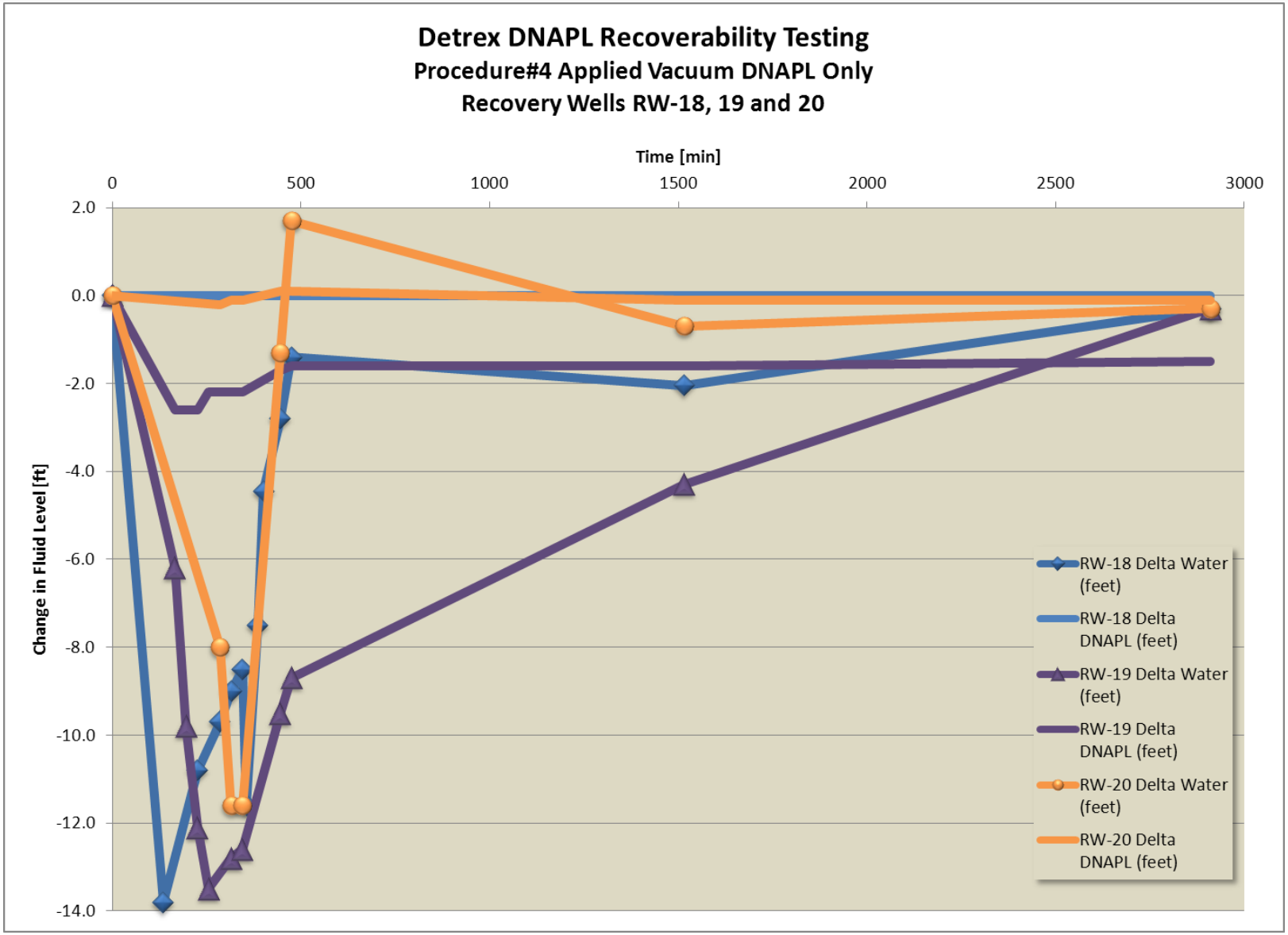
Procedure #4 (North Area Applied Vacuum)



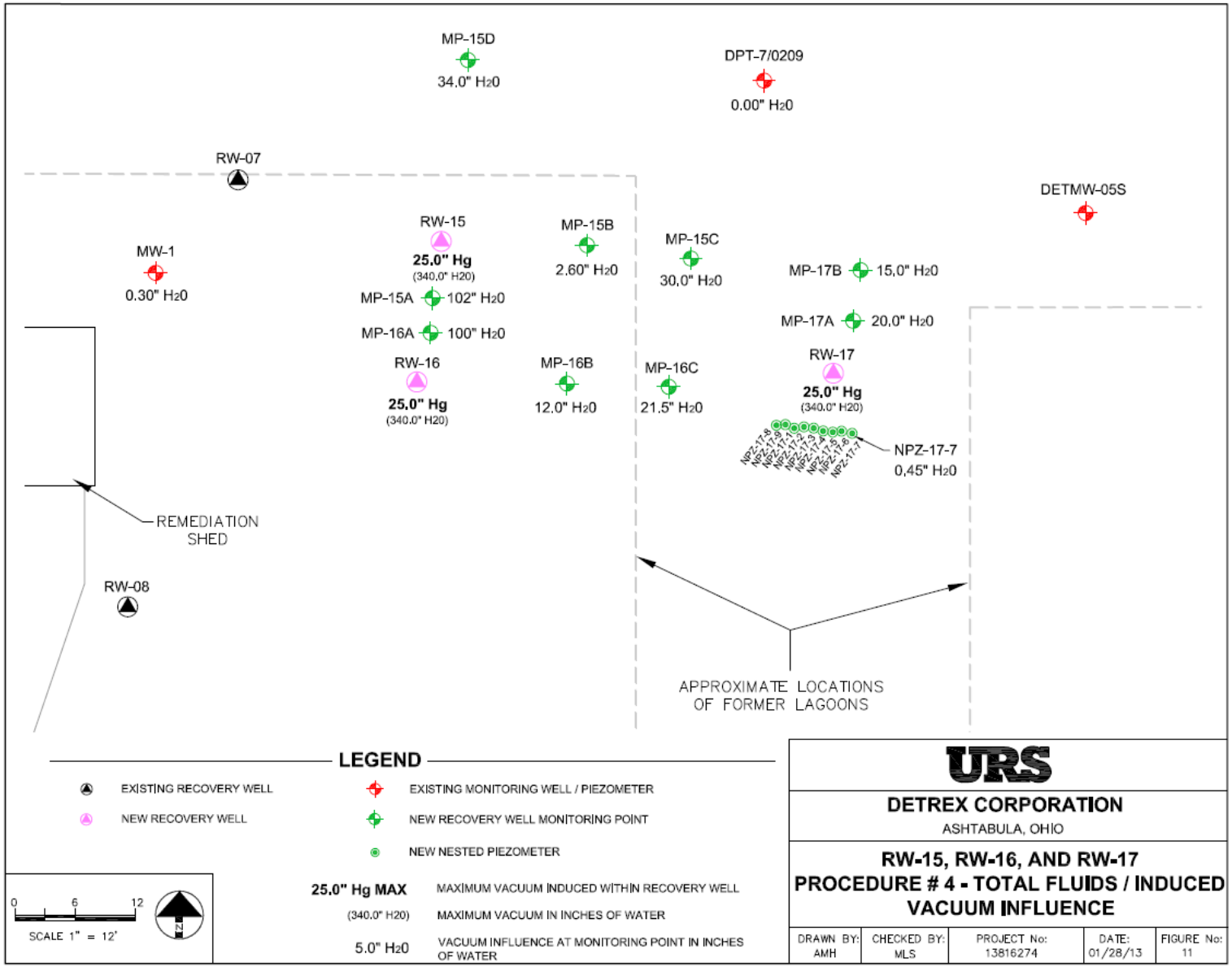
Procedure #4 (South Area Applied Vacuum)



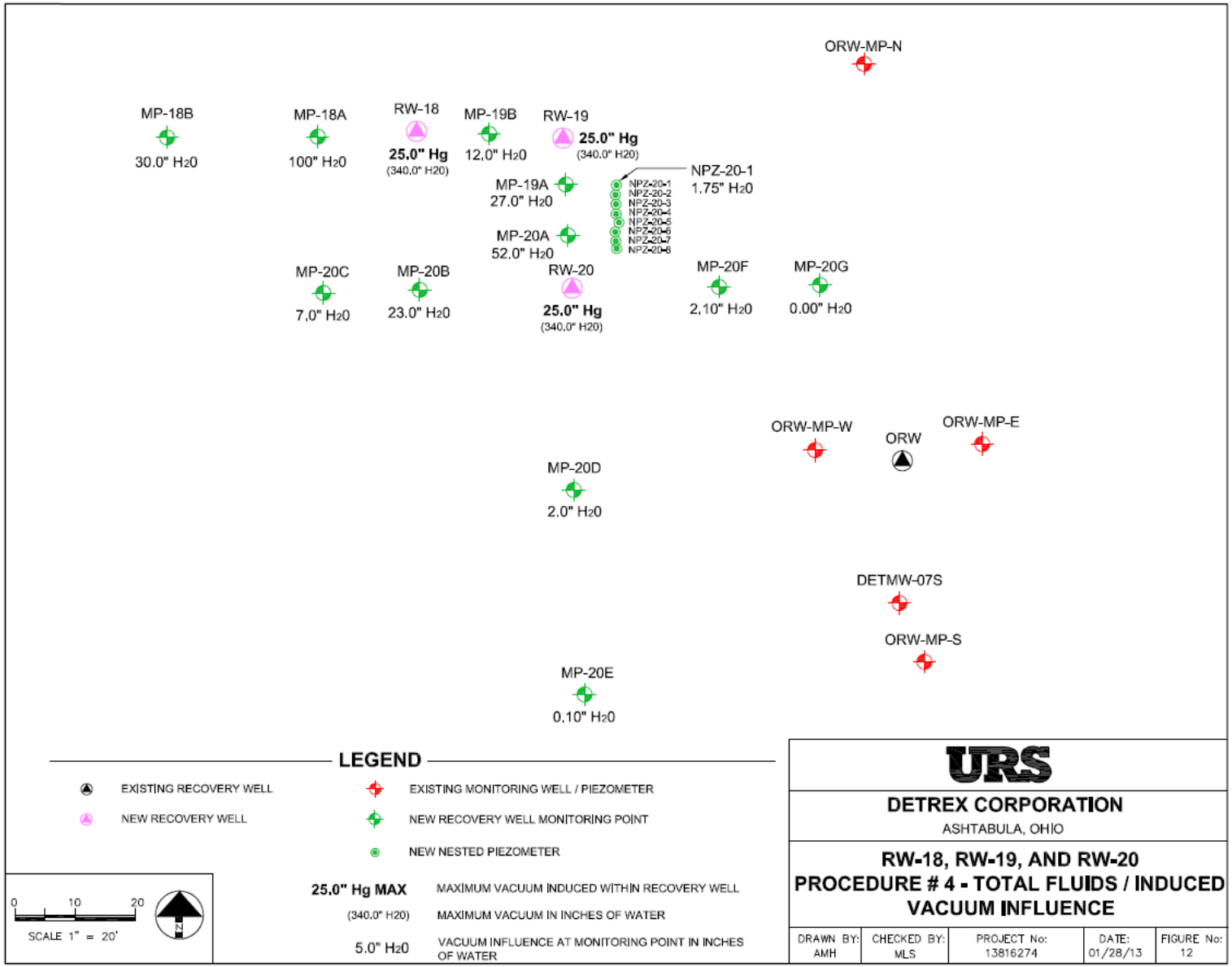
Procedure #4 (South Area Applied Vacuum)



Procedure #4 (North Area Vacuum Influence)



Procedure #4 (South Area Vacuum Influence)



URS

Data Summary – Procedure #4(Applied Vacuum / DNAPL Only)

- Testing showed
  - Limited response in North Area
  - No significant response in South Area
- North Area (RW-15, 16 and 17) and South Area (RW-18, 19 and 20) tested as groups
  - **RW-15, 16 and 17:** DNAPL recovery rates ranged from 0.004 – 0.02 gpm
  - **RW-18, 19 and 20:** DNAPL recovery rates ranged from 0 – 0.01 gpm
- Additional details in Procedure #4 Summary PDF (11x17 handout)

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PRELIMINARY CONCLUSIONS

Preliminary Conclusions

URS

- All DNAPL recovery well installation and testing was generally completed per the approved Work Plan
- Procedure #1 did not result in significant changes in DNAPL thickness or recovery from static (i.e., pre-pumping) conditions
- Procedures #2 and #3 did not result in significant changes in DNAPL thickness or recovery
- The FBAG DNAPL recovery approach (Procedure #2) was not effective at enhancing DNAPL recovery in the former Source Area of the Site
- Procedure #4 did not result in significant changes in DNAPL thickness or recovery rate, except for RW-17

Preliminary Conclusions (cont.)

URS

- Site geologic conditions and resulting DNAPL distribution do not appear conducive to enhanced DNAPL recovery techniques
- There is no apparent correlation between observed DNAPL thickness and DNAPL recoverability
- The operational (O&M) and DNAPL composition/corrosion issues related to potentially employing Procedures #2, #3 or #4 were problematic, and would be difficult to implement on a large scale

DISCUSSION

URS

Discussion

- Roundtable Discussion

PATH FORWARD

URS

Path Forward

- Detrex to complete Data Evaluation
- Detrex to prepare and submit Enhanced DNAPL Recoverability Report to USEPA by March 29, 2013

APPENDIX E

SPECIFIC PROCEDURES FOR DNAPL RECOVERABILITY TESTING / WELL DEVELOPMENT

Detrex Site - Ashtabula, Ohio **Date:** _____

DNAPL RECOVERABILITY TESTING PROCEDURE #1 **URS On-site Tech:** _____

1) Identify well location
2) Record top of casing (TOC) elevation for measurement reference point
3) Using interface probe determine:
    a) Depth to H_2O
    b) Depth to DNAPL
    c) Total Well Depth
4) Record Date and Starting Time (i.e., Time of initial measurement)
5) Begin Recoverability Testing using peristaltic pump

- Groundwater Only Removal (tubing at bottom of H_2O column)

a) Using peristaltic pump begin at 50ml/min or as appropriate; Record GW pumping rate
b) Adjust as necessary to maintain min. of 0.1ft H_2O above DNAPL; or note that well is pumped dry
c) Record GW rate and Volume recovered (1min, 2min, 5min, 10min, then every 15min; for up to 4 hrs.)
d) Record Depth to H_2O (1min, 2min, 5min, 10min, then every 15min; for up to 4 hrs.)
e) Record Depth to DNAPL (1min, 2min, 5min, 10min, then every 15min; for up to 4 hrs.)
f) Total Well Depth at beginning and end of testing period to check for silting

- DNAPL Only Removal (tubing at bottom of DNAPL column)

a) Using peristaltic pump begin at 25ml/min or as appropriate; Record DNAPL pumping rate
b) Adjust as necessary to maintain min. of 0.05ft DNAPL above well TD; or note that well is pumped dry
d) Record DNAPL rate and Volume recovered (1min, 2min, 5min, 10min, then every 15min; for up to 4 hrs.)
d) Record Depth to H_2O (1min, 2min, 5min, 10min, then every 15min; for up to 4 hrs.)
e) Record Depth to DNAPL (1min, 2min, 5min, 10min, then every 15min; for up to 4 hrs.)
f) Total Well Depth at beginning and end of testing period to check for silting

Wells to be Tested:

RW-15; RW-16, RW-17, RW-18, RW-19, RW-20

MW-5S; MW-7S; MW-8S

Large diameter RW (unnamed)

Total 10 wells for testing

Detrex Site - Ashtabula, Ohio **Date:** _____

DNAPL RECOVERABILITY TESTING - PROCEDURE #1 **URS On-site Tech:** _____

Well ID	Date	TIME	Diameter [in.]	Well Depth [ft.]	Depth H_2O [ft.]	Depth DNAPL [ft.]	H_2O Rate [ml/min]	DNAPL Rate [ml/min]	H_2O Purged [mL]	DNAPL Purged [mL]	Comments

Well ID	Date	TIME	Diameter [in.]	Well Depth [ft.]	Depth H_2O [ft.]	Depth DNAPL [ft.]	H_2O Rate [ml/min]	DNAPL Rate [ml/min]	H_2O Purged [mL]	DNAPL Purged [mL]	Comments

Notes:

Detrex Site - Ashtabula, Ohio **Date:** _____

DNAPL RECOVERABILITY TESTING PROCEDURE #2 **URS On-site Tech:** _____

1) Identify well location
2) Record top of casing (TOC) elevation for measurement reference point
3) Using interface probe determine:
    a) Depth to H_2O
    b) Depth to DNAPL
    c) Total Well Depth
4) Record Date and Starting Time (i.e., Time of initial measurement)
5) Begin Recoverability Testing using DPE Unit (FBAG Approach)

- DPE Unit (Simultaneous Groundwater and DNAPL Recovery - Dual Pumps)

a) Install H_2O and DNAPL pumps with discharge to near bottom of respective fluid columns
b) Adjust H_2O and DNAPL flow rates to match Procedure #1 values; or note that well is pumped dry
d) Record initial Depth to H_2O and DNAPL; Total Well Depth
d) Seal wellhead / prepare for vacuum application (step - 5in.; 10in.; 15in., 20in., up to 25in. of Hg)
e) Initiate vacuum @ lowest value (see above)
f) Record vacuum at wellhead (1min, 2min, 5min, 10min, then every 15min; for up to 2 hrs.)
g) Record air flow rate to DPE Unit (1min, 2min, 5min, 10min, then every 15min; for up to 2 hrs.)
h) Adjust as necessary to maintain established vacuum for duration of testing period
i) Record pressures in surrounding observation well network (same frequency as above)
j) Record Depth to H_2O (1min, 2min, 5min, 10min, then every 15min; for up to 2 hrs.)
k) Record Depth to DNAPL (1min, 2min, 5min, 10min, then every 15min; for up to 2 hrs.)
l) Total Well Depth at beginning and end of testing period to check for silting
m) Record GW rate and Volume recovered (1min, 2min, 5min, 10min, then every 15min; for up to 2 hrs.)
n) Adjust as necessary to maintain min. of 0.1ft GW above DNAPL; or note that well is pumped dry
o) Record DNAPL rate and Volume recovered (1min, 2min, 5min, 10min, then every 15min; for up to 2 hrs.)
p) Adjust as necessary to maintain min. of 0.05ft DNAPL above bottom; or note that well is pumped dry

Wells to be Tested / Monitored:

RW-15; RW-16, RW-17 (North Area); all North Area Monitoring points

RW-18, RW-19, RW-20 (South Area); all South Area Monitoring points

Detrex Site - Ashtabula, Ohio

Date: _____

DNAPL RECOVERABILITY TESTING - PROCEDURE #2

URS On-site Tech: _____

Well ID	Date	TIME	Diameter [in.]	Well Depth [ft.]	Depth H_2O [ft.]	Depth DNAPL [ft.]	Wellhead Vacuum [in Hg]	Air Flow Rate [CFM]	H_2O Rate [ml/min]	DNAPL Rate [ml/min]	H_2O Purged [mL]	DNAPL Purged [mL]	Comments

Date	TIME	MP ____	MP ____	MP ____	MP ____	MP ____	MP ____	MP ____	MP ____	MP ____	MP ____	MP ____	MP ____	MP ____	Comments
Measured Vacuum (in. Hg)															

Notes:

Detrex Site - Ashtabula, Ohio **Date:** _____

DNAPL RECOVERABILITY TESTING PROCEDURE #3 **URS On-site Tech:** _____

1) Identify well location
2) Record top of casing (TOC) elevation for measurement reference point
3) Using interface probe determine:
    a) Depth to H_2O
    b) Depth to DNAPL
    c) Total Well Depth
4) Record Date and Starting Time (i.e., Time of initial measurement)
5) Begin Recoverability Testing using DPE Unit (Existing Detrex Approach)

- DPE Unit (Simultaneous Groundwater and DNAPL Recovery - Total Fluids)

a) Install Total Fluid pump with discharge to near bottom of well

b) Adjust Total Fluid pump flow rates to approx. Procedure #2 values; or note that well is pumped dry

d) Record initial Depth to H_2O and DNAPL; Total Well Depth

d) Seal wellhead / prepare for vacuum application (step - 5in.; 10in.; 15in., 20in., up to 25in. of Hg)

e) Initiate vacuum @ lowest value (see above)

f) Record vacuum at wellhead (1min, 2min, 5min, 10min, then every 15min; for up to 2 hrs.)

g) Record air flow rate to DPE Unit (1min, 2min, 5min, 10min, then every 15min; for up to 2 hrs.)

h) Adjust as necessary to maintain established vacuum for duration of testing period

i) Record pressures in surrounding observation well network (same frequency as above)

j) Record Depth to H_2O (1min, 2min, 5min, 10min, then every 15min; for up to 2 hrs.)

k) Record Depth to DNAPL (1min, 2min, 5min, 10min, then every 15min; for up to 2 hrs.)

l) Total Well Depth at beginning and end of testing period to check for silting

m) Record Total Fluid rate / volume recovered (1min, 2min, 5min, 10min, then every 15min; for up to 2 hrs.)

n) Adjust as necessary to maintain min. of 0.1ft fluid above bottom; or note that well is pumped dry

Wells to be Tested:

RW-15; RW-16, RW-17 (North Area); all North Area Monitoring points

RW-18, RW-19, RW-20 (South Area); all South Area Monitoring points

Detrex Site - Ashtabula, Ohio

Date: _____

DNAPL RECOVERABILITY TESTING - PROCEDURE #3

URS On-site Tech: _____

Well ID	Date	TIME	Diameter [in.]	Well Depth [ft.]	Depth H_2O [ft.]	Depth DNAPL [ft.]	Wellhead Vacuum [in Hg]	Air Flow Rate [CFM]	Total Fluid Rate [ml/min]	Total Fluid Purged [mL]	Comments

Date	TIME	MP ____	MP ____	MP ____	MP ____	MP ____	MP ____	MP ____	MP ____	MP ____	MP ____	MP ____	MP ____	MP ____	Comments
Measured Vacuum (in. Hg)															

Notes:

Detrex Site - Ashtabula, Ohio **Date:** _____

DNAPL RECOVERABILITY TESTING PROCEDURE #4 **URS On-site Tech:** _____

1) Identify well location
2) Record top of casing (TOC) elevation for measurement reference point
3) Using interface probe determine:
    a) Depth to H_2O
    b) Depth to DNAPL
    c) Total Well Depth
4) Record Date and Starting Time (i.e., Time of initial measurement)
5) Begin Recoverability Testing using DPE Unit (MDRU Approach)

- DPE Unit (Intermittent Vacuum (MDRU Approach - DNAPL Only)

a) Install DNAPL pump with discharge to near bottom of well
b) Record initial Depth to H_2O and DNAPL; Total Well Depth
c) Seal wellhead / prepare for vacuum application (step - 5in.; 10in.; 15in., 20in., up to 25in. of Hg)
d) Initiate vacuum @ lowest value (see above)
e) Record vacuum at wellhead (1min, 2min, 5min, 10min, then every 15min; for up to 2 hrs.)
f) Adjust as necessary to maintain established vacuum for duration of testing period
g) Record pressures in surrounding observation well network (same frequency as above)
h) Record Depth to H_2O (1min, 2min, 5min, 10min, then every 15min; for up to 2 hrs.)
i) Record Depth to DNAPL (1min, 2min, 5min, 10min, then every 15min; for up to 2 hrs.)
j) Shut-in well and allow to sit for 24 hrs.
k) Record Depth to H_2O (after 24 hrs.)
l) Record Depth to DNAPL (after 24 hrs.)
m) Total Well Depth at beginning and end of testing period to check for silting
n) Record DNAPL flow rate (pumping after 24 hrs.)
o) Record DNAPL volume recovered (pumping after 24 hrs.)

Wells to be Tested:
RW-15; RW-16, RW-17 (North Area)
RW-18, RW-19, RW-20 (South Area)

Detrex Site - Ashtabula, Ohio

Date: _____

DNAPL RECOVERABILITY TESTING - PROCEDURE #4

URS On-site Tech: _____

Well ID	Date	TIME	Diameter [in.]	Well Depth [ft.]	Depth H_2O [ft.]	Depth DNAPL [ft.]	Wellhead Vacuum [in Hg]	DNAPL Rate [ml/min]	DNAPL Purged [mL]	Comments

Date	TIME	MP ____	MP ____	MP ____	MP ____	MP ____	MP ____	MP ____	MP ____	MP ____	MP ____	MP ____	MP ____	MP ____	Comments
Measured Vacuum (in. Hg)															

Notes:

DNAPL Recoverability Testing

Former Lagoon Area (Source Area)

Detrex Site - Ashtabula, OH

Well Testing General Schedule / Approach

Description	RW-15	RW-16	RW-17	All RWs	Comment
North Area					
Initial Recoverability	1st	2nd	3rd	TBD	All RWs, or a combination of wells as appropriate, will be tested collectively following completion of individual tests. Method to be determined based on evaluation of all individual tests.
Dual Pumps (FBAG)	1st	2nd	3rd	TBD	
Total Fluids (Detrex)	1st	2nd	3rd	TBD	
MDRU (DNAPL Only)	1st	2nd	3rd	TBD	
Description	**RW-18**	**RW-19**	**RW-20**	**All RWs**	**Comment**
South Area					
Initial Recoverability	1st	2nd	3rd	TBD	All RWs, or a combination of wells as appropriate, will be tested collectively following completion of individual tests. Method to be determined based on evaluation of all individual tests.
Dual Pumps (FBAG)	1st	2nd	3rd	TBD	
Total Fluids (Detrex)	1st	2nd	3rd	TBD	
MDRU (DNAPL Only)	1st	2nd	3rd	TBD	
Description	**MW-5S**	**MW-7S**	**MW-8S**	**-**	**Comment**
Both Areas					
Initial Recoverability	1st	2nd	3rd	TBD	Existing wells tested for recoverability only

DNAPL Recoverability Testing

Former Lagoon Area (Source Area)

Detrex Site - Ashtabula, OH

Various Borehole / Well Specific Capacities

Description	Well Dia. [in]	Area [ft2]	Volume [gal/ft]	Porosity	Calculated Volume [gal/ft]
1-in well	1	0.005	0.04	100%	0.04
2-in well	2	0.022	0.16	100%	0.16
4-in well	4	0.087	0.65	100%	0.65
6-in well	6	0.196	1.47	100%	1.47
3.5-in borehole	3.5	0.067	0.50	40%	0.20
8.25-in borehole	8.25	0.371	2.78	40%	1.11
10-in borehole	10	0.545	4.08	40%	1.63
Annular space	(3.5-1)	0.061	0.46	40%	0.18
Annular space	(8.25-2)	0.349	2.61	40%	1.05
Annular space	(8.25-4)	0.284	2.12	40%	0.85
Annular space	(8.25-6)	0.175	1.31	40%	0.52
Annular space	(10-4)	0.458	3.43	40%	1.37
Annular space	(10-6)	0.349	2.61	40%	1.04

APPENDIX F

SURVEY, DNAPL AND GROUNDWATER GAUGING DATA

Location ID	Northing [ft]	Easting [ft]	Elevation [ft-msl]	Survey Pt ID
DPT-10-GS	817,201.31	2,439,712.37	634.58	818
DPT-10-PVC	817,201.29	2,439,711.88	639.76	819
DPT-3-GS	817,023.62	2,439,847.29	635.43	824
DPT-3-PVC	817,023.30	2,439,847.40	640.44	825
DPT-6-GS	817,033.47	2,440,371.28	634.85	832
DPT-6-PVC-B	817,033.94	2,440,371.47	636.97	833
DPT7-GS	817,301.13	2,439,929.18	634.53	725
DPT7-PVC	817,301.08	2,439,928.92	637.89	726
GP-10-GS	817,176.79	2,439,880.23	636.95	797
GP-11-GS	817,211.18	2,440,247.40	635.93	828
GP-15-GS	817,122.28	2,439,955.49	638.04	715
GP-15-PVC	817,122.26	2,439,955.41	639.21	716
GP-16-GS	817,125.51	2,440,013.37	638.65	719
GP-18-GS	817,100.78	2,439,871.33	636.90	808
GP-20-GS	817,120.68	2,440,223.48	637.29	827
GP-21-GS	817,125.73	2,440,387.61	635.39	831
GP-24-GS	817,015.95	2,440,007.15	635.92	658
GP-25-GS	817,012.26	2,440,080.19	636.05	826
GP-26-GS	817,018.14	2,439,744.55	635.73	712
GP-26-PVC	817,018.09	2,439,744.40	636.34	713
GP-27-GS	816,992.20	2,440,148.11	635.81	834
GP-32-GS	816,931.20	2,440,067.23	634.81	837
GP-49-GS	817,020.52	2,439,885.82	635.32	711
GP-50-GS	817,125.27	2,439,986.26	638.31	718
GP-51-GS	817,124.73	2,439,970.05	638.13	717
GP-52-GS	817,082.79	2,439,971.22	636.82	714
GP-53-GS	817,165.59	2,439,970.75	638.28	721
GP-54-GS	817,164.36	2,439,990.88	638.54	720
GP-55-GS	817,135.96	2,439,875.98	637.19	807
GP-56-GS	817,151.49	2,439,851.51	636.15	804
GP-61-GS	817,034.99	2,439,892.75	635.63	710
GP-62-GS	817,042.62	2,440,018.12	636.35	667
GP-63-GS	817,028.25	2,440,018.56	636.22	668
GP-65-GS	817,028.03	2,439,935.72	635.39	709
GP-7-GS	817,185.46	2,439,991.75	638.33	722
MP-13A-CONC	817,264.46	2,439,750.56	635.63	813
MP-13A-STEEL	817,264.25	2,439,750.24	638.36	814
MP-13B-CONC	817,248.52	2,439,760.14	635.79	811
MP-13B-STEEL	817,248.11	2,439,759.96	638.60	812
MP-14A-GS	817,176.17	2,439,858.34	636.14	800
MP-14A-STEEL	817,175.94	2,439,858.08	639.09	801
MP-14B-CONC	817,161.93	2,439,867.78	636.92	802

MP-14B-STEEL	817,162.06	2,439,867.53	639.20	803
MP-15A-GS	817,279.33	2,439,896.12	636.12	731
MP-15A-PVC	817,279.37	2,439,895.80	637.76	732
MP-15B-GS	817,284.57	2,439,911.47	635.95	741
MP-15B-PVC	817,284.64	2,439,911.23	637.77	767
MP-15C-GS	817,283.18	2,439,921.65	636.01	768
MP-15C-PVC	817,283.31	2,439,921.61	638.22	769
MP-15D-GS	817,303.13	2,439,899.46	635.40	727
MP-15D-PVC	817,303.13	2,439,899.33	637.32	728
MP-16A-GS	817,275.89	2,439,895.87	636.26	733
MP-16A-PVC	817,275.90	2,439,895.59	637.90	734
MP-16B-GS	817,270.85	2,439,909.21	635.83	737
MP-16B-PVC	817,270.83	2,439,909.22	637.62	738
MP-16C-GS	817,270.44	2,439,919.51	636.10	739
MP-16C-PVC	817,270.51	2,439,919.40	638.15	740
MP-17A-GS	817,277.13	2,439,937.91	636.21	773
MP-17A-PVC	817,277.10	2,439,937.83	639.07	774
MP-17B-GS	817,282.18	2,439,938.72	636.21	771
MP-17B-PVC	817,282.16	2,439,938.56	638.87	772
MP-18-A-GS	817,042.97	2,439,950.76	635.51	705
MP-18-A-PVC	817,042.74	2,439,950.76	638.14	706
MP-18-B-GS	817,042.94	2,439,935.83	635.79	707
MP-18-B-PVC	817,042.82	2,439,935.68	638.33	708
MP-19A-GS	817,038.16	2,439,975.52	635.95	677
MP-19A-PVC	817,038.07	2,439,975.56	638.47	678
MP-19-B-GS	817,043.20	2,439,967.77	636.07	697
MP-19-B-PVC	817,043.21	2,439,967.91	638.57	698
MP-20A-GS	817,033.05	2,439,975.82	635.83	675
MP-20A-PVC	817,033.02	2,439,975.71	638.53	676
MP-20-B-GS	817,027.84	2,439,960.95	635.42	701
MP-20-B-PVC	817,027.61	2,439,960.96	637.97	702
MP-20-C-GS	817,027.41	2,439,951.19	635.28	703
MP-20-C-PVC	817,027.27	2,439,951.30	637.84	704
MP-20D-GS	817,007.57	2,439,976.34	635.52	669
MP-20D-PVC	817,007.58	2,439,976.35	638.17	670
MP-20E-GS	816,987.62	2,439,977.38	635.02	671
MP-20E-PVC	816,987.21	2,439,977.44	637.70	672
MP-20F-GS	817,027.88	2,439,990.84	635.84	663
MP-20F-PVC	817,027.98	2,439,990.91	638.47	664
MP-20G-GS	817,028.21	2,440,001.13	635.88	661
MP-20G-PVC	817,028.08	2,440,000.96	638.59	662
MW-1-CONC	817,281.70	2,439,868.04	635.69	820
MW-1-STEEL	817,281.88	2,439,868.12	637.26	821
MW-2-GS	817,272.15	2,439,736.28	635.12	816
MW-2-STEEL	817,272.27	2,439,736.17	637.50	817
MW-3S-CONC	817,186.32	2,439,886.02	637.18	795

MW-3S-STEEL	817,186.31	2,439,886.16	639.66	796
MW-5S-CONC	817,287.52	2,439,961.47	635.96	723
MW-5S-STEEL	817,287.86	2,439,961.06	639.20	724
MW-6S-CONC	817,199.06	2,440,287.64	636.10	829
MW-6S-STEEL	817,199.52	2,440,287.51	638.35	830
MW-7-CONC	816,996.52	2,440,009.15	635.88	652
MW-7-STEEL	816,996.34	2,440,008.92	638.10	653
MW-8S-GS	817,119.52	2,439,801.23	636.46	809
MW-8S-STEEL	817,119.64	2,439,800.79	638.15	810
NPZ-17-1-GS	817,266.29	2,439,931.95	636.35	781
NPZ-17-1-PVC	817,266.37	2,439,931.93	638.66	782
NPZ-17-2-GS	817,266.13	2,439,932.99	636.24	783
NPZ-17-2-PVC	817,266.50	2,439,932.90	638.68	784
NPZ-17-3-GS	817,266.00	2,439,933.99	636.31	785
NPZ-17-3-PVC	817,266.38	2,439,933.88	638.66	786
NPZ-17-4-GS	817,265.94	2,439,935.03	636.28	787
NPZ-17-4-PVC	817,266.10	2,439,934.82	638.66	788
NPZ-17-5-GS	817,265.71	2,439,935.76	636.36	789
NPZ-17-5-PVC	817,265.99	2,439,935.79	638.60	790
NPZ-17-6-GS	817,265.72	2,439,936.63	636.35	791
NPZ-17-6-PVC	817,266.08	2,439,936.67	638.65	792
NPZ-17-7-GS	817,265.61	2,439,937.85	636.29	793
NPZ-17-7-PVC	817,265.86	2,439,937.72	638.58	794
NPZ-17-8-GS	817,266.23	2,439,930.96	636.39	779
NPZ-17-8-PVC	817,266.73	2,439,931.05	638.69	780
NPZ-17-9-GS	817,266.40	2,439,930.32	636.42	777
NPZ-17-9-PVC	817,266.67	2,439,930.15	638.64	778
NPZ-20-1-GS	817,031.68	2,439,980.79	636.01	681
NPZ-20-1-PVC	817,031.72	2,439,980.66	638.58	682
NPZ-20-2-GS	817,032.64	2,439,980.87	636.03	683
NPZ-20-2-PVC	817,032.48	2,439,980.57	638.51	684
NPZ-20-3-GS	817,033.53	2,439,980.80	636.04	685
NPZ-20-3-PVC	817,033.39	2,439,980.51	638.54	686
NPZ-20-4-GS	817,034.34	2,439,980.72	636.02	687
NPZ-20-4-PVC	817,034.33	2,439,980.88	638.52	688
NPZ-20-5-GS	817,035.47	2,439,980.92	636.07	689
NPZ-20-5-PVC	817,035.18	2,439,980.61	638.57	690
NPZ-20-6-GS	817,036.33	2,439,980.75	636.04	691
NPZ-20-6-PVC	817,036.15	2,439,980.59	638.55	692
NPZ-20-7-GS	817,037.22	2,439,980.76	636.07	693
NPZ-20-7-PVC	817,037.09	2,439,980.53	638.57	694
NPZ-20-8-GS	817,038.09	2,439,980.63	636.06	695
NPZ-20-8-PVC	817,038.07	2,439,980.63	638.55	696
ORW-GS	817,010.88	2,440,009.36	635.76	654
ORW-MP-E-GS	817,012.28	2,440,017.17	636.02	656
ORW-MP-E-PVC	817,012.23	2,440,017.22	638.00	657

ORW-MP-N-GS	817,050.49	2,440,006.41	636.37	665
ORW-MP-N-PVC	817,050.16	2,440,005.38	637.93	666
ORW-MP-S-GS	816,990.51	2,440,011.25	635.28	650
ORW-MP-S-PVC	816,990.47	2,440,011.37	637.67	651
ORW-MP-W-GS	817,011.78	2,440,000.41	635.79	659
ORW-MP-W-PVC	817,011.58	2,440,000.55	637.93	660
ORW-PVC	817,010.53	2,440,009.21	637.89	655
RW-11-GS	817,137.13	2,439,830.29	636.44	805
RW-11-TOP-DRUM	817,137.29	2,439,829.36	638.31	806
RW-13-GS	817,267.50	2,439,746.16	635.41	815
RW-14-FLANGE	817,185.86	2,439,880.83	638.75	799
RW-14-GS	817,185.40	2,439,880.66	636.38	798
RW-15-GS	817,284.68	2,439,898.34	636.29	729
RW-15-STEEL	817,285.03	2,439,896.65	637.83	730
RW-16-GS	817,270.63	2,439,894.71	635.81	735
RW-16-STEEL	817,271.00	2,439,894.22	637.51	736
RW-17-GS	817,271.55	2,439,936.29	636.10	775
RW-17-STEEL	817,271.87	2,439,935.84	637.47	776
RW-18-GS	817,043.04	2,439,961.04	636.07	699
RW-18-STEEL	817,043.43	2,439,960.66	637.97	700
RW-19-GS	817,043.15	2,439,975.90	636.14	679
RW-19-STEEL	817,042.76	2,439,975.29	638.38	680
RW-20-GS	817,027.52	2,439,975.97	635.89	674
RW-20-STEEL	817,027.78	2,439,976.21	638.14	673
RW-7-GS	817,291.95	2,439,877.26	635.74	822
RW-7-TOP-DRUM	817,291.17	2,439,876.36	638.64	823
UMK-1-GS	816,896.56	2,439,973.06	636.11	835
UMK-1-PVC	816,896.58	2,439,973.01	638.51	836

APPENDIX G

DNAPL AND GROUNDWATER LABORATORY ANALYTICAL DATA

Precision Analytical, Inc.
4450 Johnston Parkway Unit B
Cleveland, OH 44128
TEL: 216 663 0808 FAX: 216 663 0656
Website: www.precisionanalytical.com

March 26, 2013

Martin Schmidt
URS Corp.
1375 Euclid Avenue
Cleveland, OH 44115
TEL: (216) 622-2400
FAX: (216) 622-2464

RE: Detrex / 13816274 Order No.: 1302637

Dear Martin Schmidt:

Precision Analytical, Inc. received 2 sample(s) on 2/27/2013 for the analyses presented in the following report.

THIS IS A REVISED REPORT

There were no problems with the analytical events associated with this report unless noted in an attached Case Narrative. Quality control data is within laboratory defined or method specified acceptance limits except if noted. Note that sample results reported relate only the samples as received at the laboratory.

Solid samples are reported in ug/Kg or mg/Kg as received, unless specified in the units as dry weight. Unless otherwise noted, results have not been background or blank corrected.

If you have any questions regarding these tests results, please feel free to call.

Certifications: Ohio EPA - 4041; NELAC PA - 68-00434; W.Va DEP - 245

Sincerely,

Cary Mathias
President

Precision Analytical, Inc.
4450 Johnston Parkway Unit B
Cleveland, OH 44128
TEL: 216 663 0808 FAX: 216 663 0656
Website: www.precisionanalytical.com

Case Narrative

WO#: **1302637**
Date: **3/26/2013**

CLIENT: URS Corp.
Project: Detrex / 13816274

Report Revised 26 March 2013
·Units for VOC TCL and SVOC TIC amended; Samples were treated as oils, and waste dilutions were performed. The units were erroneously not updated prior to report generation.
·QC Report amended to report.

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Analytical Report

(consolidated)

WO#: **1302637**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/25/2013 4:10:00 PM
Project: Detrex / 13816274
Lab ID: 1302637-001
Matrix: LIQUID
Client Sample ID RW-17

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL SEMI-VOLATILES				**SW8270C**		Analyst: **CS**
SEMI-VOLATILE ORGANIC COMPOUNDS IN OIL						
1,2,4-Trichlorobenzene	451	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
1,2-Dichlorobenzene	767	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
1,3-Dichlorobenzene	10.3	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
1,4-Dichlorobenzene	26.2	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
2,4,5-Trichlorophenol	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
2,4,6-Trichlorophenol	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
2,4-Dichlorophenol	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
2,4-Dimethylphenol	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
2,4-Dinitrophenol	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
2,4-Dinitrotoluene	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
2,6-Dinitrotoluene	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
2-Chloronaphthalene	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
2-Chlorophenol	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
2-Methylnaphthalene	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
2-Methylphenol	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
2-Nitroaniline	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
2-Nitrophenol	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
3,3´-Dichlorobenzidine	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
3-Nitroaniline	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
4,6-Dinitro-2-methylphenol	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
4-Bromophenyl phenyl ether	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
4-Chloro-3-methylphenol	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
4-Chloroaniline	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
4-Chlorophenyl phenyl ether	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
4-Nitroaniline	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
4-Nitrophenol	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Acenaphthene	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Acenaphthylene	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Anthracene	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Benzo (a) anthracene	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Benzo(a)pyrene	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Benzo(b)fluoranthene	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Benzo(g,h,i)perylene	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Benzo(k)fluoranthene	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

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Analytical Report

(consolidated)

WO#: **1302637**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/25/2013 4:10:00 PM
Project: Detrex / 13816274
Lab ID: 1302637-001
Matrix: LIQUID
Client Sample ID RW-17

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL SEMI-VOLATILES				**SW8270C**		Analyst: **CS**
SEMI-VOLATILE ORGANIC COMPOUNDS IN OIL						
Benzoic acid	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Benzyl alcohol	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Bis(2-chloroethoxy)methane	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Bis(2-chloroethyl) ether	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Bis(2-chloroisopropyl) ether	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Bis(2-ethylhexyl) phthalate	123	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Butyl benzyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Chrysene	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Dibenz(a,h)anthracene	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Dibenzofuran	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Diethyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Dimethyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Di-n-butyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Di-n-octyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Fluoranthene	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Fluorene	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Hexachlorobenzene	7,110	200		mg/Kg	40	3/12/2013 8:17:00 PM
Hexachlorobutadiene	13,600	200		mg/Kg	40	3/12/2013 8:17:00 PM
Hexachlorocyclopentadiene	176	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Hexachloroethane	35,200	200		mg/Kg	40	3/12/2013 8:17:00 PM
Indeno(1,2,3-cd)pyrene	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Isophorone	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
m&p-cresols (3&4-methylphenols)	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Naphthalene	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Nitrobenzene	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
N-Nitrosodi-n-propylamine	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
N-Nitrosodiphenylamine	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Pentachlorophenol	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Phenanthrene	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Phenol	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Pyrene	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Pyridine	ND	5.00		mg/Kg	1	3/13/2013 1:02:00 AM
Surr: 2,4,6-Tribromophenol	106	40-150		%REC	1	3/13/2013 1:02:00 AM
Surr: 2-Fluorobiphenyl	76.6	40-150		%REC	1	3/13/2013 1:02:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
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Website: www.precisionanalytical.com

Analytical Report

(consolidated)

WO#: **1302637**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/25/2013 4:10:00 PM
Project: Detrex / 13816274
Lab ID: 1302637-001
Matrix: LIQUID
Client Sample ID RW-17

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL SEMI-VOLATILES				**SW8270C**		Analyst: **CS**
SEMI-VOLATILE ORGANIC COMPOUNDS IN OIL						
Surr: 2-Fluorophenol	101	40-150		%REC	1	3/13/2013 1:02:00 AM
Surr: Nitrobenzene-d5	87.5	40-150		%REC	1	3/13/2013 1:02:00 AM
Surr: Phenol-d6	116	40-150		%REC	1	3/13/2013 1:02:00 AM
Surr: Terphenyl-d14	97.7	40-150		%REC	1	3/13/2013 1:02:00 AM
SVOC TENTATIVELY IDENTIFIED COMPOUNDS				**SVOC-TIC**		Analyst: **CS**
SVOC-TICS	ND	0		mg/Kg	40	3/13/2013
TIC: 1,2,4,5-Tetrachlorobenzene	6,520		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,2,4,4-pentachloro- [A]	7,460		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,2,4,4-pentachloro- [B]	20,100		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,2,4,4-pentachloro- [c]	26,400		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- [A]	5,100		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- [B]	21,000		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,4,4-tetrachloro- [A]	24,400		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,4,4-tetrachloro- [B]	7,100		N	mg/Kg	40	3/13/2013
TIC: Chlorethate [A]	33,400		N	mg/Kg	40	3/13/2013
TIC: Clorethate [B]	3,030		N	mg/Kg	40	3/13/2013
TIC: Ethane, 1,1,2,2-tetrachloro-	243,000		N	mg/Kg	40	3/13/2013
TIC: Pentachlorobenzene	2,510		N	mg/Kg	40	3/13/2013
TIC: Pentachloroethane [A]	19,500		N	mg/Kg	40	3/13/2013
TIC: Pentachloroethane [B]	10,200		N	mg/Kg	40	3/13/2013
TIC: Tetrachloroethylene	42,600		N	mg/Kg	40	3/13/2013
TIC: Trichloroethylene	86,200		N	mg/Kg	40	3/13/2013
TIC: Unknown 01	4,670			mg/Kg	40	3/13/2013
TIC: Unknown 02	9,440			mg/Kg	40	3/13/2013
TIC: Unknown 03	29,800			mg/Kg	40	3/13/2013
TIC: Unknown 04	10,800			mg/Kg	40	3/13/2013
TIC: Unknown 05	292,000			mg/Kg	40	3/13/2013

Qualifiers:

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Analytical Report

(consolidated)

WO#: **1302637**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/25/2013 4:10:00 PM
Project: Detrex / 13816274
Lab ID: 1302637-001
Matrix: LIQUID
Client Sample ID RW-17

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SVOC TENTATIVELY IDENTIFIED COMPOUNDS				**SVOC-TIC**		Analyst: **CS**
TIC: Unknown 06	63,600			mg/Kg	40	3/13/2013
TIC: Unknown 07	3,670			mg/Kg	40	3/13/2013
TIC: Unknown 08	61,100			mg/Kg	40	3/13/2013
TIC: Unknown 09	6,900			mg/Kg	40	3/13/2013
TIC: Unknown 10	3,700			mg/Kg	40	3/13/2013
TCL VOC VOLATILE ORGANIC COMPOUNDS				**SW8260B**		Analyst: **AC**
1,1,1-Trichloroethane	ND	328,000		µg/Kg	1	2/28/2013 10:45:00 AM
1,1,2,2-Tetrachloroethane	16,800,000	1,640,000		µg/Kg	1	2/28/2013 1:32:00 PM
1,1,2-Trichloroethane	931,000	328,000		µg/Kg	1	2/28/2013 10:45:00 AM
1,1-Dichloroethane	ND	328,000		µg/Kg	1	2/28/2013 10:45:00 AM
1,1-Dichloroethene	263,000	197,000		µg/Kg	1	2/28/2013 10:45:00 AM
1,2-Dichloroethane	ND	328,000		µg/Kg	1	2/28/2013 10:45:00 AM
1,2-Dichloropropane	ND	328,000		µg/Kg	1	2/28/2013 10:45:00 AM
2-Hexanone	ND	657,000		µg/Kg	1	2/28/2013 10:45:00 AM
4-Methyl-2-pentanone	ND	1,310,000		µg/Kg	1	2/28/2013 10:45:00 AM
Acetone	ND	3,280,000		µg/Kg	1	2/28/2013 10:45:00 AM
Benzene	ND	328,000		µg/Kg	1	2/28/2013 10:45:00 AM
Bromodichloromethane	ND	328,000		µg/Kg	1	2/28/2013 10:45:00 AM
Bromoform	ND	328,000		µg/Kg	1	2/28/2013 10:45:00 AM
Bromomethane	ND	328,000		µg/Kg	1	2/28/2013 10:45:00 AM
Carbon disulfide	ND	328,000		µg/Kg	1	2/28/2013 10:45:00 AM
Carbon tetrachloride	ND	328,000		µg/Kg	1	2/28/2013 10:45:00 AM
Chlorobenzene	ND	328,000		µg/Kg	1	2/28/2013 10:45:00 AM
Chloroethane	ND	657,000		µg/Kg	1	2/28/2013 10:45:00 AM
Chloroform	366,000	328,000		µg/Kg	1	2/28/2013 10:45:00 AM
Chloromethane	ND	328,000		µg/Kg	1	2/28/2013 10:45:00 AM
cis-1,2-Dichloroethene	882,000	328,000		µg/Kg	1	2/28/2013 10:45:00 AM
cis-1,3-Dichloropropene	ND	328,000		µg/Kg	1	2/28/2013 10:45:00 AM
Dibromochloromethane	ND	328,000		µg/Kg	1	2/28/2013 10:45:00 AM
Ethylbenzene	ND	328,000		µg/Kg	1	2/28/2013 10:45:00 AM
m,p-Xylene	ND	328,000		µg/Kg	1	2/28/2013 10:45:00 AM
Methyl ethyl ketone	ND	3,280,000		µg/Kg	1	2/28/2013 10:45:00 AM

Qualifiers:

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WO#: **1302637**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Project: Detrex / 13816274
Lab ID: 1302637-001
Client Sample ID RW-17

Collection Date: 2/25/2013 4:10:00 PM
Matrix: LIQUID

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL VOC VOLATILE ORGANIC COMPOUNDS				**SW8260B**		Analyst: **AC**
Methylene chloride	ND	657,000		µg/Kg	1	2/28/2013 10:45:00 AM
o-Xylene	ND	328,000		µg/Kg	1	2/28/2013 10:45:00 AM
Styrene	ND	1,310,000		µg/Kg	1	2/28/2013 10:45:00 AM
Tetrachloroethene	2,950,000	821,000		µg/L	1	2/28/2013 12:20:00 PM
Toluene	ND	328,000		µg/Kg	1	2/28/2013 10:45:00 AM
trans-1,2-Dichloroethene	ND	657,000		µg/Kg	1	2/28/2013 10:45:00 AM
trans-1,3-Dichloropropene	ND	328,000		µg/Kg	1	2/28/2013 10:45:00 AM
Trichloroethene	8,330,000	821,000		µg/L	1	2/28/2013 12:20:00 PM
Vinyl acetate	ND	657,000		µg/Kg	1	2/28/2013 10:45:00 AM
Vinyl chloride	ND	328,000		µg/Kg	1	2/28/2013 10:45:00 AM
Surr: 4-Bromofluorobenzene	93.0	80-120		%REC	1	2/28/2013 10:45:00 AM
Surr: Dibromofluoromethane	102	80-120		%REC	1	2/28/2013 10:45:00 AM
Surr: Toluene-d8	95.4	80-120		%REC	1	2/28/2013 10:45:00 AM

NOTES:
* The reporting limits were raised because the sample extract required a methanol dilution.
The sample required a methanol extraction.

VOC TENTATIVELY IDENTIFIED COMPOUNDS				**VOC-TIC**		Analyst: **AC**
VOC-TICS	ND	0		µg/Kg	1	2/28/2013
TIC: 1,3-Butadiene, 1,1,3,4,-tetrachloro- A	1,680,000		N	µg/Kg	1	2/28/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- B	1,700,000		N	µg/Kg	1	2/28/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- C	10,000,000		N	µg/Kg	1	2/28/2013
TIC: 1,3-Butadiene, pentachloro- A	7,060,000		N	µg/Kg	1	2/28/2013
TIC: 1,3-Butadiene, pentachloro- B	7,190,000		N	µg/Kg	1	2/28/2013
TIC: Hexachlorobutadiene	15,300,000		N	µg/Kg	1	2/28/2013
TIC: Hexachloroethane	8,420,000		N	µg/Kg	1	2/28/2013
TIC: Pentachloroethane	10,400,000		N	µg/Kg	1	2/28/2013
TIC: Unknown 01	6,080,000			µg/Kg	1	2/28/2013
TIC: Unknown 02	1,800,000			µg/Kg	1	2/28/2013
TIC: Unknown 03	2,000,000			µg/Kg	1	2/28/2013
TIC: Unknown 04	808,000			µg/Kg	1	2/28/2013

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

Precision Analytical, Inc.
4450 Johnston Parkway Unit B
Cleveland, OH 44128
TEL: 216 663 0808 FAX: 216 663 0656
Website: www.precisionanalytical.com

Analytical Report

(consolidated)

WO#: **1302637**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/25/2013 4:10:00 PM
Project: Detrex / 13816274
Lab ID: 1302637-001
Matrix: LIQUID
Client Sample ID RW-17

Analyses	Result	RL	Qual	Units	DF	Date Analyzed

VOC TENTATIVELY IDENTIFIED COMPOUNDS **VOC-TIC** Analyst: **AC**

NOTES:
* The reporting limits were raised because the sample extract required a methanol dilution.
The sample required a methanol extraction.

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
	DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
	MDL	Method Detection Limit	N	Tentatively identified compounds
	ND	Not Detected at the Reporting Limit	PL	Permit Limit
	RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

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Analytical Report

(consolidated)

WO#: **1302637**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/25/2013 4:25:00 PM
Project: Detrex / 13816274
Lab ID: 1302637-002
Matrix: LIQUID
Client Sample ID RW-19

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL SEMI-VOLATILES				**SW8270C**		Analyst: **CS**
SEMI-VOLATILE ORGANIC COMPOUNDS IN OIL						
1,2,4-Trichlorobenzene	387	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
1,2-Dichlorobenzene	834	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
1,3-Dichlorobenzene	10.5	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
1,4-Dichlorobenzene	23.9	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
2,4,5-Trichlorophenol	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
2,4,6-Trichlorophenol	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
2,4-Dichlorophenol	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
2,4-Dimethylphenol	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
2,4-Dinitrophenol	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
2,4-Dinitrotoluene	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
2,6-Dinitrotoluene	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
2-Chloronaphthalene	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
2-Chlorophenol	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
2-Methylnaphthalene	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
2-Methylphenol	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
2-Nitroaniline	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
2-Nitrophenol	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
3,3´-Dichlorobenzidine	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
3-Nitroaniline	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
4,6-Dinitro-2-methylphenol	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
4-Bromophenyl phenyl ether	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
4-Chloro-3-methylphenol	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
4-Chloroaniline	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
4-Chlorophenyl phenyl ether	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
4-Nitroaniline	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
4-Nitrophenol	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Acenaphthene	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Acenaphthylene	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Anthracene	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Benzo (a) anthracene	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Benzo(a)pyrene	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Benzo(b)fluoranthene	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Benzo(g,h,i)perylene	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Benzo(k)fluoranthene	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

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Analytical Report

(consolidated)

WO#: **1302637**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/25/2013 4:25:00 PM
Project: Detrex / 13816274
Lab ID: 1302637-002
Matrix: LIQUID
Client Sample ID RW-19

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL SEMI-VOLATILES				**SW8270C**		Analyst: **CS**
SEMI-VOLATILE ORGANIC COMPOUNDS IN OIL						
Benzoic acid	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Benzyl alcohol	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Bis(2-chloroethoxy)methane	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Bis(2-chloroethyl) ether	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Bis(2-chloroisopropyl) ether	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Bis(2-ethylhexyl) phthalate	54.3	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Butyl benzyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Chrysene	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Dibenz(a,h)anthracene	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Dibenzofuran	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Diethyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Dimethyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Di-n-butyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Di-n-octyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Fluoranthene	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Fluorene	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Hexachlorobenzene	7,760	200		mg/Kg	40	3/12/2013 8:53:00 PM
Hexachlorobutadiene	13,800	200		mg/Kg	40	3/12/2013 8:53:00 PM
Hexachlorocyclopentadiene	202	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Hexachloroethane	46,600	200		mg/Kg	40	3/12/2013 8:53:00 PM
Indeno(1,2,3-cd)pyrene	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Isophorone	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
m&p-cresols (3&4-methylphenols)	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Naphthalene	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Nitrobenzene	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
N-Nitrosodi-n-propylamine	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
N-Nitrosodiphenylamine	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Pentachlorophenol	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Phenanthrene	31.8	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Phenol	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Pyrene	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Pyridine	ND	5.00		mg/Kg	1	3/13/2013 1:38:00 AM
Surr: 2,4,6-Tribromophenol	94.4	40-150		%REC	1	3/13/2013 1:38:00 AM
Surr: 2-Fluorobiphenyl	76.5	40-150		%REC	1	3/13/2013 1:38:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

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Analytical Report

(consolidated)

WO#: **1302637**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/25/2013 4:25:00 PM
Project: Detrex / 13816274
Lab ID: 1302637-002
Matrix: LIQUID
Client Sample ID RW-19

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL SEMI-VOLATILES				**SW8270C**		Analyst: **CS**
SEMI-VOLATILE ORGANIC COMPOUNDS IN OIL						
Surr: 2-Fluorophenol	105	40-150		%REC	1	3/13/2013 1:38:00 AM
Surr: Nitrobenzene-d5	82.9	40-150		%REC	1	3/13/2013 1:38:00 AM
Surr: Phenol-d6	118	40-150		%REC	1	3/13/2013 1:38:00 AM
Surr: Terphenyl-d14	95.9	40-150		%REC	1	3/13/2013 1:38:00 AM
SVOC TENTATIVELY IDENTIFIED COMPOUNDS				**SVOC-TIC**		Analyst: **CS**
SVOC-TICS	ND	0		mg/Kg	40	3/13/2013
TIC: 1,2,4,5-Tetrachlorobenzene	6,690		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,2,4,4-pentachloro- [A]	8,700		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,2,4,4-pentachloro- [B]	20,300		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,2,4,4-pentachloro- [C]	30,000		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- [A]	7,520		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- [B]	9,480		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- [C]	14,400		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,4,4-tetrachloro-	41,700		N	mg/Kg	40	3/13/2013
TIC: Clorethate	24,400		N	mg/Kg	40	3/13/2013
TIC: Ethane, 1,1,2,2-tetrachloro-	254,000		N	mg/Kg	40	3/13/2013
TIC: Pentachlorobenzene	2,620		N	mg/Kg	40	3/13/2013
TIC: Pentachloroethane [A]	22,200		N	mg/Kg	40	3/13/2013
TIC: Pentachloroethane [B]	12,700		N	mg/Kg	40	3/13/2013
TIC: Tetrachloroethylene	24,100		N	mg/Kg	40	3/13/2013
TIC: Trichloroethylene	126,000		N	mg/Kg	40	3/13/2013
TIC: Unknown 01	5,730			mg/Kg	40	3/13/2013
TIC: Unknown 02	10,900			mg/Kg	40	3/13/2013
TIC: Unknown 03	24,500			mg/Kg	40	3/13/2013
TIC: Unknown 04	13,300			mg/Kg	40	3/13/2013
TIC: Unknown 05	4,880			mg/Kg	40	3/13/2013
TIC: Unknown 06	245,000			mg/Kg	40	3/13/2013

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
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Analytical Report

(consolidated)

WO#: **1302637**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/25/2013 4:25:00 PM
Project: Detrex / 13816274
Lab ID: 1302637-002
Matrix: LIQUID
Client Sample ID RW-19

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SVOC TENTATIVELY IDENTIFIED COMPOUNDS				**SVOC-TIC**		Analyst: **CS**
TIC: Unknown 07	60,200			mg/Kg	40	3/13/2013
TIC: Unknown 08	3,080			mg/Kg	40	3/13/2013
TIC: Unknown 09	50,700			mg/Kg	40	3/13/2013
TIC: Unknown 10	8,600			mg/Kg	40	3/13/2013
TIC: Unknown 11	5,810			mg/Kg	40	3/13/2013
TCL VOC VOLATILE ORGANIC COMPOUNDS				**SW8260B**		Analyst: **AC**
1,1,1-Trichloroethane	ND	343,000		µg/Kg	1	2/28/2013 11:09:00 AM
1,1,2,2-Tetrachloroethane	18,300,000	1,720,000		µg/Kg	1	2/28/2013 1:55:00 PM
1,1,2-Trichloroethane	509,000	343,000		µg/Kg	1	2/28/2013 11:09:00 AM
1,1-Dichloroethane	ND	343,000		µg/Kg	1	2/28/2013 11:09:00 AM
1,1-Dichloroethene	ND	343,000		µg/Kg	1	2/28/2013 11:09:00 AM
1,2-Dichloroethane	ND	343,000		µg/Kg	1	2/28/2013 11:09:00 AM
1,2-Dichloropropane	ND	343,000		µg/Kg	1	2/28/2013 11:09:00 AM
2-Hexanone	ND	686,000		µg/Kg	1	2/28/2013 11:09:00 AM
4-Methyl-2-pentanone	ND	1,370,000		µg/Kg	1	2/28/2013 11:09:00 AM
Acetone	ND	3,430,000		µg/Kg	1	2/28/2013 11:09:00 AM
Benzene	ND	343,000		µg/Kg	1	2/28/2013 11:09:00 AM
Bromodichloromethane	ND	343,000		µg/Kg	1	2/28/2013 11:09:00 AM
Bromoform	ND	343,000		µg/Kg	1	2/28/2013 11:09:00 AM
Bromomethane	ND	343,000		µg/Kg	1	2/28/2013 11:09:00 AM
Carbon disulfide	ND	343,000		µg/Kg	1	2/28/2013 11:09:00 AM
Carbon tetrachloride	ND	343,000		µg/Kg	1	2/28/2013 11:09:00 AM
Chlorobenzene	ND	343,000		µg/Kg	1	2/28/2013 11:09:00 AM
Chloroethane	ND	686,000		µg/Kg	1	2/28/2013 11:09:00 AM
Chloroform	415,000	343,000		µg/Kg	1	2/28/2013 11:09:00 AM
Chloromethane	ND	343,000		µg/Kg	1	2/28/2013 11:09:00 AM
cis-1,2-Dichloroethene	ND	343,000		µg/Kg	1	2/28/2013 11:09:00 AM
cis-1,3-Dichloropropene	ND	343,000		µg/Kg	1	2/28/2013 11:09:00 AM
Dibromochloromethane	ND	343,000		µg/Kg	1	2/28/2013 11:09:00 AM
Ethylbenzene	ND	343,000		µg/Kg	1	2/28/2013 11:09:00 AM
m,p-Xylene	ND	343,000		µg/Kg	1	2/28/2013 11:09:00 AM
Methyl ethyl ketone	ND	3,430,000		µg/Kg	1	2/28/2013 11:09:00 AM

Qualifiers:

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DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

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Analytical Report

(consolidated)

WO#: **1302637**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/25/2013 4:25:00 PM
Project: Detrex / 13816274
Lab ID: 1302637-002
Matrix: LIQUID
Client Sample ID RW-19

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL VOC				**SW8260B**		Analyst: **AC**
VOLATILE ORGANIC COMPOUNDS						
Methylene chloride	ND	686,000		µg/Kg	1	2/28/2013 11:09:00 AM
o-Xylene	ND	343,000		µg/Kg	1	2/28/2013 11:09:00 AM
Styrene	ND	1,370,000		µg/Kg	1	2/28/2013 11:09:00 AM
Tetrachloroethene	1,940,000	858,000		µg/Kg	1	2/28/2013 12:44:00 PM
Toluene	ND	343,000		µg/Kg	1	2/28/2013 11:09:00 AM
trans-1,2-Dichloroethene	ND	686,000		µg/Kg	1	2/28/2013 11:09:00 AM
trans-1,3-Dichloropropene	ND	343,000		µg/Kg	1	2/28/2013 11:09:00 AM
Trichloroethene	12,200,000	858,000		µg/Kg	1	2/28/2013 12:44:00 PM
Vinyl acetate	ND	686,000		µg/Kg	1	2/28/2013 11:09:00 AM
Vinyl chloride	ND	343,000		µg/Kg	1	2/28/2013 11:09:00 AM
Surr: 4-Bromofluorobenzene	89.7	80-120		%REC	1	2/28/2013 11:09:00 AM
Surr: Dibromofluoromethane	104	80-120		%REC	1	2/28/2013 11:09:00 AM
Surr: Toluene-d8	102	80-120		%REC	1	2/28/2013 11:09:00 AM

NOTES:
* The reporting limits were raised because the sample extract required a methanol dilution.
The sample required a methanol extraction.

VOC TENTATIVELY IDENTIFIED COMPOUNDS				**VOC-TIC**		Analyst: **AC**
VOC-TICS	ND	0		µg/Kg	1	2/28/2013
TIC: 1,1,1,4,4,4,-Hexachloro-2-butene	1,240,000		N	µg/Kg	1	2/28/2013
TIC: 1,1,2.4-Tetrachlorobut-1-ene	2,400,000		N	µg/Kg	1	2/28/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- A	2,050,000		N	µg/Kg	1	2/28/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- B	6,760,000		N	µg/Kg	1	2/28/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- C	1,750,000		N	µg/Kg	1	2/28/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- D	1,770,000		N	µg/Kg	1	2/28/2013
TIC: 1,3-Butadiene, pentachloro- A	5,080,000		N	µg/Kg	1	2/28/2013
TIC: 1,3-Butadiene, pentachloro- B	5,900,000		N	µg/Kg	1	2/28/2013
TIC: Hexachlorobutadiene	9,140,000		N	µg/Kg	1	2/28/2013
TIC: Hexachloroethane	8,500,000		N	µg/Kg	1	2/28/2013
TIC: Pentachloroethane	10,500,000		N	µg/Kg	1	2/28/2013

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

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Analytical Report

(consolidated)

WO#: **1302637**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/25/2013 4:25:00 PM
Project: Detrex / 13816274
Lab ID: 1302637-002
Matrix: LIQUID
Client Sample ID RW-19

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
VOC TENTATIVELY IDENTIFIED COMPOUNDS				**VOC-TIC**		Analyst: **AC**
TIC: Unknown 01	14,000,000			µg/Kg	1	2/28/2013
TIC: Unknown 02	1,150,000			µg/Kg	1	2/28/2013
TIC: Unknown 03	7,750,000			µg/Kg	1	2/28/2013
TIC: Unknown 04	2,120,000			µg/Kg	1	2/28/2013
TIC: Unknown 05	628,000			µg/Kg	1	2/28/2013
TIC: Unknown 06	823,000			µg/Kg	1	2/28/2013

NOTES:
* The reporting limits were raised because the sample extract required a methanol dilution.
The sample required a methanol extraction.

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
	DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
	MDL	Method Detection Limit	N	Tentatively identified compounds
	ND	Not Detected at the Reporting Limit	PL	Permit Limit
	RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

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Website: www.precisionanalytical.com

QC SUMMARY REPORT

WO#: **1302637**

26-Mar-13

Client: URS Corp.
Project: Detrex / 13816274 **BatchID:** **19429**

Sample ID: **LCS-19429** SampType: **lcs** TestCode: **sw_8270oil** Units: **mg/Kg** Prep Date: **3/8/2013** RunNo: **43243**
Client ID: **LCSW** Batch ID: **19429** TestNo: **SW8270C** Analysis Date: **3/11/2013** SeqNo: **631324**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	237	5.00	250.0	0	94.8	40	150				
1,4-Dichlorobenzene	239	5.00	250.0	0	95.4	40	150				
2,4-Dinitrotoluene	239	5.00	250.0	0	95.8	40	150				
2-Chlorophenol	262	5.00	250.0	0	105	40	150				
4-Chloro-3-methylphenol	261	5.00	250.0	0	104	40	150				
4-Nitrophenol	252	5.00	250.0	0	101	40	150				
Acenaphthene	244	5.00	250.0	0	97.8	40	150				
N-Nitrosodi-n-propylamine	270	5.00	250.0	0	108	40	150				
Pentachlorophenol	182	5.00	250.0	0	72.8	40	150				
Phenol	281	5.00	250.0	0	113	40	150				
Pyrene	250	5.00	250.0	0	100	40	150				
Surr: 2,4,6-Tribromophenol	1,060		1,000		106	40	150				
Surr: 2-Fluorobiphenyl	1,110		1,000		111	40	150				
Surr: 2-Fluorophenol	1,110		1,000		111	40	150				
Surr: Nitrobenzene-d5	1,130		1,000		113	40	150				
Surr: Phenol-d6	1,110		1,000		111	40	150				
Surr: Terphenyl-d14	1,100		1,000		110	40	150				

Sample ID: **MB-19429** SampType: **mblk** TestCode: **sw_8270oil** Units: **mg/Kg** Prep Date: **3/8/2013** RunNo: **43243**
Client ID: **PBW** Batch ID: **19429** TestNo: **SW8270C** Analysis Date: **3/11/2013** SeqNo: **631325**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	ND	5.00									
1,2-Dichlorobenzene	ND	5.00									
1,3-Dichlorobenzene	ND	5.00									
1,4-Dichlorobenzene	ND	5.00									

Qualifiers:

*	Value exceeds Maximum Contaminant Level	E	Value above quantitation range	H	Holding times for preparation or analys
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	P	Second column confirmation exceeds	R	RPD outside accepted recovery limits
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits		

Precision Analytical, Inc.
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Website: www.precisionanalytical.com

QC SUMMARY REPORT

WO#: **1302637**

26-Mar-13

Client: URS Corp.
Project: Detrex / 13816274 **BatchID:** **19429**

Sample ID: **MB-19429** SampType: **mblk** TestCode: **sw_8270oil** Units: **mg/Kg** Prep Date: **3/8/2013** RunNo: **43243**
Client ID: **PBW** Batch ID: **19429** TestNo: **SW8270C** Analysis Date: **3/11/2013** SeqNo: **631325**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
2,4,5-Trichlorophenol	ND	5.00									
2,4,6-Trichlorophenol	ND	5.00									
2,4-Dichlorophenol	ND	5.00									
2,4-Dimethylphenol	ND	5.00									
2,4-Dinitrophenol	ND	5.00									
2,4-Dinitrotoluene	ND	5.00									
2,6-Dinitrotoluene	ND	5.00									
2-Chloronaphthalene	ND	5.00									
2-Chlorophenol	ND	5.00									
2-Methylnaphthalene	ND	5.00									
2-Methylphenol	ND	5.00									
2-Nitroaniline	ND	5.00									
2-Nitrophenol	ND	5.00									
3,3´-Dichlorobenzidine	ND	5.00									
3-Nitroaniline	ND	5.00									
4,6-Dinitro-2-methylphenol	ND	5.00									
4-Bromophenyl phenyl ether	ND	5.00									
4-Chloro-3-methylphenol	ND	5.00									
4-Chloroaniline	ND	5.00									
4-Chlorophenyl phenyl ether	ND	5.00									
4-Nitroaniline	ND	5.00									
4-Nitrophenol	ND	5.00									
Acenaphthene	ND	5.00									
Acenaphthylene	ND	5.00									
Anthracene	ND	5.00									
Benzo (a) anthracene	ND	5.00									

Qualifiers:

*	Value exceeds Maximum Contaminant Level	E	Value above quantitation range	H	Holding times for preparation or analys
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response	N	Tentatively identified compounds
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QC SUMMARY REPORT

WO#: **1302637**

26-Mar-13

Client: URS Corp.
Project: Detrex / 13816274 **BatchID:** **19429**

Sample ID: **MB-19429** SampType: **mblk** TestCode: **sw_8270oil** Units: **mg/Kg** Prep Date: **3/8/2013** RunNo: **43243**
Client ID: **PBW** Batch ID: **19429** TestNo: **SW8270C** Analysis Date: **3/11/2013** SeqNo: **631325**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzo(a)pyrene	ND	5.00									
Benzo(b)fluoranthene	ND	5.00									
Benzo(g,h,i)perylene	ND	5.00									
Benzo(k)fluoranthene	ND	5.00									
Benzoic acid	ND	5.00									
Benzyl alcohol	ND	5.00									
Bis(2-chloroethoxy)methane	ND	5.00									
Bis(2-chloroethyl) ether	ND	5.00									
Bis(2-chloroisopropyl) ether	ND	5.00									
Bis(2-ethylhexyl) phthalate	ND	5.00									
Butyl benzyl phthalate	ND	5.00									
Chrysene	ND	5.00									
Dibenz(a,h)anthracene	ND	5.00									
Dibenzofuran	ND	5.00									
Diethyl phthalate	ND	5.00									
Dimethyl phthalate	ND	5.00									
Di-n-butyl phthalate	ND	5.00									
Di-n-octyl phthalate	ND	5.00									
Fluoranthene	ND	5.00									
Fluorene	ND	5.00									
Hexachlorobenzene	ND	5.00									
Hexachlorobutadiene	ND	5.00									
Hexachlorocyclopentadiene	ND	5.00									
Hexachloroethane	ND	5.00									
Indeno(1,2,3-cd)pyrene	ND	5.00									
Isophorone	ND	5.00									

Qualifiers:

*	Value exceeds Maximum Contaminant Level	E	Value above quantitation range	H	Holding times for preparation or analys
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	P	Second column confirmation exceeds	R	RPD outside accepted recovery limits
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits		

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QC SUMMARY REPORT

WO#: **1302637**

26-Mar-13

Client: URS Corp.
Project: Detrex / 13816274 **BatchID:** **19429**

Sample ID: **MB-19429** SampType: **mblk** TestCode: **sw_8270oil** Units: **mg/Kg** Prep Date: **3/8/2013** RunNo: **43243**
Client ID: **PBW** Batch ID: **19429** TestNo: **SW8270C** Analysis Date: **3/11/2013** SeqNo: **631325**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
m&p-cresols (3&4-methylphenols)	ND	5.00									
Naphthalene	ND	5.00									
Nitrobenzene	ND	5.00									
N-Nitrosodi-n-propylamine	ND	5.00									
N-Nitrosodiphenylamine	ND	5.00									
Pentachlorophenol	ND	5.00									
Phenanthrene	ND	5.00									
Phenol	ND	5.00									
Pyrene	ND	5.00									
Pyridine	ND	5.00									
Surr: 2,4,6-Tribromophenol	929		1,000		92.9	40	150				
Surr: 2-Fluorobiphenyl	1,020		1,000		102	40	150				
Surr: 2-Fluorophenol	1,030		1,000		103	40	150				
Surr: Nitrobenzene-d5	1,060		1,000		106	40	150				
Surr: Phenol-d6	1,060		1,000		106	40	150				
Surr: Terphenyl-d14	1,050		1,000		105	40	150				

Qualifiers:

*	Value exceeds Maximum Contaminant Level	E	Value above quantitation range	H	Holding times for preparation or analys
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	P	Second column confirmation exceeds	R	RPD outside accepted recovery limits
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits		

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QC SUMMARY REPORT

WO#: **1302637**

26-Mar-13

Client: URS Corp.
Project: Detrex / 13816274

BatchID: **R42897**

Sample ID: **1302636-002ams** SampType: **ms** TestCode: **sw_8260tclp** Units: **µg/L** Prep Date: RunNo: **42897**
Client ID: **ZZZZZZ** Batch ID: **R42897** TestNo: **SW8260B** Analysis Date: **2/28/2013** SeqNo: **627310**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethene	938	200	800.0	0	117	75	125				
Benzene	872	200	800.0	0	109	83	117				
Chlorobenzene	857	200	800.0	0	107	77	123				
Trichloroethene	918	200	800.0	0	115	79	121				
Surr: 4-Bromofluorobenzene	1,010		1,000		101	80	120				
Surr: Dibromofluoromethane	994		1,000		99.4	80	120				
Surr: Toluene-d8	983		1,000		98.3	80	120				

Sample ID: **1302636-002amsd** SampType: **msd** TestCode: **sw_8260tclp** Units: **µg/L** Prep Date: RunNo: **42897**
Client ID: **ZZZZZZ** Batch ID: **R42897** TestNo: **SW8260B** Analysis Date: **2/28/2013** SeqNo: **627311**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethene	956	200	800.0	0	119	75	125	937.6	1.90	20	
Benzene	886	200	800.0	0	111	83	117	871.6	1.59	20	
Chlorobenzene	865	200	800.0	0	108	77	123	856.8	0.929	20	
Trichloroethene	944	200	800.0	0	118	79	121	917.6	2.79	20	
Surr: 4-Bromofluorobenzene	1,010		1,000		101	80	120		0	20	
Surr: Dibromofluoromethane	973		1,000		97.3	80	120		0	20	
Surr: Toluene-d8	984		1,000		98.4	80	120		0	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level	E	Value above quantitation range	H	Holding times for preparation or analys
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	P	Second column confirmation exceeds	R	RPD outside accepted recovery limits
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits		

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QC SUMMARY REPORT

WO#: **1302637**

26-Mar-13

Client: URS Corp.
Project: Detrex / 13816274 **BatchID:** **R42897**

Sample ID: **BLK** SampType: **MBLK** TestCode: **SW_8260LIQ** Units: **µg/L** Prep Date: RunNo: **42897**
Client ID: **PBW** Batch ID: **R42897** TestNo: **SW8260B** Analysis Date: **2/28/2013** SeqNo: **627295**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1-Trichloroethane	ND	5.00									
1,1,2,2-Tetrachloroethane	ND	5.00									
1,1,2-Trichloroethane	ND	5.00									
1,1-Dichloroethane	ND	5.00									
1,1-Dichloroethene	ND	5.00									
1,2-Dichloroethane	ND	5.00									
1,2-Dichloropropane	ND	5.00									
2-Hexanone	ND	10.0									
4-Methyl-2-pentanone	ND	10.0									
Acetone	ND	50.0									
Benzene	ND	5.00									
Bromodichloromethane	ND	5.00									
Bromoform	ND	5.00									
Bromomethane	ND	5.00									
Carbon disulfide	ND	5.00									
Carbon tetrachloride	ND	5.00									
Chlorobenzene	ND	5.00									
Chloroethane	ND	5.00									
Chloroform	ND	5.00									
Chloromethane	ND	5.00									
cis-1,2-Dichloroethene	ND	5.00									
cis-1,3-Dichloropropene	ND	5.00									
Dibromochloromethane	ND	5.00									
Ethylbenzene	ND	5.00									
m,p-Xylene	ND	5.00									
Methyl ethyl ketone	ND	25.0									

Qualifiers:

*	Value exceeds Maximum Contaminant Level	E	Value above quantitation range	H	Holding times for preparation or analys
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	P	Second column confirmation exceeds	R	RPD outside accepted recovery limits
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits		

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QC SUMMARY REPORT

WO#: **1302637**

26-Mar-13

Client: URS Corp.
Project: Detrex / 13816274

BatchID: **R42897**

Sample ID: **BLK** SampType: **MBLK** TestCode: **SW_8260LIQ** Units: **µg/L** Prep Date: RunNo: **42897**
Client ID: **PBW** Batch ID: **R42897** TestNo: **SW8260B** Analysis Date: **2/28/2013** SeqNo: **627295**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methylene chloride	ND	5.00									
o-Xylene	ND	5.00									
Styrene	ND	5.00									
Tetrachloroethene	ND	5.00									
Toluene	ND	5.00									
trans-1,2-Dichloroethene	ND	5.00									
trans-1,3-Dichloropropene	ND	5.00									
Trichloroethene	ND	5.00									
Vinyl acetate	ND	10.0									
Vinyl chloride	ND	5.00									
Surr: 4-Bromofluorobenzene	23.9		25.00		95.7	80	120				
Surr: Dibromofluoromethane	25.1		25.00		100	80	120				
Surr: Toluene-d8	23.1		25.00		92.4	80	120				

Sample ID: **ccv 20 ug/l** SampType: **CCV** TestCode: **sw_8260liq** Units: **µg/L** Prep Date: RunNo: **42897**
Client ID: **CCV** Batch ID: **R42897** TestNo: **SW8260B** Analysis Date: **2/28/2013** SeqNo: **627296**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1-Trichloroethane	21.6	5.00	20.00	0	108	80	120				
1,1,2,2-Tetrachloroethane	18.6	5.00	20.00	0	93.1	80	120				
1,1,2-Trichloroethane	19.6	5.00	20.00	0	98.0	80	120				
1,1-Dichloroethane	20.2	5.00	20.00	0	101	80	120				
1,1-Dichloroethene	21.2	5.00	20.00	0	106	80	120				
1,2-Dichloroethane	21.4	5.00	20.00	0	107	80	120				
1,2-Dichloropropane	19.8	5.00	20.00	0	98.8	80	120				
2-Hexanone	83.7	10.0	80.00	0	105	80	120				

Qualifiers:

*	Value exceeds Maximum Contaminant Level	E	Value above quantitation range	H	Holding times for preparation or analys
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	P	Second column confirmation exceeds	R	RPD outside accepted recovery limits
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits		

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QC SUMMARY REPORT

WO#: **1302637**

26-Mar-13

Client: URS Corp.
Project: Detrex / 13816274

BatchID: **R42897**

Sample ID: **ccv 20 ug/l** SampType: **CCV** TestCode: **sw_8260liq** Units: **µg/L** Prep Date: RunNo: **42897**
Client ID: **CCV** Batch ID: **R42897** TestNo: **SW8260B** Analysis Date: **2/28/2013** SeqNo: **627296**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
4-Methyl-2-pentanone	85.6	10.0	80.00	0	107	80	120				
Acetone	105	50.0	80.00	0	132	80	120				S
Benzene	20.2	5.00	20.00	0	101	80	120				
Bromodichloromethane	20.5	5.00	20.00	0	103	80	120				
Bromoform	20.8	5.00	20.00	0	104	80	120				
Bromomethane	23.5	5.00	20.00	0	117	80	120				
Carbon disulfide	20.0	5.00	20.00	0	100	80	120				
Carbon tetrachloride	21.1	5.00	20.00	0	105	80	120				
Chlorobenzene	19.5	5.00	20.00	0	97.4	80	120				
Chloroethane	20.0	5.00	20.00	0	100	80	120				
Chloroform	19.3	5.00	20.00	0	96.4	80	120				
Chloromethane	20.4	5.00	20.00	0	102	80	120				
cis-1,2-Dichloroethene	21.0	5.00	20.00	0	105	80	120				
cis-1,3-Dichloropropene	19.6	5.00	20.00	0	98.2	80	120				
Dibromochloromethane	20.9	5.00	20.00	0	105	80	120				
Ethylbenzene	19.3	5.00	20.00	0	96.6	80	120				
m,p-Xylene	41.8	5.00	40.00	0	105	80	120				
Methyl ethyl ketone	97.9	25.0	80.00	0	122	80	120				S
Methylene chloride	20.6	5.00	20.00	0	103	80	120				
o-Xylene	19.9	5.00	20.00	0	99.4	80	120				
Styrene	19.3	5.00	20.00	0	96.6	80	120				
Tetrachloroethene	24.9	5.00	20.00	0	125	80	120				S
Toluene	19.9	5.00	20.00	0	99.4	80	120				
trans-1,2-Dichloroethene	20.7	5.00	20.00	0	103	80	120				
trans-1,3-Dichloropropene	19.6	5.00	20.00	0	97.8	80	120				
Trichloroethene	21.0	5.00	20.00	0	105	80	120				

Qualifiers:

*	Value exceeds Maximum Contaminant Level	E	Value above quantitation range	H	Holding times for preparation or analys
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	P	Second column confirmation exceeds	R	RPD outside accepted recovery limits
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits		

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QC SUMMARY REPORT

WO#: **1302637**

26-Mar-13

Client: URS Corp.
Project: Detrex / 13816274

BatchID: **R42897**

Sample ID: **ccv 20 ug/l** SampType: **CCV** TestCode: **sw_8260liq** Units: **µg/L** Prep Date: RunNo: **42897**
Client ID: **CCV** Batch ID: **R42897** TestNo: **SW8260B** Analysis Date: **2/28/2013** SeqNo: **627296**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Vinyl acetate	42.0	10.0	40.00	0	105	80	120				
Vinyl chloride	21.2	5.00	20.00	0	106	80	120				
Surr: 4-Bromofluorobenzene	25.2		25.00		101	80	120				
Surr: Dibromofluoromethane	23.7		25.00		95.0	80	120				
Surr: Toluene-d8	24.5		25.00		98.0	80	120				

Qualifiers:

*	Value exceeds Maximum Contaminant Level	E	Value above quantitation range	H	Holding times for preparation or analys
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	P	Second column confirmation exceeds	R	RPD outside accepted recovery limits
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits		

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QC SUMMARY REPORT

WO#: **1302637**

26-Mar-13

Client: URS Corp.
Project: Detrex / 13816274

BatchID: **R42897**

Sample ID: **lcs 20 ug/l** SampType: **LCS** TestCode: **EPA_624AQ** Units: **µg/L** Prep Date: RunNo: **42897**
Client ID: **LCSW** Batch ID: **R42897** TestNo: **SW8260B** Analysis Date: **2/28/2013** SeqNo: **627297**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1-Trichloroethane	23.1	5.00	20.00	0	115	52	162				
1,1,2,2-Tetrachloroethane	18.5	5.00	20.00	0	92.6	46	157				
1,1,2-Trichloroethane	20.3	5.00	20.00	0	101	52	150				
1,1-Dichloroethane	20.6	5.00	20.00	0	103	59	155				
1,1-Dichloroethene	21.9	5.00	20.00	0	110	1	234				
1,2-Dichloroethane	21.9	5.00	20.00	0	110	49	155				
1,2-Dichloropropane	20.1	5.00	20.00	0	100	1	210				
Benzene	20.6	5.00	20.00	0	103	37	151				
Bromodichloromethane	20.9	5.00	20.00	0	104	35	155				
Bromoform	20.5	5.00	20.00	0	103	45	169				
Bromomethane	29.4	5.00	20.00	0	147	1	242				
Carbon tetrachloride	22.2	5.00	20.00	0	111	70	140				
Chlorobenzene	20.1	5.00	20.00	0	100	37	160				
Chloroethane	20.0	5.00	20.00	0	99.9	14	230				
Chloroform	19.4	5.00	20.00	0	97.0	51	138				
Chloromethane	20.8	5.00	20.00	0	104	1	273				
cis-1,3-Dichloropropene	22.0	5.00	20.00	0	110	1	227				
Dibromochloromethane	20.3	5.00	20.00	0	102	53	149				
Ethylbenzene	19.8	5.00	20.00	0	99.2	37	162				
Methylene chloride	20.6	5.00	20.00	0	103	1	221				
Tetrachloroethene	30.8	5.00	20.00	0	154	64	148				S
Toluene	20.7	5.00	20.00	0	103	47	150				
trans-1,2-Dichloroethene	21.7	5.00	20.00	0	108	54	156				
trans-1,3-Dichloropropene	20.7	5.00	20.00	0	103	17	183				
Trichloroethene	22.1	5.00	20.00	0	110	71	157				
Vinyl chloride	21.3	5.00	20.00	0	106	1	251				

Qualifiers:

*	Value exceeds Maximum Contaminant Level	E	Value above quantitation range	H	Holding times for preparation or analys
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	P	Second column confirmation exceeds	R	RPD outside accepted recovery limits
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits		

Precision Analytical, Inc.
4450 Johnston Parkway Unit B
Cleveland, OH 44128
TEL: 216 663 0808 FAX: 216 663 0656
Website: www.precisionanalytical.com

QC SUMMARY REPORT

WO#: **1302637**

26-Mar-13

Client: URS Corp.
Project: Detrex / 13816274

BatchID: **R42897**

Sample ID: **lcs 20 ug/l** SampType: **LCS** TestCode: **EPA_624AQ** Units: **µg/L** Prep Date: RunNo: **42897**
Client ID: **LCSW** Batch ID: **R42897** TestNo: **SW8260B** Analysis Date: **2/28/2013** SeqNo: **627297**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: 4-Bromofluorobenzene	24.8		25.00		99.2	80	120				
Surr: Dibromofluoromethane	23.6		25.00		94.3	80	120				
Surr: Toluene-d8	24.3		25.00		97.1	80	120				

Sample ID: **lcsd 20 ug/l** SampType: **LCSD** TestCode: **EPA_624AQ** Units: **µg/L** Prep Date: RunNo: **42897**
Client ID: **LCSS02** Batch ID: **R42897** TestNo: **SW8260B** Analysis Date: **2/28/2013** SeqNo: **627298**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1-Trichloroethane	21.5	5.00	20.00	0	107	52	162	23.07	7.23	20	
1,1,2,2-Tetrachloroethane	18.5	5.00	20.00	0	92.3	46	157	18.52	0.324	20	
1,1,2-Trichloroethane	20.1	5.00	20.00	0	101	52	150	20.26	0.793	20	
1,1-Dichloroethane	19.6	5.00	20.00	0	97.9	59	155	20.63	5.22	20	
1,1-Dichloroethene	20.5	5.00	20.00	0	102	1	234	21.92	6.79	20	
1,2-Dichloroethane	21.4	5.00	20.00	0	107	49	155	21.92	2.45	20	
1,2-Dichloropropane	19.3	5.00	20.00	0	96.4	1	210	20.09	4.11	20	
Benzene	19.7	5.00	20.00	0	98.4	37	151	20.57	4.47	20	
Bromodichloromethane	20.7	5.00	20.00	0	103	35	155	20.90	1.11	20	
Bromoform	20.2	5.00	20.00	0	101	45	169	20.52	1.52	20	
Bromomethane	26.7	5.00	20.00	0	133	1	242	29.35	9.57	20	
Carbon tetrachloride	20.8	5.00	20.00	0	104	70	140	22.25	6.74	20	
Chlorobenzene	19.2	5.00	20.00	0	96.2	37	160	20.09	4.32	20	
Chloroethane	18.6	5.00	20.00	0	92.8	14	230	19.98	7.42	20	
Chloroform	18.7	5.00	20.00	0	93.3	51	138	19.39	3.84	20	
Chloromethane	19.2	5.00	20.00	0	96.2	1	273	20.78	7.70	20	
cis-1,3-Dichloropropene	21.3	5.00	20.00	0	107	1	227	22.03	3.18	20	
Dibromochloromethane	20.1	5.00	20.00	0	100	53	149	20.30	1.09	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level	E	Value above quantitation range	H	Holding times for preparation or analys
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	P	Second column confirmation exceeds	R	RPD outside accepted recovery limits
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits		

Precision Analytical, Inc.
4450 Johnston Parkway Unit B
Cleveland, OH 44128
TEL: 216 663 0808 FAX: 216 663 0656
Website: www.precisionanalytical.com

QC SUMMARY REPORT

WO#: **1302637**

26-Mar-13

Client: URS Corp.
Project: Detrex / 13816274

BatchID: **R42897**

Sample ID: **lcsd 20 ug/l** SampType: **LCSD** TestCode: **EPA_624AQ** Units: **µg/L** Prep Date: RunNo: **42897**
Client ID: **LCSS02** Batch ID: **R42897** TestNo: **SW8260B** Analysis Date: **2/28/2013** SeqNo: **627298**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Ethylbenzene	18.9	5.00	20.00	0	94.6	37	162	19.85	4.74	20	
Methylene chloride	19.7	5.00	20.00	0	98.5	1	221	20.60	4.47	20	
Tetrachloroethene	31.5	5.00	20.00	0	158	64	148	30.78	2.38	20	S
Toluene	19.6	5.00	20.00	0	98.0	47	150	20.68	5.31	20	
trans-1,2-Dichloroethene	20.5	5.00	20.00	0	103	54	156	21.68	5.40	20	
trans-1,3-Dichloropropene	20.0	5.00	20.00	0	100	17	183	20.69	3.14	20	
Trichloroethene	21.1	5.00	20.00	0	105	71	157	22.08	4.68	20	
Vinyl chloride	20.5	5.00	20.00	0	102	1	251	21.30	4.02	20	
Surr: 4-Bromofluorobenzene	24.9		25.00		99.7	80	120		0	20	
Surr: Dibromofluoromethane	23.5		25.00		93.8	80	120		0	20	
Surr: Toluene-d8	24.2		25.00		96.9	80	120		0	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level	E	Value above quantitation range	H	Holding times for preparation or analys
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	P	Second column confirmation exceeds	R	RPD outside accepted recovery limits
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits		

PRECISION ANALYTICAL, INC.

4450 JOHNSTON PARKWAY, UNIT B • CLEVELAND, OH 44128
(216) 663-0808 • FAX (216) 663-0656

LABORATORY WORK ORDER # 1302.637

☒ Check if same as Report To

REPORT TO: CONTACT & COMPANY: Martin Schmidt, URS Corporation	INVOICE TO: NAME
ADDRESS: 1375 Euclid Ave, Suite 600	ADDRESS
CITY: Cleveland; STATE: OH; ZIP CODE: 44115	CITY; STATE; ZIP CODE
PHONE NO.: 216-622-2400; FAX NO.: 216-622-2464	PHONE NO.; FAX NO.
EMAIL: Martin.Schmidt@URS.com; PROJECT NAME/NUMBER: Detrex/13816274	PO#; QUOTE #: 1555

Turnaround Time: ☒ Std. **Rush:** ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. Authorizing signature _____

Special Instructions & QC Requirements (additional charge for QC):
also send results to karen.cingel@URS.com and anton.heitger@URS.com

TEMP (°C) 10

VISIBLE ICE (circle) YES NO

Sample Disposal (A fee will be assessed if samples are retained longer than 1 month & disposed of by lab)
☐ *Return To Client* ☒ *Disposal By Lab* ☐ *Archive For* _____ *Months*

ANALYSIS REQUESTED

NO.	CUSTOMER SAMPLE IDENTIFICATION	SAMPLE DATE	SAMPLE TIME	Comp	Grab	NO. OF CONT.	MATRIX LIQ	VOC 8260*	SVOC 8270*	* plus TIC	* Ion Plot Mass Spec to Match Prominent Chemical										
1	RW-17	2/25/13	1610		X	4	~~P~~	X	X				-1								
2	RW-~~18~~ 19	2/25/13	1625		X	4	~~P~~	X	X				-2								
3								~~X~~													
4																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					
13																					

Samplers: (Signature)	Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Relinquished by: (Signature)	Date	Time
[signature]	[signature]	2/26/13	1320	[signature]	[signature]	2/27/13	1035
Received by: (Signature)	**Relinquished by: (Signature)**	**Date**	**Time**	**Received in laboratory by: (Signature)**		**Date**	**Time**
				[signature]		2/27/13	1035

Form 244
Rev#: 1
5/21/10

PRECISION ANALYTICAL, INC.

Sample Receipt Checklist

Work Order No. 1302.637

RUSH: ☐ Yes ☒ No ☐ NA

Date & Time Received: 2/27/13 1035 Received By: CRW

Date & Time Logged In: 2/27/13 1203 Logged In By: CRW

Date & Time Reviewed: 2/28/13 0933 Reviewed By: CRW

Carrier Name: ☒ PAI ☐ UPS ☐ FedEx ☐ Client ☐ Other/Tracking #_____

Samples Analyzed In House? ☒ Yes ☐ No Subbed To _____

Is Chain Of Custody Present? ☒ Yes ☐ No

Is Chain Of Custody Properly Filled Out? ☒ Yes ☐ No

Does Chain Of Custody Match Sample Labels? ☒ Yes ☐ No

Are Samples Past Hold Time? ☐ Yes ☒ No ☐ NA

Are Samples In Proper Containers? ☒ Yes ☐ No Intact? ☒ Yes ☐ No

No. Of Containers? ~~2~~ 8 CRW ☐ Glass ☐ Plastic ~~☒ Baggie~~ CRW ☒ VOA ☐ Micro ☐ Tedlar ☐ Other_____

When Applicable, Is Headspace Present? ☐ Yes ☐ No MSDS Provided ☐ Yes ☐ No

---

Matrix: ☐ Aqueous ☒ Liquid ☐ Sludge ☐ Solid ☐ Oil ☐ Drinking Water ☐ Soil ☐ Gas ☐ Other_____

On Ice? 10 °C ☒ Yes ☐ No ☐ NA

Are Samples Preserved? ☐ Yes ☐ No ☒ NA

pH Results:

Metals_____ Hardness_____ ☐ HN03	CN_____ ☐NaOH

COD_____ NH3_____ Phenol_____ TOC_____ TKN/TON_____ Phos_____ No2No3_____ ☐H2S04

Sulfide_____ ☐ NaOH & ZnAcetate	Other_____

Field Data: ☐ pH ☐ Temp ☐ Flow ☐ TRC ☐ TRC Low ☐ Color ☐ Odor ☐Turbidity ☐ Other_____

Explanation of Comments & Problems:

Precision Analytical, Inc.
4450 Johnston Parkway Unit B
Cleveland, OH 44128
TEL: 216 663 0808 FAX: 216 663 0656
Website: www.precisionanalytical.com

March 26, 2013

Martin Schmidt
URS Corp.
1375 Euclid Avenue
Cleveland, OH 44115
TEL: (216) 622-2400
FAX: (216) 622-2464

RE: Detrex / 13816274 Order No.: 1302705

Dear Martin Schmidt:

Precision Analytical, Inc. received 6 sample(s) on 2/28/2013 for the analyses presented in the following report.

THIS IS A REVISED REPORT

There were no problems with the analytical events associated with this report unless noted in an attached Case Narrative. Quality control data is within laboratory defined or method specified acceptance limits except if noted. Note that sample results reported relate only the samples as received at the laboratory.

Solid samples are reported in ug/Kg or mg/Kg as received, unless specified in the units as dry weight. Unless otherwise noted, results have not been background or blank corrected.

If you have any questions regarding these tests results, please feel free to call.

Certifications: Ohio EPA - 4041; NELAC PA - 68-00434; W.Va DEP - 245

Sincerely,

Cary Mathias
President

Precision Analytical, Inc.
4450 Johnston Parkway Unit B
Cleveland, OH 44128
TEL: 216 663 0808 FAX: 216 663 0656
Website: www.precisionanalytical.com

Case Narrative

WO#: **1302705**
Date: **3/26/2013**

CLIENT: URS Corp.
Project: Detrex / 13816274

Report Revised 26 March 2013
·Units for VOC TCL and SVOC TIC amended; Samples were treated as oils, and waste dilutions were performed. The units were erroneously not updated prior to report generation.
·QC Report amended to report.

Precision Analytical, Inc.
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Cleveland, OH 44128
TEL: 216 663 0808 FAX: 216 663 0656
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Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/28/2013 11:35:00 AM
Project: Detrex / 13816274
Lab ID: 1302705-001
Matrix: PURE PRODUCT
Client Sample ID MW-6

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL SEMI-VOLATILES				**SW8270C**		Analyst: **CS**
SEMI-VOLATILE ORGANIC COMPOUNDS IN OIL						
1,2,4-Trichlorobenzene	360	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
1,2-Dichlorobenzene	704	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
1,3-Dichlorobenzene	10.6	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
1,4-Dichlorobenzene	17.8	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
2,4,5-Trichlorophenol	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
2,4,6-Trichlorophenol	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
2,4-Dichlorophenol	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
2,4-Dimethylphenol	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
2,4-Dinitrophenol	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
2,4-Dinitrotoluene	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
2,6-Dinitrotoluene	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
2-Chloronaphthalene	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
2-Chlorophenol	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
2-Methylnaphthalene	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
2-Methylphenol	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
2-Nitroaniline	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
2-Nitrophenol	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
3,3´-Dichlorobenzidine	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
3-Nitroaniline	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
4,6-Dinitro-2-methylphenol	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
4-Bromophenyl phenyl ether	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
4-Chloro-3-methylphenol	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
4-Chloroaniline	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
4-Chlorophenyl phenyl ether	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
4-Nitroaniline	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
4-Nitrophenol	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Acenaphthene	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Acenaphthylene	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Anthracene	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Benzo (a) anthracene	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Benzo(a)pyrene	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Benzo(b)fluoranthene	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Benzo(g,h,i)perylene	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Benzo(k)fluoranthene	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

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Cleveland, OH 44128
TEL: 216 663 0808 FAX: 216 663 0656
Website: www.precisionanalytical.com

Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/28/2013 11:35:00 AM
Project: Detrex / 13816274
Lab ID: 1302705-001
Matrix: PURE PRODUCT
Client Sample ID MW-6

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL SEMI-VOLATILES				**SW8270C**		Analyst: **CS**
SEMI-VOLATILE ORGANIC COMPOUNDS IN OIL						
Benzoic acid	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Benzyl alcohol	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Bis(2-chloroethoxy)methane	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Bis(2-chloroethyl) ether	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Bis(2-chloroisopropyl) ether	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Bis(2-ethylhexyl) phthalate	88.4	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Butyl benzyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Chrysene	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Dibenz(a,h)anthracene	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Dibenzofuran	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Diethyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Dimethyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Di-n-butyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Di-n-octyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Fluoranthene	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Fluorene	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Hexachlorobenzene	6,930	200		mg/Kg	40	3/12/2013 9:29:00 PM
Hexachlorobutadiene	23,000	200		mg/Kg	40	3/12/2013 9:29:00 PM
Hexachlorocyclopentadiene	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Hexachloroethane	30,200	200		mg/Kg	40	3/12/2013 9:29:00 PM
Indeno(1,2,3-cd)pyrene	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Isophorone	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
m&p-cresols (3&4-methylphenols)	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Naphthalene	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Nitrobenzene	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
N-Nitrosodi-n-propylamine	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
N-Nitrosodiphenylamine	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Pentachlorophenol	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Phenanthrene	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Phenol	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Pyrene	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Pyridine	ND	5.00		mg/Kg	1	3/13/2013 2:13:00 AM
Surr: 2,4,6-Tribromophenol	85.4	40-150		%REC	1	3/13/2013 2:13:00 AM
Surr: 2-Fluorobiphenyl	87.7	40-150		%REC	1	3/13/2013 2:13:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

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Website: www.precisionanalytical.com

Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Project: Detrex / 13816274
Lab ID: 1302705-001
Client Sample ID MW-6

Collection Date: 2/28/2013 11:35:00 AM
Matrix: PURE PRODUCT

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL SEMI-VOLATILES				**SW8270C**		Analyst: **CS**
SEMI-VOLATILE ORGANIC COMPOUNDS IN OIL						
Surr: 2-Fluorophenol	103	40-150		%REC	1	3/13/2013 2:13:00 AM
Surr: Nitrobenzene-d5	87.0	40-150		%REC	1	3/13/2013 2:13:00 AM
Surr: Phenol-d6	107	40-150		%REC	1	3/13/2013 2:13:00 AM
Surr: Terphenyl-d14	95.3	40-150		%REC	1	3/13/2013 2:13:00 AM
SVOC TENTATIVELY IDENTIFIED COMPOUNDS				**SVOC-TIC**		Analyst: **CS**
SVOC-TICS	ND	0		mg/Kg	40	3/13/2013
TIC: 1,2,4,5-Tetrachlorobenzene	6,540		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,2,4,4-pentachloro- [A]	5,220		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,2,4,4-pentachloro- [B]	12,800		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,2,4,4-pentachloro- [C]	19,300		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,2,4,4-pentachloro- [D]	71,100		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- [A]	6,500		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- [B]	29,900		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- [C]	41,600		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- [D]	54,400		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,4,4-tetrachloro-	138,000		N	mg/Kg	40	3/13/2013
TIC: Ethane, 1,1,2,2-tetrachloro-	3,970		N	mg/Kg	40	3/13/2013
TIC: Pentachlorobenzene	2,630		N	mg/Kg	40	3/13/2013
TIC: Pentachloroethane	12,300		N	mg/Kg	40	3/13/2013
TIC: Tetrachloroethylene	132,000		N	mg/Kg	40	3/13/2013
TIC: Trichloroethylene	383,000		N	mg/Kg	40	3/13/2013
TIC: Unknown 01	4,480			mg/Kg	40	3/13/2013
TIC: Unknown 02	16,900			mg/Kg	40	3/13/2013
TIC: Unknown 03	20,800			mg/Kg	40	3/13/2013
TIC: Unknown 04	17,500			mg/Kg	40	3/13/2013

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

Precision Analytical, Inc.
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Website: www.precisionanalytical.com

Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/28/2013 11:35:00 AM
Project: Detrex / 13816274
Lab ID: 1302705-001
Matrix: PURE PRODUCT
Client Sample ID MW-6

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SVOC TENTATIVELY IDENTIFIED COMPOUNDS				**SVOC-TIC**		Analyst: **CS**
TIC: Unknown 05	5,080			mg/Kg	40	3/13/2013
TIC: Unknown 06	90,000			mg/Kg	40	3/13/2013
TIC: Unknown 07	2,670			mg/Kg	40	3/13/2013
TIC: Unknown 08	32,700			mg/Kg	40	3/13/2013
TIC: Unknown 09	4,600			mg/Kg	40	3/13/2013
TIC: Unknown 10	23,400			mg/Kg	40	3/13/2013
TCL VOC VOLATILE ORGANIC COMPOUNDS				**SW8260B**		Analyst: **AC**
1,1,1-Trichloroethane	ND	1,400,000		µg/Kg	1	3/1/2013 9:43:00 AM
1,1,2,2-Tetrachloroethane	2,550,000	1,400,000		µg/Kg	1	3/1/2013 9:43:00 AM
1,1,2-Trichloroethane	ND	1,400,000		µg/Kg	1	3/1/2013 9:43:00 AM
1,1-Dichloroethane	ND	1,400,000		µg/Kg	1	3/1/2013 9:43:00 AM
1,1-Dichloroethene	ND	1,400,000		µg/Kg	1	3/1/2013 9:43:00 AM
1,2-Dichloroethane	ND	1,400,000		µg/Kg	1	3/1/2013 9:43:00 AM
1,2-Dichloropropane	ND	1,400,000		µg/Kg	1	3/1/2013 9:43:00 AM
2-Hexanone	ND	2,810,000		µg/Kg	1	3/1/2013 9:43:00 AM
4-Methyl-2-pentanone	ND	5,620,000		µg/Kg	1	3/1/2013 9:43:00 AM
Acetone	ND	14,000,000		µg/Kg	1	3/1/2013 9:43:00 AM
Benzene	ND	1,400,000		µg/Kg	1	3/1/2013 9:43:00 AM
Bromodichloromethane	ND	1,400,000		µg/Kg	1	3/1/2013 9:43:00 AM
Bromoform	ND	1,400,000		µg/Kg	1	3/1/2013 9:43:00 AM
Bromomethane	ND	1,400,000		µg/Kg	1	3/1/2013 9:43:00 AM
Carbon disulfide	ND	1,400,000		µg/Kg	1	3/1/2013 9:43:00 AM
Carbon tetrachloride	ND	1,400,000		µg/Kg	1	3/1/2013 9:43:00 AM
Chlorobenzene	ND	1,400,000		µg/Kg	1	3/1/2013 9:43:00 AM
Chloroethane	ND	2,810,000		µg/Kg	1	3/1/2013 9:43:00 AM
Chloroform	ND	1,400,000		µg/Kg	1	3/1/2013 9:43:00 AM
Chloromethane	ND	1,400,000		µg/Kg	1	3/1/2013 9:43:00 AM
cis-1,2-Dichloroethene	ND	1,400,000		µg/Kg	1	3/1/2013 9:43:00 AM
cis-1,3-Dichloropropene	ND	1,400,000		µg/Kg	1	3/1/2013 9:43:00 AM
Dibromochloromethane	ND	1,400,000		µg/Kg	1	3/1/2013 9:43:00 AM
Ethylbenzene	ND	1,400,000		µg/Kg	1	3/1/2013 9:43:00 AM
m,p-Xylene	ND	1,400,000		µg/Kg	1	3/1/2013 9:43:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

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Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/28/2013 11:35:00 AM
Project: Detrex / 13816274
Lab ID: 1302705-001
Matrix: PURE PRODUCT
Client Sample ID MW-6

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL VOC				**SW8260B**		Analyst: **AC**
VOLATILE ORGANIC COMPOUNDS						
Methyl ethyl ketone	ND	14,000,000		µg/Kg	1	3/1/2013 9:43:00 AM
Methylene chloride	ND	2,810,000		µg/Kg	1	3/1/2013 9:43:00 AM
o-Xylene	ND	1,400,000		µg/Kg	1	3/1/2013 9:43:00 AM
Styrene	ND	5,620,000		µg/Kg	1	3/1/2013 9:43:00 AM
Tetrachloroethene	28,100,000	1,400,000		µg/Kg	1	3/1/2013 9:43:00 AM
Toluene	ND	1,400,000		µg/Kg	1	3/1/2013 9:43:00 AM
trans-1,2-Dichloroethene	ND	2,810,000		µg/Kg	1	3/1/2013 9:43:00 AM
trans-1,3-Dichloropropene	ND	1,400,000		µg/Kg	1	3/1/2013 9:43:00 AM
Trichloroethene	298,000,000	18,200,000		µg/Kg	1	3/1/2013 1:43:00 PM
Vinyl acetate	ND	2,810,000		µg/Kg	1	3/1/2013 9:43:00 AM
Vinyl chloride	ND	1,400,000		µg/Kg	1	3/1/2013 9:43:00 AM
Surr: 4-Bromofluorobenzene	82.8	80-120		%REC	1	3/1/2013 9:43:00 AM
Surr: Dibromofluoromethane	102	80-120		%REC	1	3/1/2013 9:43:00 AM
Surr: Toluene-d8	93.0	80-120		%REC	1	3/1/2013 9:43:00 AM

NOTES:
* The reporting limits were raised because the sample extract required a waste dilution.
The sample required a methanol extraction.

VOC TENTATIVELY IDENTIFIED COMPOUNDS				**VOC-TIC**		Analyst: **AC**
VOC-TICS	ND	0		µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- (A)	3,190,000		N	µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- (B)	2,770,000		N	µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- [C]	6,880,000		N	µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, pentachloro- (A	1,990,000		N	µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, pentachloro- (B	4,630,000		N	µg/Kg	1	3/1/2013
TIC: Hexachlorobutadiene	3,140,000		N	µg/Kg	1	3/1/2013
TIC: Hexachloroethane	1,900,000		N	µg/Kg	1	3/1/2013
TIC: Unknown 01	8,300,000			µg/Kg	1	3/1/2013

Qualifiers:

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DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

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Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/28/2013 11:35:00 AM
Project: Detrex / 13816274
Lab ID: 1302705-001
Matrix: PURE PRODUCT
Client Sample ID MW-6

Analyses	Result	RL	Qual	Units	DF	Date Analyzed

VOC TENTATIVELY IDENTIFIED COMPOUNDS **VOC-TIC** Analyst: **AC**

NOTES:
* Insufficient data for tentative identification. Laboratory protocol requires a library match of 70+% certainty for a unknown TIC analyte to be considered positively identified.
* The reporting limits were raised because the sample extract required a waste dilution.

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
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Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/28/2013 10:50:00 AM
Project: Detrex / 13816274
Lab ID: 1302705-002
Matrix: PURE PRODUCT
Client Sample ID MW-9

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL SEMI-VOLATILES				**SW8270C**		Analyst: **CS**
SEMI-VOLATILE ORGANIC COMPOUNDS IN OIL						
1,2,4-Trichlorobenzene	626	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
1,2-Dichlorobenzene	882	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
1,3-Dichlorobenzene	14.7	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
1,4-Dichlorobenzene	27.8	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
2,4,5-Trichlorophenol	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
2,4,6-Trichlorophenol	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
2,4-Dichlorophenol	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
2,4-Dimethylphenol	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
2,4-Dinitrophenol	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
2,4-Dinitrotoluene	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
2,6-Dinitrotoluene	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
2-Chloronaphthalene	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
2-Chlorophenol	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
2-Methylnaphthalene	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
2-Methylphenol	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
2-Nitroaniline	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
2-Nitrophenol	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
3,3´-Dichlorobenzidine	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
3-Nitroaniline	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
4,6-Dinitro-2-methylphenol	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
4-Bromophenyl phenyl ether	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
4-Chloro-3-methylphenol	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
4-Chloroaniline	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
4-Chlorophenyl phenyl ether	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
4-Nitroaniline	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
4-Nitrophenol	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Acenaphthene	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Acenaphthylene	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Anthracene	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Benzo (a) anthracene	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Benzo(a)pyrene	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Benzo(b)fluoranthene	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Benzo(g,h,i)perylene	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Benzo(k)fluoranthene	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
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Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Project: Detrex / 13816274
Lab ID: 1302705-002
Client Sample ID MW-9

Collection Date: 2/28/2013 10:50:00 AM
Matrix: PURE PRODUCT

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL SEMI-VOLATILES				**SW8270C**		Analyst: **CS**
SEMI-VOLATILE ORGANIC COMPOUNDS IN OIL						
Benzoic acid	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Benzyl alcohol	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Bis(2-chloroethoxy)methane	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Bis(2-chloroethyl) ether	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Bis(2-chloroisopropyl) ether	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Bis(2-ethylhexyl) phthalate	82.0	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Butyl benzyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Chrysene	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Dibenz(a,h)anthracene	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Dibenzofuran	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Diethyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Dimethyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Di-n-butyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Di-n-octyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Fluoranthene	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Fluorene	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Hexachlorobenzene	10,400	200		mg/Kg	40	3/12/2013 10:04:00 PM
Hexachlorobutadiene	52,900	200		mg/Kg	40	3/12/2013 10:04:00 PM
Hexachlorocyclopentadiene	193	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Hexachloroethane	20,200	200		mg/Kg	40	3/12/2013 10:04:00 PM
Indeno(1,2,3-cd)pyrene	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Isophorone	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
m&p-cresols (3&4-methylphenols)	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Naphthalene	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Nitrobenzene	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
N-Nitrosodi-n-propylamine	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
N-Nitrosodiphenylamine	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Pentachlorophenol	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Phenanthrene	48.4	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Phenol	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Pyrene	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Pyridine	ND	5.00		mg/Kg	1	3/13/2013 2:48:00 AM
Surr: 2,4,6-Tribromophenol	88.2	40-150		%REC	1	3/13/2013 2:48:00 AM
Surr: 2-Fluorobiphenyl	93.3	40-150		%REC	1	3/13/2013 2:48:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
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RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

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Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/28/2013 10:50:00 AM
Project: Detrex / 13816274
Lab ID: 1302705-002
Matrix: PURE PRODUCT
Client Sample ID MW-9

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL SEMI-VOLATILES				**SW8270C**		Analyst: **CS**
SEMI-VOLATILE ORGANIC COMPOUNDS IN OIL						
Surr: 2-Fluorophenol	105	40-150		%REC	1	3/13/2013 2:48:00 AM
Surr: Nitrobenzene-d5	92.4	40-150		%REC	1	3/13/2013 2:48:00 AM
Surr: Phenol-d6	109	40-150		%REC	1	3/13/2013 2:48:00 AM
Surr: Terphenyl-d14	101	40-150		%REC	1	3/13/2013 2:48:00 AM
SVOC TENTATIVELY IDENTIFIED COMPOUNDS				**SVOC-TIC**		Analyst: **CS**
SVOC-TICS	ND	0		mg/Kg	40	3/13/2013
TIC: 1,2,4,5-Tetrachlorobenzene	223,000		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,2,4,4-pentachloro- [A]	18,900		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,2,4,4-pentachloro- [B]	28,000		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,2,4,4-pentachloro- [C]	110,000		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- [A]	22,700		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- [B]	53,500		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- [C]	96,900		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,4,4-tetrachloro- [A]	510,000		EN	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,4,4-tetrachloro- [B]	74,200		N	mg/Kg	40	3/13/2013
TIC: Docosane	464			mg/Kg	40	3/13/2013
TIC: N-Hexadecane	728		N	mg/Kg	40	3/13/2013
TIC: Pentachlorobenzene	170,000		N	mg/Kg	40	3/13/2013
TIC: Pentachloroethane	5,280		N	mg/Kg	40	3/13/2013
TIC: Tetrachloroethylene	21,800		N	mg/Kg	40	3/13/2013
TIC: Trichloroethylene	48,800		N	mg/Kg	40	3/13/2013
TIC: Unknown 01	7,840			mg/Kg	40	3/13/2013
TIC: Unknown 02	34,200			mg/Kg	40	3/13/2013
TIC: Unknown 03	17,400			mg/Kg	40	3/13/2013
TIC: Unknown 04	4,840			mg/Kg	40	3/13/2013
TIC: Unknown 05	10,800			mg/Kg	40	3/13/2013

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

Precision Analytical, Inc.
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Cleveland, OH 44128
TEL: 216 663 0808 FAX: 216 663 0656
Website: www.precisionanalytical.com

Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Project: Detrex / 13816274
Lab ID: 1302705-002
Client Sample ID MW-9

Collection Date: 2/28/2013 10:50:00 AM
Matrix: PURE PRODUCT

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SVOC TENTATIVELY IDENTIFIED COMPOUNDS				**SVOC-TIC**		Analyst: **CS**
TIC: Unknown 06	13,300			mg/Kg	40	3/13/2013
TIC: Unknown 07	62,900			mg/Kg	40	3/13/2013
TIC: Unknown 08	23,800			mg/Kg	40	3/13/2013
TIC: Unknown 09	3,370			mg/Kg	40	3/13/2013
TIC: Unknown 10	8,380			mg/Kg	40	3/13/2013
TCL VOC VOLATILE ORGANIC COMPOUNDS				**SW8260B**		Analyst: **AC**
1,1,1-Trichloroethane	ND	1,400,000		µg/Kg	1	3/1/2013 10:09:00 AM
1,1,2,2-Tetrachloroethane	2,430,000	1,400,000		µg/Kg	1	3/1/2013 10:09:00 AM
1,1,2-Trichloroethane	ND	1,400,000		µg/Kg	1	3/1/2013 10:09:00 AM
1,1-Dichloroethane	ND	1,400,000		µg/Kg	1	3/1/2013 10:09:00 AM
1,1-Dichloroethene	ND	1,400,000		µg/Kg	1	3/1/2013 10:09:00 AM
1,2-Dichloroethane	ND	1,400,000		µg/Kg	1	3/1/2013 10:09:00 AM
1,2-Dichloropropane	ND	1,400,000		µg/Kg	1	3/1/2013 10:09:00 AM
2-Hexanone	ND	2,800,000		µg/Kg	1	3/1/2013 10:09:00 AM
4-Methyl-2-pentanone	ND	5,600,000		µg/Kg	1	3/1/2013 10:09:00 AM
Acetone	ND	14,000,000		µg/Kg	1	3/1/2013 10:09:00 AM
Benzene	ND	1,400,000		µg/Kg	1	3/1/2013 10:09:00 AM
Bromodichloromethane	ND	1,400,000		µg/Kg	1	3/1/2013 10:09:00 AM
Bromoform	ND	1,400,000		µg/Kg	1	3/1/2013 10:09:00 AM
Bromomethane	ND	1,400,000		µg/Kg	1	3/1/2013 10:09:00 AM
Carbon disulfide	ND	1,400,000		µg/Kg	1	3/1/2013 10:09:00 AM
Carbon tetrachloride	ND	1,400,000		µg/Kg	1	3/1/2013 10:09:00 AM
Chlorobenzene	ND	1,400,000		µg/Kg	1	3/1/2013 10:09:00 AM
Chloroethane	ND	2,800,000		µg/Kg	1	3/1/2013 10:09:00 AM
Chloroform	ND	1,400,000		µg/Kg	1	3/1/2013 10:09:00 AM
Chloromethane	ND	1,400,000		µg/Kg	1	3/1/2013 10:09:00 AM
cis-1,2-Dichloroethene	ND	1,400,000		µg/Kg	1	3/1/2013 10:09:00 AM
cis-1,3-Dichloropropene	ND	1,400,000		µg/Kg	1	3/1/2013 10:09:00 AM
Dibromochloromethane	ND	1,400,000		µg/Kg	1	3/1/2013 10:09:00 AM
Ethylbenzene	ND	1,400,000		µg/Kg	1	3/1/2013 10:09:00 AM
m,p-Xylene	ND	1,400,000		µg/Kg	1	3/1/2013 10:09:00 AM
Methyl ethyl ketone	ND	14,000,000		µg/Kg	1	3/1/2013 10:09:00 AM

Qualifiers:

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DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

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Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/28/2013 10:50:00 AM
Project: Detrex / 13816274
Lab ID: 1302705-002
Matrix: PURE PRODUCT
Client Sample ID MW-9

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL VOC				**SW8260B**		Analyst: **AC**
VOLATILE ORGANIC COMPOUNDS						
Methylene chloride	ND	2,800,000		µg/Kg	1	3/1/2013 10:09:00 AM
o-Xylene	ND	1,400,000		µg/Kg	1	3/1/2013 10:09:00 AM
Styrene	ND	5,600,000		µg/Kg	1	3/1/2013 10:09:00 AM
Tetrachloroethene	4,720,000	1,400,000		µg/Kg	1	3/1/2013 10:09:00 AM
Toluene	ND	1,400,000		µg/Kg	1	3/1/2013 10:09:00 AM
trans-1,2-Dichloroethene	ND	2,800,000		µg/Kg	1	3/1/2013 10:09:00 AM
trans-1,3-Dichloropropene	ND	1,400,000		µg/Kg	1	3/1/2013 10:09:00 AM
Trichloroethene	35,800,000	3,500,000		µg/Kg	1	3/1/2013 12:55:00 PM
Vinyl acetate	ND	2,800,000		µg/Kg	1	3/1/2013 10:09:00 AM
Vinyl chloride	ND	1,400,000		µg/Kg	1	3/1/2013 10:09:00 AM
Surr: 4-Bromofluorobenzene	85.7	80-120		%REC	1	3/1/2013 10:09:00 AM
Surr: Dibromofluoromethane	106	80-120		%REC	1	3/1/2013 10:09:00 AM
Surr: Toluene-d8	95.6	80-120		%REC	1	3/1/2013 10:09:00 AM

NOTES:
* The reporting limits were raised because the sample extract required a waste dilution.
The sample required a methanol extraction.

VOC TENTATIVELY IDENTIFIED COMPOUNDS				**VOC-TIC**		Analyst: **AC**
VOC-TICS	ND	0		µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- (A)	1,220,000		N	µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- (B)	1,690,000		N	µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- (D)	5,480,000		N	µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- (E)	5,400,000		N	µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- (F)	13,700,000		N	µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- [C]	6,640,000		N	µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, pentachloro-	8,730,000		N	µg/Kg	1	3/1/2013
TIC: Hexachlorobutadiene	7,630,000		N	µg/Kg	1	3/1/2013
TIC: Hexachloroethane	1,590,000		N	µg/Kg	1	3/1/2013
TIC: Unknown 01	493,000			µg/Kg	1	3/1/2013

Qualifiers:

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DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
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MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

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Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/28/2013 10:50:00 AM
Project: Detrex / 13816274
Lab ID: 1302705-002
Matrix: PURE PRODUCT
Client Sample ID MW-9

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
VOC TENTATIVELY IDENTIFIED COMPOUNDS				**VOC-TIC**		Analyst: **AC**
TIC: Unknown 02	768,000			µg/Kg	1	3/1/2013
TIC: Unknown 03	32,100,000			µg/Kg	1	3/1/2013
TIC: Unknown 04	4,460,000			µg/Kg	1	3/1/2013
TIC: Unknown 05	684,000			µg/Kg	1	3/1/2013
TIC: Unknown 06	818,000			µg/Kg	1	3/1/2013

NOTES:

* Insufficient data for tentative identification. Laboratory protocol requires a library match of 70+% certainty for a unknown TIC analyte to be considered positively identified.

* The reporting limits were raised because the sample extract required a waste dilution.

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
	DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
	MDL	Method Detection Limit	N	Tentatively identified compounds
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Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/28/2013 11:00:00 AM
Project: Detrex / 13816274
Lab ID: 1302705-003
Matrix: PURE PRODUCT
Client Sample ID MW-10

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL SEMI-VOLATILES				**SW8270C**		Analyst: **CS**
SEMI-VOLATILE ORGANIC COMPOUNDS IN OIL						
1,2,4-Trichlorobenzene	700	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
1,2-Dichlorobenzene	275	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
1,3-Dichlorobenzene	14.5	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
1,4-Dichlorobenzene	19.3	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
2,4,5-Trichlorophenol	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
2,4,6-Trichlorophenol	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
2,4-Dichlorophenol	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
2,4-Dimethylphenol	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
2,4-Dinitrophenol	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
2,4-Dinitrotoluene	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
2,6-Dinitrotoluene	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
2-Chloronaphthalene	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
2-Chlorophenol	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
2-Methylnaphthalene	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
2-Methylphenol	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
2-Nitroaniline	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
2-Nitrophenol	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
3,3´-Dichlorobenzidine	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
3-Nitroaniline	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
4,6-Dinitro-2-methylphenol	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
4-Bromophenyl phenyl ether	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
4-Chloro-3-methylphenol	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
4-Chloroaniline	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
4-Chlorophenyl phenyl ether	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
4-Nitroaniline	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
4-Nitrophenol	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Acenaphthene	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Acenaphthylene	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Anthracene	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Benzo (a) anthracene	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Benzo(a)pyrene	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Benzo(b)fluoranthene	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Benzo(g,h,i)perylene	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Benzo(k)fluoranthene	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
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Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/28/2013 11:00:00 AM
Project: Detrex / 13816274
Lab ID: 1302705-003
Matrix: PURE PRODUCT
Client Sample ID MW-10

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL SEMI-VOLATILES				**SW8270C**		Analyst: **CS**
SEMI-VOLATILE ORGANIC COMPOUNDS IN OIL						
Benzoic acid	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Benzyl alcohol	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Bis(2-chloroethoxy)methane	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Bis(2-chloroethyl) ether	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Bis(2-chloroisopropyl) ether	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Bis(2-ethylhexyl) phthalate	29.6	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Butyl benzyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Chrysene	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Dibenz(a,h)anthracene	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Dibenzofuran	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Diethyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Dimethyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Di-n-butyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Di-n-octyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Fluoranthene	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Fluorene	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Hexachlorobenzene	12,400	200		mg/Kg	40	3/12/2013 10:40:00 PM
Hexachlorobutadiene	67,800	200		mg/Kg	40	3/12/2013 10:40:00 PM
Hexachlorocyclopentadiene	209	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Hexachloroethane	27,800	200		mg/Kg	40	3/12/2013 10:40:00 PM
Indeno(1,2,3-cd)pyrene	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Isophorone	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
m&p-cresols (3&4-methylphenols)	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Naphthalene	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Nitrobenzene	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
N-Nitrosodi-n-propylamine	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
N-Nitrosodiphenylamine	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Pentachlorophenol	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Phenanthrene	15.0	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Phenol	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Pyrene	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Pyridine	ND	5.00		mg/Kg	1	3/13/2013 3:23:00 AM
Surr: 2,4,6-Tribromophenol	86.5	40-150		%REC	1	3/13/2013 3:23:00 AM
Surr: 2-Fluorobiphenyl	103	40-150		%REC	1	3/13/2013 3:23:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

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Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/28/2013 11:00:00 AM
Project: Detrex / 13816274
Lab ID: 1302705-003
Matrix: PURE PRODUCT
Client Sample ID MW-10

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL SEMI-VOLATILES				**SW8270C**		Analyst: **CS**
SEMI-VOLATILE ORGANIC COMPOUNDS IN OIL						
Surr: 2-Fluorophenol	104	40-150		%REC	1	3/13/2013 3:23:00 AM
Surr: Nitrobenzene-d5	88.2	40-150		%REC	1	3/13/2013 3:23:00 AM
Surr: Phenol-d6	110	40-150		%REC	1	3/13/2013 3:23:00 AM
Surr: Terphenyl-d14	102	40-150		%REC	1	3/13/2013 3:23:00 AM
SVOC TENTATIVELY IDENTIFIED COMPOUNDS				**SVOC-TIC**		Analyst: **CS**
SVOC-TICS	ND	0		mg/Kg	40	3/13/2013
TIC: 1,2,4,5-Tetrachlorobenzene	9,090		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,2,4,4-pentachloro- [A]	8,900		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,2,4,4-pentachloro- [B]	22,600		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,2,4,4-pentachloro- [C]	29,200		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,2,4,4-pentachloro- [D]	130,000		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- [A]	19,500		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- [B]	63,600		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- [C]	106,000		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,4,4-tetrachloro- [A]	14,900		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,4,4-tetrachloro- [B]	619,000		EN	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,4,4-tetrachloro- [C]	93,000		N	mg/Kg	40	3/13/2013
TIC: Pentachlorobenzene	5,030		N	mg/Kg	40	3/13/2013
TIC: Tetrachloroethylene	36,800		N	mg/Kg	40	3/13/2013
TIC: Trichloroethylene	52,000		N	mg/Kg	40	3/13/2013
TIC: Unknown 01	42,700			mg/Kg	40	3/13/2013
TIC: Unknown 02	6,940			mg/Kg	40	3/13/2013
TIC: Unknown 03	4,730			mg/Kg	40	3/13/2013

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
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RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

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Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Project: Detrex / 13816274
Lab ID: 1302705-003
Client Sample ID MW-10

Collection Date: 2/28/2013 11:00:00 AM
Matrix: PURE PRODUCT

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL VOC				**SW8260B**		Analyst: **AC**
VOLATILE ORGANIC COMPOUNDS						
1,1,1-Trichloroethane	ND	1,560,000		µg/Kg	1	3/1/2013 10:32:00 AM
1,1,2,2-Tetrachloroethane	ND	1,560,000		µg/Kg	1	3/1/2013 10:32:00 AM
1,1,2-Trichloroethane	ND	1,560,000		µg/Kg	1	3/1/2013 10:32:00 AM
1,1-Dichloroethane	ND	1,560,000		µg/Kg	1	3/1/2013 10:32:00 AM
1,1-Dichloroethene	ND	1,560,000		µg/Kg	1	3/1/2013 10:32:00 AM
1,2-Dichloroethane	ND	1,560,000		µg/Kg	1	3/1/2013 10:32:00 AM
1,2-Dichloropropane	ND	1,560,000		µg/Kg	1	3/1/2013 10:32:00 AM
2-Hexanone	ND	3,110,000		µg/Kg	1	3/1/2013 10:32:00 AM
4-Methyl-2-pentanone	ND	6,230,000		µg/Kg	1	3/1/2013 10:32:00 AM
Acetone	ND	15,600,000		µg/Kg	1	3/1/2013 10:32:00 AM
Benzene	ND	1,560,000		µg/Kg	1	3/1/2013 10:32:00 AM
Bromodichloromethane	ND	1,560,000		µg/Kg	1	3/1/2013 10:32:00 AM
Bromoform	ND	1,560,000		µg/Kg	1	3/1/2013 10:32:00 AM
Bromomethane	ND	1,560,000		µg/Kg	1	3/1/2013 10:32:00 AM
Carbon disulfide	ND	1,560,000		µg/Kg	1	3/1/2013 10:32:00 AM
Carbon tetrachloride	ND	1,560,000		µg/Kg	1	3/1/2013 10:32:00 AM
Chlorobenzene	ND	1,560,000		µg/Kg	1	3/1/2013 10:32:00 AM
Chloroethane	ND	3,110,000		µg/Kg	1	3/1/2013 10:32:00 AM
Chloroform	ND	1,560,000		µg/Kg	1	3/1/2013 10:32:00 AM
Chloromethane	ND	1,560,000		µg/Kg	1	3/1/2013 10:32:00 AM
cis-1,2-Dichloroethene	ND	1,560,000		µg/Kg	1	3/1/2013 10:32:00 AM
cis-1,3-Dichloropropene	ND	1,560,000		µg/Kg	1	3/1/2013 10:32:00 AM
Dibromochloromethane	ND	1,560,000		µg/Kg	1	3/1/2013 10:32:00 AM
Ethylbenzene	ND	1,560,000		µg/Kg	1	3/1/2013 10:32:00 AM
m,p-Xylene	ND	1,560,000		µg/Kg	1	3/1/2013 10:32:00 AM
Methyl ethyl ketone	ND	15,600,000		µg/Kg	1	3/1/2013 10:32:00 AM
Methylene chloride	ND	3,110,000		µg/Kg	1	3/1/2013 10:32:00 AM
o-Xylene	ND	1,560,000		µg/Kg	1	3/1/2013 10:32:00 AM
Styrene	ND	6,230,000		µg/Kg	1	3/1/2013 10:32:00 AM
Tetrachloroethene	10,700,000	1,560,000		µg/Kg	1	3/1/2013 10:32:00 AM
Toluene	ND	1,560,000		µg/Kg	1	3/1/2013 10:32:00 AM
trans-1,2-Dichloroethene	ND	3,110,000		µg/Kg	1	3/1/2013 10:32:00 AM
trans-1,3-Dichloropropene	ND	1,560,000		µg/Kg	1	3/1/2013 10:32:00 AM
Trichloroethene	40,200,000	3,890,000		µg/Kg	1	3/1/2013 1:19:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

Precision Analytical, Inc.
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Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/28/2013 11:00:00 AM
Project: Detrex / 13816274
Lab ID: 1302705-003
Matrix: PURE PRODUCT
Client Sample ID MW-10

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL VOC				**SW8260B**		Analyst: **AC**
VOLATILE ORGANIC COMPOUNDS						
Vinyl acetate	ND	3,110,000		µg/Kg	1	3/1/2013 10:32:00 AM
Vinyl chloride	ND	1,560,000		µg/Kg	1	3/1/2013 10:32:00 AM
Surr: 4-Bromofluorobenzene	85.2	80-120		%REC	1	3/1/2013 10:32:00 AM
Surr: Dibromofluoromethane	108	80-120		%REC	1	3/1/2013 10:32:00 AM
Surr: Toluene-d8	95.6	80-120		%REC	1	3/1/2013 10:32:00 AM

NOTES:
* The reporting limits were raised because the sample extract required a waste dilution.
The sample required a methanol extraction.

VOC TENTATIVELY IDENTIFIED COMPOUNDS				**VOC-TIC**		Analyst: **AC**
VOC-TICS	ND	0		µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- (A)	9,240,000		N	µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- (B)	1,820,000		N	µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- (D)	6,710,000		N	µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- (E)	6,240,000		N	µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- (F)	16,400,000		N	µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- [C]	1,510,000		N	µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, pentachloro-	5,780,000		N	µg/Kg	1	3/1/2013
TIC: Hexachlorobutadiene	8,400,000		N	µg/Kg	1	3/1/2013
TIC: Hexachloroethane	1,860,000		N	µg/Kg	1	3/1/2013
TIC: Unknown 01	1,710,000			µg/Kg	1	3/1/2013
TIC: Unknown 02	34,600,000			µg/Kg	1	3/1/2013
TIC: Unknown 03	427,000			µg/Kg	1	3/1/2013

NOTES:
* Insufficient data for tentative identification. Laboratory protocol requires a library match of 70+% certainty for a unknown TIC analyte to be considered positively identified.
* The reporting limits were raised because the sample extract required a waste dilution.

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

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Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/28/2013 1:10:00 PM
Project: Detrex / 13816274
Lab ID: 1302705-004
Matrix: PURE PRODUCT
Client Sample ID MW-8

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL SEMI-VOLATILES				**SW8270C**		Analyst: **CS**
SEMI-VOLATILE ORGANIC COMPOUNDS IN OIL						
1,2,4-Trichlorobenzene	623	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
1,2-Dichlorobenzene	336	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
1,3-Dichlorobenzene	13.7	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
1,4-Dichlorobenzene	18.5	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
2,4,5-Trichlorophenol	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
2,4,6-Trichlorophenol	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
2,4-Dichlorophenol	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
2,4-Dimethylphenol	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
2,4-Dinitrophenol	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
2,4-Dinitrotoluene	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
2,6-Dinitrotoluene	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
2-Chloronaphthalene	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
2-Chlorophenol	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
2-Methylnaphthalene	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
2-Methylphenol	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
2-Nitroaniline	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
2-Nitrophenol	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
3,3´-Dichlorobenzidine	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
3-Nitroaniline	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
4,6-Dinitro-2-methylphenol	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
4-Bromophenyl phenyl ether	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
4-Chloro-3-methylphenol	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
4-Chloroaniline	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
4-Chlorophenyl phenyl ether	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
4-Nitroaniline	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
4-Nitrophenol	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Acenaphthene	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Acenaphthylene	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Anthracene	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Benzo (a) anthracene	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Benzo(a)pyrene	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Benzo(b)fluoranthene	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Benzo(g,h,i)perylene	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Benzo(k)fluoranthene	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

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Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/28/2013 1:10:00 PM
Project: Detrex / 13816274
Lab ID: 1302705-004
Matrix: PURE PRODUCT
Client Sample ID MW-8

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL SEMI-VOLATILES				**SW8270C**		Analyst: **CS**
SEMI-VOLATILE ORGANIC COMPOUNDS IN OIL						
Benzoic acid	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Benzyl alcohol	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Bis(2-chloroethoxy)methane	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Bis(2-chloroethyl) ether	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Bis(2-chloroisopropyl) ether	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Bis(2-ethylhexyl) phthalate	40.3	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Butyl benzyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Chrysene	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Dibenz(a,h)anthracene	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Dibenzofuran	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Diethyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Dimethyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Di-n-butyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Di-n-octyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Fluoranthene	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Fluorene	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Hexachlorobenzene	9,050	200		mg/Kg	40	3/12/2013 11:15:00 PM
Hexachlorobutadiene	37,200	200		mg/Kg	40	3/12/2013 11:15:00 PM
Hexachlorocyclopentadiene	195	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Hexachloroethane	27,200	200		mg/Kg	40	3/12/2013 11:15:00 PM
Indeno(1,2,3-cd)pyrene	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Isophorone	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
m&p-cresols (3&4-methylphenols)	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Naphthalene	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Nitrobenzene	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
N-Nitrosodi-n-propylamine	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
N-Nitrosodiphenylamine	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Pentachlorophenol	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Phenanthrene	10.8	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Phenol	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Pyrene	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Pyridine	ND	5.00		mg/Kg	1	3/13/2013 3:59:00 AM
Surr: 2,4,6-Tribromophenol	95.2	40-150		%REC	1	3/13/2013 3:59:00 AM
Surr: 2-Fluorobiphenyl	91.0	40-150		%REC	1	3/13/2013 3:59:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

Precision Analytical, Inc.
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Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/28/2013 1:10:00 PM
Project: Detrex / 13816274
Lab ID: 1302705-004
Matrix: PURE PRODUCT
Client Sample ID MW-8

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL SEMI-VOLATILES				**SW8270C**		Analyst: **CS**
SEMI-VOLATILE ORGANIC COMPOUNDS IN OIL						
Surr: 2-Fluorophenol	108	40-150		%REC	1	3/13/2013 3:59:00 AM
Surr: Nitrobenzene-d5	96.0	40-150		%REC	1	3/13/2013 3:59:00 AM
Surr: Phenol-d6	113	40-150		%REC	1	3/13/2013 3:59:00 AM
Surr: Terphenyl-d14	101	40-150		%REC	1	3/13/2013 3:59:00 AM
SVOC TENTATIVELY IDENTIFIED COMPOUNDS				**SVOC-TIC**		Analyst: **CS**
SVOC-TICS	ND	0		mg/Kg	40	3/13/2013
TIC: 1,2,4,5-Tetrachlorobenzene	7,930		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,2,4,4-pentachloro- [A]	13,900		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,2,4,4-pentachloro- [B]	25,400		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,2,4,4-pentachloro- [C]	57,300		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- [A]	5,260		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- [B]	5,780		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- [C]	19,900		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- [D]	23,900		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- [E]	38,500		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,4,4-tetrachloro- [A]	97,500		N	mg/Kg	40	3/13/2013
TIC: 1-Propene, 1,1,2,3-tetrachloro	25,300		N	mg/Kg	40	3/13/2013
TIC: Clorethate	32,300		N	mg/Kg	40	3/13/2013
TIC: Ethane, 1,1,2,2-tetrachloro-	66,900		N	mg/Kg	40	3/13/2013
TIC: Pentachlorobenzene	3,900		N	mg/Kg	40	3/13/2013
TIC: Pentachloroethane [A]	5,390		N	mg/Kg	40	3/13/2013
TIC: Pentachloroethane [B]	5,450		N	mg/Kg	40	3/13/2013
TIC: Tetrachloroethylene	45,200		N	mg/Kg	40	3/13/2013
TIC: Trichloroethylene	188,000		N	mg/Kg	40	3/13/2013
TIC: Unknown 01	4,180			mg/Kg	40	3/13/2013

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
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RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

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Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Project: Detrex / 13816274
Lab ID: 1302705-004
Client Sample ID MW-8

Collection Date: 2/28/2013 1:10:00 PM
Matrix: PURE PRODUCT

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SVOC TENTATIVELY IDENTIFIED COMPOUNDS				**SVOC-TIC**		Analyst: **CS**
TIC: Unknown 02	21,200			mg/Kg	40	3/13/2013
TIC: Unknown 03	3,840			mg/Kg	40	3/13/2013
TIC: Unknown 04	3,970			mg/Kg	40	3/13/2013
TIC: Unknown 05	34,200			mg/Kg	40	3/13/2013
TIC: Unknown 06	5,170			mg/Kg	40	3/13/2013
TIC: Unknown 07	13,200			mg/Kg	40	3/13/2013
TIC: Unknown 08	3,130			mg/Kg	40	3/13/2013
TIC: Unknown 09	179,000			mg/Kg	40	3/13/2013
TIC: Unknown 10	56,800			mg/Kg	40	3/13/2013
TIC: Unknown 11	3,820			mg/Kg	40	3/13/2013
TIC: Unknown 12	2,720			mg/Kg	40	3/13/2013
TIC: Unknown 13	40,500			mg/Kg	40	3/13/2013
TIC: Unknown 14	2,020			mg/Kg	40	3/13/2013
TIC: Unknown 15	2,280			mg/Kg	40	3/13/2013
TCL VOC VOLATILE ORGANIC COMPOUNDS				**SW8260B**		Analyst: **AC**
1,1,1-Trichloroethane	ND	1,520,000		µg/Kg	1	3/1/2013 10:56:00 AM
1,1,2,2-Tetrachloroethane	51,700,000	19,000,000		µg/Kg	1	3/1/2013 2:07:00 PM
1,1,2-Trichloroethane	ND	1,520,000		µg/Kg	1	3/1/2013 10:56:00 AM
1,1-Dichloroethane	ND	1,520,000		µg/Kg	1	3/1/2013 10:56:00 AM
1,1-Dichloroethene	ND	1,520,000		µg/Kg	1	3/1/2013 10:56:00 AM
1,2-Dichloroethane	ND	1,520,000		µg/Kg	1	3/1/2013 10:56:00 AM
1,2-Dichloropropane	ND	1,520,000		µg/Kg	1	3/1/2013 10:56:00 AM
2-Hexanone	ND	3,040,000		µg/Kg	1	3/1/2013 10:56:00 AM
4-Methyl-2-pentanone	ND	6,070,000		µg/Kg	1	3/1/2013 10:56:00 AM
Acetone	ND	15,200,000		µg/Kg	1	3/1/2013 10:56:00 AM
Benzene	ND	1,520,000		µg/Kg	1	3/1/2013 10:56:00 AM
Bromodichloromethane	ND	1,520,000		µg/Kg	1	3/1/2013 10:56:00 AM
Bromoform	ND	1,520,000		µg/Kg	1	3/1/2013 10:56:00 AM
Bromomethane	ND	1,520,000		µg/Kg	1	3/1/2013 10:56:00 AM
Carbon disulfide	ND	1,520,000		µg/Kg	1	3/1/2013 10:56:00 AM
Carbon tetrachloride	ND	1,520,000		µg/Kg	1	3/1/2013 10:56:00 AM
Chlorobenzene	ND	1,520,000		µg/Kg	1	3/1/2013 10:56:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

Precision Analytical, Inc.
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Cleveland, OH 44128
TEL: 216 663 0808 FAX: 216 663 0656
Website: www.precisionanalytical.com

Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/28/2013 1:10:00 PM
Project: Detrex / 13816274
Lab ID: 1302705-004
Matrix: PURE PRODUCT
Client Sample ID MW-8

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL VOC				**SW8260B**		Analyst: **AC**
VOLATILE ORGANIC COMPOUNDS						
Chloroethane	ND	3,040,000		µg/Kg	1	3/1/2013 10:56:00 AM
Chloroform	ND	1,520,000		µg/Kg	1	3/1/2013 10:56:00 AM
Chloromethane	ND	1,520,000		µg/Kg	1	3/1/2013 10:56:00 AM
cis-1,2-Dichloroethene	ND	1,520,000		µg/Kg	1	3/1/2013 10:56:00 AM
cis-1,3-Dichloropropene	ND	1,520,000		µg/Kg	1	3/1/2013 10:56:00 AM
Dibromochloromethane	ND	1,520,000		µg/Kg	1	3/1/2013 10:56:00 AM
Ethylbenzene	ND	1,520,000		µg/Kg	1	3/1/2013 10:56:00 AM
m,p-Xylene	ND	1,520,000		µg/Kg	1	3/1/2013 10:56:00 AM
Methyl ethyl ketone	ND	15,200,000		µg/Kg	1	3/1/2013 10:56:00 AM
Methylene chloride	ND	3,040,000		µg/Kg	1	3/1/2013 10:56:00 AM
o-Xylene	ND	1,520,000		µg/Kg	1	3/1/2013 10:56:00 AM
Styrene	ND	6,070,000		µg/Kg	1	3/1/2013 10:56:00 AM
Tetrachloroethene	12,100,000	1,520,000		µg/Kg	1	3/1/2013 10:56:00 AM
Toluene	ND	1,520,000		µg/Kg	1	3/1/2013 10:56:00 AM
trans-1,2-Dichloroethene	ND	3,040,000		µg/Kg	1	3/1/2013 10:56:00 AM
trans-1,3-Dichloropropene	ND	1,520,000		µg/Kg	1	3/1/2013 10:56:00 AM
Trichloroethene	169,000,000	19,000,000		µg/Kg	1	3/1/2013 2:07:00 PM
Vinyl acetate	ND	3,040,000		µg/Kg	1	3/1/2013 10:56:00 AM
Vinyl chloride	ND	1,520,000		µg/Kg	1	3/1/2013 10:56:00 AM
Surr: 4-Bromofluorobenzene	91.2	80-120		%REC	1	3/1/2013 10:56:00 AM
Surr: Dibromofluoromethane	109	80-120		%REC	1	3/1/2013 10:56:00 AM
Surr: Toluene-d8	96.6	80-120		%REC	1	3/1/2013 10:56:00 AM

NOTES:
* The reporting limits were raised because the sample extract required a waste dilution.
The sample required a methanol extraction.

VOC TENTATIVELY IDENTIFIED COMPOUNDS				**VOC-TIC**		Analyst: **AC**
VOC-TICS	ND	0		µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- (A)	2,260,000		N	µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- (B)	1,520,000		N	µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- (D)	5,560,000		N	µg/Kg	1	3/1/2013

Qualifiers:

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MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

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Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp. **Collection Date:** 2/28/2013 1:10:00 PM

Project: Detrex / 13816274

Lab ID: 1302705-004 **Matrix:** PURE PRODUCT

Client Sample ID MW-8

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
VOC TENTATIVELY IDENTIFIED COMPOUNDS				**VOC-TIC**		Analyst: **AC**
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- [C]	1,650,000		N	µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, pentachloro- (A	3,110,000		N	µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, pentachloro- (E	3,640,000		N	µg/Kg	1	3/1/2013
TIC: Hexachlorobutadiene	4,910,000		N	µg/Kg	1	3/1/2013
TIC: Hexachloroethane	1,590,000		N	µg/Kg	1	3/1/2013
TIC: Unknown 01	2,260,000			µg/Kg	1	3/1/2013

NOTES:

* Insufficient data for tentative identification. Laboratory protocol requires a library match of 70+% certainty for a unknown TIC analyte to be considered positively identified.

* The reporting limits were raised because the sample extract required a waste dilution.

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
	DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
	MDL	Method Detection Limit	N	Tentatively identified compounds
	ND	Not Detected at the Reporting Limit	PL	Permit Limit
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Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/28/2013 1:35:00 PM
Project: Detrex / 13816274
Lab ID: 1302705-005
Matrix: PURE PRODUCT
Client Sample ID MW-13-2

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL SEMI-VOLATILES				**SW8270C**		Analyst: **CS**
SEMI-VOLATILE ORGANIC COMPOUNDS IN OIL						
1,2,4-Trichlorobenzene	468	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
1,2-Dichlorobenzene	559	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
1,3-Dichlorobenzene	12.2	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
1,4-Dichlorobenzene	24.3	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
2,4,5-Trichlorophenol	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
2,4,6-Trichlorophenol	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
2,4-Dichlorophenol	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
2,4-Dimethylphenol	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
2,4-Dinitrophenol	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
2,4-Dinitrotoluene	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
2,6-Dinitrotoluene	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
2-Chloronaphthalene	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
2-Chlorophenol	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
2-Methylnaphthalene	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
2-Methylphenol	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
2-Nitroaniline	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
2-Nitrophenol	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
3,3´-Dichlorobenzidine	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
3-Nitroaniline	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
4,6-Dinitro-2-methylphenol	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
4-Bromophenyl phenyl ether	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
4-Chloro-3-methylphenol	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
4-Chloroaniline	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
4-Chlorophenyl phenyl ether	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
4-Nitroaniline	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
4-Nitrophenol	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Acenaphthene	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Acenaphthylene	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Anthracene	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Benzo (a) anthracene	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Benzo(a)pyrene	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Benzo(b)fluoranthene	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Benzo(g,h,i)perylene	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Benzo(k)fluoranthene	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM

Qualifiers:

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Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/28/2013 1:35:00 PM
Project: Detrex / 13816274
Lab ID: 1302705-005
Matrix: PURE PRODUCT
Client Sample ID MW-13-2

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL SEMI-VOLATILES				**SW8270C**		Analyst: **CS**
SEMI-VOLATILE ORGANIC COMPOUNDS IN OIL						
Benzoic acid	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Benzyl alcohol	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Bis(2-chloroethoxy)methane	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Bis(2-chloroethyl) ether	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Bis(2-chloroisopropyl) ether	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Bis(2-ethylhexyl) phthalate	134	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Butyl benzyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Chrysene	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Dibenz(a,h)anthracene	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Dibenzofuran	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Diethyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Dimethyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Di-n-butyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Di-n-octyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Fluoranthene	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Fluorene	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Hexachlorobenzene	7,100	200		mg/Kg	40	3/12/2013 11:51:00 PM
Hexachlorobutadiene	14,600	200		mg/Kg	40	3/12/2013 11:51:00 PM
Hexachlorocyclopentadiene	163	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Hexachloroethane	21,600	200		mg/Kg	40	3/12/2013 11:51:00 PM
Indeno(1,2,3-cd)pyrene	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Isophorone	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
m&p-cresols (3&4-methylphenols)	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Naphthalene	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Nitrobenzene	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
N-Nitrosodi-n-propylamine	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
N-Nitrosodiphenylamine	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Pentachlorophenol	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Phenanthrene	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Phenol	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Pyrene	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Pyridine	ND	5.00		mg/Kg	1	3/13/2013 4:34:00 AM
Surr: 2,4,6-Tribromophenol	99.4	40-150		%REC	1	3/13/2013 4:34:00 AM
Surr: 2-Fluorobiphenyl	79.4	40-150		%REC	1	3/13/2013 4:34:00 AM

Qualifiers:

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Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/28/2013 1:35:00 PM
Project: Detrex / 13816274
Lab ID: 1302705-005
Matrix: PURE PRODUCT
Client Sample ID MW-13-2

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL SEMI-VOLATILES				**SW8270C**		Analyst: **CS**
SEMI-VOLATILE ORGANIC COMPOUNDS IN OIL						
Surr: 2-Fluorophenol	110	40-150		%REC	1	3/13/2013 4:34:00 AM
Surr: Nitrobenzene-d5	94.0	40-150		%REC	1	3/13/2013 4:34:00 AM
Surr: Phenol-d6	119	40-150		%REC	1	3/13/2013 4:34:00 AM
Surr: Terphenyl-d14	101	40-150		%REC	1	3/13/2013 4:34:00 AM
SVOC TENTATIVELY IDENTIFIED COMPOUNDS				**SVOC-TIC**		Analyst: **CS**
SVOC-TICS	ND	0		mg/Kg	40	3/13/2013
TIC: 1,2,4,5-Tetrachlorobenzene	6,830		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,2,4,4-pentachloro- [A]	18,400		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,2,4,4-pentachloro- [B]	28,100		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- [A]	7,090		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- [B]	29,700		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,4,4-tetrachloro- [A]	30,800		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,4,4-tetrachloro- [B]	10,700		N	mg/Kg	40	3/13/2013
TIC: Clorethate	35,700		N	mg/Kg	40	3/13/2013
TIC: Ethane, 1,1,2,2-tetrachloro-	130,000		N	mg/Kg	40	3/13/2013
TIC: Pentachlorobenzene	2,480		N	mg/Kg	40	3/13/2013
TIC: Pentachloroethane	9,050		N	mg/Kg	40	3/13/2013
TIC: Tetrachloroethylene	62,700		N	mg/Kg	40	3/13/2013
TIC: Trichloroethylene	160,000		N	mg/Kg	40	3/13/2013
TIC: Unknown 01	6,730			mg/Kg	40	3/13/2013
TIC: Unknown 02	7,170			mg/Kg	40	3/13/2013
TIC: Unknown 03	16,600			mg/Kg	40	3/13/2013
TIC: Unknown 04	3,680			mg/Kg	40	3/13/2013
TIC: Unknown 05	36,900			mg/Kg	40	3/13/2013
TIC: Unknown 06	4,940			mg/Kg	40	3/13/2013
TIC: Unknown 07	10,900			mg/Kg	40	3/13/2013
TIC: Unknown 08	280,000			mg/Kg	40	3/13/2013
TIC: Unknown 09	63,800			mg/Kg	40	3/13/2013

Qualifiers:

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DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
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Analytical Report

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WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/28/2013 1:35:00 PM
Project: Detrex / 13816274
Lab ID: 1302705-005
Matrix: PURE PRODUCT
Client Sample ID MW-13-2

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SVOC TENTATIVELY IDENTIFIED COMPOUNDS				**SVOC-TIC**		Analyst: **CS**
TIC: Unknown 10	4,720			mg/Kg	40	3/13/2013
TIC: Unknown 11	3,040			mg/Kg	40	3/13/2013
TIC: Unknown 12	59,900			mg/Kg	40	3/13/2013
TIC: Unknown 13	5,030			mg/Kg	40	3/13/2013
TIC: Unknown 14	3,420			mg/Kg	40	3/13/2013
TCL VOC VOLATILE ORGANIC COMPOUNDS				**SW8260B**		Analyst: **AC**
1,1,1-Trichloroethane	ND	1,930,000		µg/Kg	1	3/1/2013 11:20:00 AM
1,1,2,2-Tetrachloroethane	88,500,000	24,100,000		µg/Kg	1	3/1/2013 2:30:00 PM
1,1,2-Trichloroethane	ND	1,930,000		µg/Kg	1	3/1/2013 11:20:00 AM
1,1-Dichloroethane	ND	1,930,000		µg/Kg	1	3/1/2013 11:20:00 AM
1,1-Dichloroethene	ND	1,930,000		µg/Kg	1	3/1/2013 11:20:00 AM
1,2-Dichloroethane	ND	1,930,000		µg/Kg	1	3/1/2013 11:20:00 AM
1,2-Dichloropropane	ND	1,930,000		µg/Kg	1	3/1/2013 11:20:00 AM
2-Hexanone	ND	3,860,000		µg/Kg	1	3/1/2013 11:20:00 AM
4-Methyl-2-pentanone	ND	7,710,000		µg/Kg	1	3/1/2013 11:20:00 AM
Acetone	ND	19,300,000		µg/Kg	1	3/1/2013 11:20:00 AM
Benzene	ND	1,930,000		µg/Kg	1	3/1/2013 11:20:00 AM
Bromodichloromethane	ND	1,930,000		µg/Kg	1	3/1/2013 11:20:00 AM
Bromoform	ND	1,930,000		µg/Kg	1	3/1/2013 11:20:00 AM
Bromomethane	ND	1,930,000		µg/Kg	1	3/1/2013 11:20:00 AM
Carbon disulfide	ND	1,930,000		µg/Kg	1	3/1/2013 11:20:00 AM
Carbon tetrachloride	ND	1,930,000		µg/Kg	1	3/1/2013 11:20:00 AM
Chlorobenzene	ND	1,930,000		µg/Kg	1	3/1/2013 11:20:00 AM
Chloroethane	ND	3,860,000		µg/Kg	1	3/1/2013 11:20:00 AM
Chloroform	ND	1,930,000		µg/Kg	1	3/1/2013 11:20:00 AM
Chloromethane	ND	1,930,000		µg/Kg	1	3/1/2013 11:20:00 AM
cis-1,2-Dichloroethene	ND	1,930,000		µg/Kg	1	3/1/2013 11:20:00 AM
cis-1,3-Dichloropropene	ND	1,930,000		µg/Kg	1	3/1/2013 11:20:00 AM
Dibromochloromethane	ND	1,930,000		µg/Kg	1	3/1/2013 11:20:00 AM
Ethylbenzene	ND	1,930,000		µg/Kg	1	3/1/2013 11:20:00 AM
m,p-Xylene	ND	1,930,000		µg/Kg	1	3/1/2013 11:20:00 AM
Methyl ethyl ketone	ND	19,300,000		µg/Kg	1	3/1/2013 11:20:00 AM

Qualifiers:

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DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
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Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/28/2013 1:35:00 PM
Project: Detrex / 13816274
Lab ID: 1302705-005
Matrix: PURE PRODUCT
Client Sample ID MW-13-2

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL VOC				**SW8260B**		Analyst: **AC**
VOLATILE ORGANIC COMPOUNDS						
Methylene chloride	ND	3,860,000		µg/Kg	1	3/1/2013 11:20:00 AM
o-Xylene	ND	1,930,000		µg/Kg	1	3/1/2013 11:20:00 AM
Styrene	ND	7,710,000		µg/Kg	1	3/1/2013 11:20:00 AM
Tetrachloroethene	28,900,000	1,930,000		µg/Kg	1	3/1/2013 11:20:00 AM
Toluene	ND	1,930,000		µg/Kg	1	3/1/2013 11:20:00 AM
trans-1,2-Dichloroethene	ND	3,860,000		µg/Kg	1	3/1/2013 11:20:00 AM
trans-1,3-Dichloropropene	ND	1,930,000		µg/Kg	1	3/1/2013 11:20:00 AM
Trichloroethene	130,000,000	24,100,000		µg/Kg	1	3/1/2013 2:30:00 PM
Vinyl acetate	ND	3,860,000		µg/Kg	1	3/1/2013 11:20:00 AM
Vinyl chloride	ND	1,930,000		µg/Kg	1	3/1/2013 11:20:00 AM
Surr: 4-Bromofluorobenzene	92.8	80-120		%REC	1	3/1/2013 11:20:00 AM
Surr: Dibromofluoromethane	108	80-120		%REC	1	3/1/2013 11:20:00 AM
Surr: Toluene-d8	96.4	80-120		%REC	1	3/1/2013 11:20:00 AM

NOTES:
* The reporting limits were raised because the sample extract required a waste dilution.
The sample required a methanol extraction.

VOC TENTATIVELY IDENTIFIED COMPOUNDS				**VOC-TIC**		Analyst: **AC**
VOC-TICS	ND	0		µg/Kg	1	3/1/2013
TIC: 1,1,2,4-Tetrachlorobut-1-ene	2,050,000		N	µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- (A)	1,580,000		N	µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- (B)	1,300,000		N	µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- (D)	8,220,000		N	µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- [C]	1,720,000		N	µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, pentachloro- (A	4,010,000		N	µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, pentachloro- (E	3,130,000		N	µg/Kg	1	3/1/2013
TIC: Hexachlorobutadiene	4,310,000		N	µg/Kg	1	3/1/2013
TIC: Hexachloroethane	2,810,000		N	µg/Kg	1	3/1/2013
TIC: Pentachloroethane	2,920,000		N	µg/Kg	1	3/1/2013
TIC: Unknown 01	1,500,000			µg/Kg	1	3/1/2013

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

Precision Analytical, Inc.
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Cleveland, OH 44128
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Website: www.precisionanalytical.com

Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/28/2013 1:35:00 PM
Project: Detrex / 13816274
Lab ID: 1302705-005
Matrix: PURE PRODUCT
Client Sample ID MW-13-2

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
VOC TENTATIVELY IDENTIFIED COMPOUNDS				**VOC-TIC**		Analyst: **AC**
TIC: Unknown 02	2,610,000			µg/Kg	1	3/1/2013
TIC: Unknown 03	4,190,000			µg/Kg	1	3/1/2013
TIC: Unknown 04	1,720,000			µg/Kg	1	3/1/2013

NOTES:

* Insufficient data for tentative identification. Laboratory protocol requires a library match of 70+% certainty for a unknown TIC analyte to be considered positively identified.

* The reporting limits were raised because the sample extract required a waste dilution.

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
	DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
	MDL	Method Detection Limit	N	Tentatively identified compounds
	ND	Not Detected at the Reporting Limit	PL	Permit Limit
	RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

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Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/28/2013 12:15:00 PM
Project: Detrex / 13816274
Lab ID: 1302705-006
Matrix: PURE PRODUCT
Client Sample ID GP-15

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL SEMI-VOLATILES				**SW8270C**		Analyst: **CS**
SEMI-VOLATILE ORGANIC COMPOUNDS IN OIL						
1,2,4-Trichlorobenzene	345	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
1,2-Dichlorobenzene	1,250	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
1,3-Dichlorobenzene	11.8	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
1,4-Dichlorobenzene	38.1	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
2,4,5-Trichlorophenol	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
2,4,6-Trichlorophenol	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
2,4-Dichlorophenol	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
2,4-Dimethylphenol	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
2,4-Dinitrophenol	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
2,4-Dinitrotoluene	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
2,6-Dinitrotoluene	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
2-Chloronaphthalene	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
2-Chlorophenol	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
2-Methylnaphthalene	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
2-Methylphenol	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
2-Nitroaniline	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
2-Nitrophenol	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
3,3´-Dichlorobenzidine	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
3-Nitroaniline	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
4,6-Dinitro-2-methylphenol	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
4-Bromophenyl phenyl ether	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
4-Chloro-3-methylphenol	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
4-Chloroaniline	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
4-Chlorophenyl phenyl ether	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
4-Nitroaniline	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
4-Nitrophenol	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Acenaphthene	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Acenaphthylene	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Anthracene	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Benzo (a) anthracene	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Benzo(a)pyrene	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Benzo(b)fluoranthene	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Benzo(g,h,i)perylene	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Benzo(k)fluoranthene	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

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Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/28/2013 12:15:00 PM
Project: Detrex / 13816274
Lab ID: 1302705-006
Matrix: PURE PRODUCT
Client Sample ID GP-15

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL SEMI-VOLATILES				**SW8270C**		Analyst: **CS**
SEMI-VOLATILE ORGANIC COMPOUNDS IN OIL						
Benzoic acid	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Benzyl alcohol	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Bis(2-chloroethoxy)methane	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Bis(2-chloroethyl) ether	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Bis(2-chloroisopropyl) ether	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Bis(2-ethylhexyl) phthalate	51.0	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Butyl benzyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Chrysene	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Dibenz(a,h)anthracene	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Dibenzofuran	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Diethyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Dimethyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Di-n-butyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Di-n-octyl phthalate	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Fluoranthene	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Fluorene	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Hexachlorobenzene	7,260	200		mg/Kg	40	3/13/2013 12:26:00 AM
Hexachlorobutadiene	10,100	200		mg/Kg	40	3/13/2013 12:26:00 AM
Hexachlorocyclopentadiene	212	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Hexachloroethane	55,600	200		mg/Kg	40	3/13/2013 12:26:00 AM
Indeno(1,2,3-cd)pyrene	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Isophorone	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
m&p-cresols (3&4-methylphenols)	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Naphthalene	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Nitrobenzene	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
N-Nitrosodi-n-propylamine	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
N-Nitrosodiphenylamine	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Pentachlorophenol	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Phenanthrene	10.0	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Phenol	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Pyrene	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Pyridine	ND	5.00		mg/Kg	1	3/13/2013 5:09:00 AM
Surr: 2,4,6-Tribromophenol	100	40-150		%REC	1	3/13/2013 5:09:00 AM
Surr: 2-Fluorobiphenyl	70.5	40-150		%REC	1	3/13/2013 5:09:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
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J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

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Website: www.precisionanalytical.com

Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/28/2013 12:15:00 PM
Project: Detrex / 13816274
Lab ID: 1302705-006
Matrix: PURE PRODUCT
Client Sample ID GP-15

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL SEMI-VOLATILES				**SW8270C**		Analyst: **CS**
SEMI-VOLATILE ORGANIC COMPOUNDS IN OIL						
Surr: 2-Fluorophenol	114	40-150		%REC	1	3/13/2013 5:09:00 AM
Surr: Nitrobenzene-d5	74.1	40-150		%REC	1	3/13/2013 5:09:00 AM
Surr: Phenol-d6	146	40-150		%REC	1	3/13/2013 5:09:00 AM
Surr: Terphenyl-d14	98.4	40-150		%REC	1	3/13/2013 5:09:00 AM
SVOC TENTATIVELY IDENTIFIED COMPOUNDS				**SVOC-TIC**		Analyst: **CS**
SVOC-TICS	ND	0		mg/Kg	40	3/13/2013
TIC: 1,2,4,5-Tetrachlorobenzene	6,360		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,2,4,4-pentachloro- [A]	8,320		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,2,4,4-pentachloro- [B]	22,200		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,2,4,4-pentachloro- [C]	21,900		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro-	7,410		N	mg/Kg	40	3/13/2013
TIC: 1,3-Butadiene, 1,1,4,4-tetrachloro-	12,600		N	mg/Kg	40	3/13/2013
TIC: Clorethate [A]	32,300		N	mg/Kg	40	3/13/2013
TIC: Clorethate [B]	3,430		N	mg/Kg	40	3/13/2013
TIC: Ethane, 1,1,2,2-tetrachloro-	332,000		N	mg/Kg	40	3/13/2013
TIC: Pentachlorobenzene	2,380		N	mg/Kg	40	3/13/2013
TIC: Pentachloroethane [A]	33,700		N	mg/Kg	40	3/13/2013
TIC: Pentachloroethane [B]	15,100		N	mg/Kg	40	3/13/2013
TIC: Tetrachloroethylene	17,200		N	mg/Kg	40	3/13/2013
TIC: Trichloroethylene	32,000		N	mg/Kg	40	3/13/2013
TIC: Unknown 01	3,490			mg/Kg	40	3/13/2013
TIC: Unknown 02	20,600			mg/Kg	40	3/13/2013
TIC: Unknown 03	6,250			mg/Kg	40	3/13/2013
TIC: Unknown 04	295,000			mg/Kg	40	3/13/2013
TIC: Unknown 05	67,100			mg/Kg	40	3/13/2013
TIC: Unknown 06	4,810			mg/Kg	40	3/13/2013
TIC: Unknown 07	63,900			mg/Kg	40	3/13/2013
TIC: Unknown 08	13,200			mg/Kg	40	3/13/2013

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
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Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Project: Detrex / 13816274
Lab ID: 1302705-006
Client Sample ID GP-15

Collection Date: 2/28/2013 12:15:00 PM
Matrix: PURE PRODUCT

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SVOC TENTATIVELY IDENTIFIED COMPOUNDS				**SVOC-TIC**		Analyst: **CS**
TIC: Unknown 09	6,380			mg/Kg	40	3/13/2013
TCL VOC VOLATILE ORGANIC COMPOUNDS				**SW8260B**		Analyst: **AC**
1,1,1-Trichloroethane	ND	1,950,000		µg/Kg	1	3/1/2013 11:44:00 AM
1,1,2,2-Tetrachloroethane	259,000,000	24,400,000		µg/Kg	1	3/1/2013 3:18:00 PM
1,1,2-Trichloroethane	ND	1,950,000		µg/Kg	1	3/1/2013 11:44:00 AM
1,1-Dichloroethane	ND	1,950,000		µg/Kg	1	3/1/2013 11:44:00 AM
1,1-Dichloroethene	ND	1,950,000		µg/Kg	1	3/1/2013 11:44:00 AM
1,2-Dichloroethane	ND	1,950,000		µg/Kg	1	3/1/2013 11:44:00 AM
1,2-Dichloropropane	ND	1,950,000		µg/Kg	1	3/1/2013 11:44:00 AM
2-Hexanone	ND	3,900,000		µg/Kg	1	3/1/2013 11:44:00 AM
4-Methyl-2-pentanone	ND	7,810,000		µg/Kg	1	3/1/2013 11:44:00 AM
Acetone	ND	19,500,000		µg/Kg	1	3/1/2013 11:44:00 AM
Benzene	ND	1,950,000		µg/Kg	1	3/1/2013 11:44:00 AM
Bromodichloromethane	ND	1,950,000		µg/Kg	1	3/1/2013 11:44:00 AM
Bromoform	ND	1,950,000		µg/Kg	1	3/1/2013 11:44:00 AM
Bromomethane	ND	1,950,000		µg/Kg	1	3/1/2013 11:44:00 AM
Carbon disulfide	ND	1,950,000		µg/Kg	1	3/1/2013 11:44:00 AM
Carbon tetrachloride	ND	1,950,000		µg/Kg	1	3/1/2013 11:44:00 AM
Chlorobenzene	ND	1,950,000		µg/Kg	1	3/1/2013 11:44:00 AM
Chloroethane	ND	3,900,000		µg/Kg	1	3/1/2013 11:44:00 AM
Chloroform	ND	1,950,000		µg/Kg	1	3/1/2013 11:44:00 AM
Chloromethane	ND	1,950,000		µg/Kg	1	3/1/2013 11:44:00 AM
cis-1,2-Dichloroethene	ND	1,950,000		µg/Kg	1	3/1/2013 11:44:00 AM
cis-1,3-Dichloropropene	ND	1,950,000		µg/Kg	1	3/1/2013 11:44:00 AM
Dibromochloromethane	ND	1,950,000		µg/Kg	1	3/1/2013 11:44:00 AM
Ethylbenzene	ND	1,950,000		µg/Kg	1	3/1/2013 11:44:00 AM
m,p-Xylene	ND	1,950,000		µg/Kg	1	3/1/2013 11:44:00 AM
Methyl ethyl ketone	ND	19,500,000		µg/Kg	1	3/1/2013 11:44:00 AM
Methylene chloride	ND	3,900,000		µg/Kg	1	3/1/2013 11:44:00 AM
o-Xylene	ND	1,950,000		µg/Kg	1	3/1/2013 11:44:00 AM
Styrene	ND	7,810,000		µg/Kg	1	3/1/2013 11:44:00 AM
Tetrachloroethene	12,700,000	1,950,000		µg/Kg	1	3/1/2013 11:44:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

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Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/28/2013 12:15:00 PM
Project: Detrex / 13816274
Lab ID: 1302705-006
Matrix: PURE PRODUCT
Client Sample ID GP-15

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCL VOC				**SW8260B**		Analyst: **AC**
VOLATILE ORGANIC COMPOUNDS						
Toluene	ND	1,950,000		µg/Kg	1	3/1/2013 11:44:00 AM
trans-1,2-Dichloroethene	ND	3,900,000		µg/Kg	1	3/1/2013 11:44:00 AM
trans-1,3-Dichloropropene	ND	1,950,000		µg/Kg	1	3/1/2013 11:44:00 AM
Trichloroethene	52,100,000	24,400,000		µg/Kg	1	3/1/2013 3:18:00 PM
Vinyl acetate	ND	3,900,000		µg/Kg	1	3/1/2013 11:44:00 AM
Vinyl chloride	ND	1,950,000		µg/Kg	1	3/1/2013 11:44:00 AM
Surr: 4-Bromofluorobenzene	92.2	80-120		%REC	1	3/1/2013 11:44:00 AM
Surr: Dibromofluoromethane	111	80-120		%REC	1	3/1/2013 11:44:00 AM
Surr: Toluene-d8	97.4	80-120		%REC	1	3/1/2013 11:44:00 AM

NOTES:
* The reporting limits were raised because the sample extract required a waste dilution.
The sample required a methanol extraction.

VOC TENTATIVELY IDENTIFIED COMPOUNDS				**VOC-TIC**		Analyst: **AC**
VOC-TICS	ND	0		µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- (A)	5,330,000		N	µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, 1,1,3,4-tetrachloro- (B)	1,090,000			µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, pentachloro-	5,310,000		N	µg/Kg	1	3/1/2013
TIC: 1,3-Butadiene, pentachloroethane	4,440,000		N	µg/Kg	1	3/1/2013
TIC: Hexachlorobutadiene	6,170,000		N	µg/Kg	1	3/1/2013
TIC: Hexachloroethane	10,500,000		N	µg/Kg	1	3/1/2013
TIC: Pentachloroethane	9,580,000		N	µg/Kg	1	3/1/2013
TIC: Unknown 01	8,660,000			µg/Kg	1	3/1/2013
TIC: Unknown 02	1,140,000			µg/Kg	1	3/1/2013
TIC: Unknown 03	2,360,000			µg/Kg	1	3/1/2013
TIC: Unknown 04	956,000			µg/Kg	1	3/1/2013
TIC: Unknown 05	1,930,000			µg/Kg	1	3/1/2013
TIC: Unknown 06	2,140,000			µg/Kg	1	3/1/2013

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

Precision Analytical, Inc.
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TEL: 216 663 0808 FAX: 216 663 0656
Website: www.precisionanalytical.com

Analytical Report

(consolidated)

WO#: **1302705**

Date Reported: **3/26/2013**

CLIENT: URS Corp.
Collection Date: 2/28/2013 12:15:00 PM
Project: Detrex / 13816274
Lab ID: 1302705-006
Matrix: PURE PRODUCT
Client Sample ID GP-15

Analyses	Result	RL	Qual	Units	DF	Date Analyzed

VOC TENTATIVELY IDENTIFIED COMPOUNDS **VOC-TIC** Analyst: **AC**

NOTES:
* Insufficient data for tentative identification. Laboratory protocol requires a library match of 70+% certainty for a unknown TIC analyte to be considered positively identified.
* The reporting limits were raised because the sample extract required a waste dilution.

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
DF	Dilution Factor	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response
MDL	Method Detection Limit	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	PL	Permit Limit
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits

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QC SUMMARY REPORT

WO#: **1302705**

26-Mar-13

Client: URS Corp.
Project: Detrex / 13816274 **BatchID:** **19429**

Sample ID: **LCS-19429** SampType: **lcs** TestCode: **sw_8270oil** Units: **mg/Kg** Prep Date: **3/8/2013** RunNo: **43243**
Client ID: **LCSW** Batch ID: **19429** TestNo: **SW8270C** Analysis Date: **3/11/2013** SeqNo: **631324**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	237	5.00	250.0	0	94.8	40	150				
1,4-Dichlorobenzene	239	5.00	250.0	0	95.4	40	150				
2,4-Dinitrotoluene	239	5.00	250.0	0	95.8	40	150				
2-Chlorophenol	262	5.00	250.0	0	105	40	150				
4-Chloro-3-methylphenol	261	5.00	250.0	0	104	40	150				
4-Nitrophenol	252	5.00	250.0	0	101	40	150				
Acenaphthene	244	5.00	250.0	0	97.8	40	150				
N-Nitrosodi-n-propylamine	270	5.00	250.0	0	108	40	150				
Pentachlorophenol	182	5.00	250.0	0	72.8	40	150				
Phenol	281	5.00	250.0	0	113	40	150				
Pyrene	250	5.00	250.0	0	100	40	150				
Surr: 2,4,6-Tribromophenol	1,060		1,000		106	40	150				
Surr: 2-Fluorobiphenyl	1,110		1,000		111	40	150				
Surr: 2-Fluorophenol	1,110		1,000		111	40	150				
Surr: Nitrobenzene-d5	1,130		1,000		113	40	150				
Surr: Phenol-d6	1,110		1,000		111	40	150				
Surr: Terphenyl-d14	1,100		1,000		110	40	150				

Sample ID: **MB-19429** SampType: **mblk** TestCode: **sw_8270oil** Units: **mg/Kg** Prep Date: **3/8/2013** RunNo: **43243**
Client ID: **PBW** Batch ID: **19429** TestNo: **SW8270C** Analysis Date: **3/11/2013** SeqNo: **631325**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	ND	5.00									
1,2-Dichlorobenzene	ND	5.00									
1,3-Dichlorobenzene	ND	5.00									
1,4-Dichlorobenzene	ND	5.00									

Qualifiers:

*	Value exceeds Maximum Contaminant Level	E	Value above quantitation range	H	Holding times for preparation or analys
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	P	Second column confirmation exceeds	R	RPD outside accepted recovery limits
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits		

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QC SUMMARY REPORT

WO#: **1302705**

26-Mar-13

Client: URS Corp.

Project: Detrex / 13816274

BatchID: **19429**

Sample ID: **MB-19429** SampType: **mblk** TestCode: **sw_8270oil** Units: **mg/Kg** Prep Date: **3/8/2013** RunNo: **43243**

Client ID: **PBW** Batch ID: **19429** TestNo: **SW8270C** Analysis Date: **3/11/2013** SeqNo: **631325**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
2,4,5-Trichlorophenol	ND	5.00									
2,4,6-Trichlorophenol	ND	5.00									
2,4-Dichlorophenol	ND	5.00									
2,4-Dimethylphenol	ND	5.00									
2,4-Dinitrophenol	ND	5.00									
2,4-Dinitrotoluene	ND	5.00									
2,6-Dinitrotoluene	ND	5.00									
2-Chloronaphthalene	ND	5.00									
2-Chlorophenol	ND	5.00									
2-Methylnaphthalene	ND	5.00									
2-Methylphenol	ND	5.00									
2-Nitroaniline	ND	5.00									
2-Nitrophenol	ND	5.00									
3,3´-Dichlorobenzidine	ND	5.00									
3-Nitroaniline	ND	5.00									
4,6-Dinitro-2-methylphenol	ND	5.00									
4-Bromophenyl phenyl ether	ND	5.00									
4-Chloro-3-methylphenol	ND	5.00									
4-Chloroaniline	ND	5.00									
4-Chlorophenyl phenyl ether	ND	5.00									
4-Nitroaniline	ND	5.00									
4-Nitrophenol	ND	5.00									
Acenaphthene	ND	5.00									
Acenaphthylene	ND	5.00									
Anthracene	ND	5.00									
Benzo (a) anthracene	ND	5.00									

Qualifiers:

*	Value exceeds Maximum Contaminant Level	E	Value above quantitation range	H	Holding times for preparation or analys
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	P	Second column confirmation exceeds	R	RPD outside accepted recovery limits
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QC SUMMARY REPORT

WO#: **1302705**

26-Mar-13

Client: URS Corp.
Project: Detrex / 13816274 **BatchID:** **19429**

Sample ID: **MB-19429** SampType: **mblk** TestCode: **sw_8270oil** Units: **mg/Kg** Prep Date: **3/8/2013** RunNo: **43243**
Client ID: **PBW** Batch ID: **19429** TestNo: **SW8270C** Analysis Date: **3/11/2013** SeqNo: **631325**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzo(a)pyrene	ND	5.00									
Benzo(b)fluoranthene	ND	5.00									
Benzo(g,h,i)perylene	ND	5.00									
Benzo(k)fluoranthene	ND	5.00									
Benzoic acid	ND	5.00									
Benzyl alcohol	ND	5.00									
Bis(2-chloroethoxy)methane	ND	5.00									
Bis(2-chloroethyl) ether	ND	5.00									
Bis(2-chloroisopropyl) ether	ND	5.00									
Bis(2-ethylhexyl) phthalate	ND	5.00									
Butyl benzyl phthalate	ND	5.00									
Chrysene	ND	5.00									
Dibenz(a,h)anthracene	ND	5.00									
Dibenzofuran	ND	5.00									
Diethyl phthalate	ND	5.00									
Dimethyl phthalate	ND	5.00									
Di-n-butyl phthalate	ND	5.00									
Di-n-octyl phthalate	ND	5.00									
Fluoranthene	ND	5.00									
Fluorene	ND	5.00									
Hexachlorobenzene	ND	5.00									
Hexachlorobutadiene	ND	5.00									
Hexachlorocyclopentadiene	ND	5.00									
Hexachloroethane	ND	5.00									
Indeno(1,2,3-cd)pyrene	ND	5.00									
Isophorone	ND	5.00									

Qualifiers:

*	Value exceeds Maximum Contaminant Level	E	Value above quantitation range	H	Holding times for preparation or analys
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response	N	Tentatively identified compounds
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QC SUMMARY REPORT

WO#: **1302705**

26-Mar-13

Client: URS Corp.

Project: Detrex / 13816274

BatchID: **19429**

Sample ID: **MB-19429** SampType: **mblk** TestCode: **sw_8270oil** Units: **mg/Kg** Prep Date: **3/8/2013** RunNo: **43243**

Client ID: **PBW** Batch ID: **19429** TestNo: **SW8270C** Analysis Date: **3/11/2013** SeqNo: **631325**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
m&p-cresols (3&4-methylphenols)	ND	5.00									
Naphthalene	ND	5.00									
Nitrobenzene	ND	5.00									
N-Nitrosodi-n-propylamine	ND	5.00									
N-Nitrosodiphenylamine	ND	5.00									
Pentachlorophenol	ND	5.00									
Phenanthrene	ND	5.00									
Phenol	ND	5.00									
Pyrene	ND	5.00									
Pyridine	ND	5.00									
Surr: 2,4,6-Tribromophenol	929		1,000		92.9	40	150				
Surr: 2-Fluorobiphenyl	1,020		1,000		102	40	150				
Surr: 2-Fluorophenol	1,030		1,000		103	40	150				
Surr: Nitrobenzene-d5	1,060		1,000		106	40	150				
Surr: Phenol-d6	1,060		1,000		106	40	150				
Surr: Terphenyl-d14	1,050		1,000		105	40	150				

Qualifiers:

*	Value exceeds Maximum Contaminant Level	E	Value above quantitation range	H	Holding times for preparation or analys
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	P	Second column confirmation exceeds	R	RPD outside accepted recovery limits
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits		

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QC SUMMARY REPORT

WO#: **1302705**

26-Mar-13

Client: URS Corp.
Project: Detrex / 13816274

BatchID: **R43004**

Sample ID: **BLK** SampType: **MBLK** TestCode: **SW_8260LIQ** Units: **µg/L** Prep Date: RunNo: **43004**
Client ID: **PBW** Batch ID: **R43004** TestNo: **SW8260B** Analysis Date: **3/1/2013** SeqNo: **628044**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1-Trichloroethane	ND	5.00									
1,1,2,2-Tetrachloroethane	ND	5.00									
1,1,2-Trichloroethane	ND	5.00									
1,1-Dichloroethane	ND	5.00									
1,1-Dichloroethene	ND	5.00									
1,2-Dichloroethane	ND	5.00									
1,2-Dichloropropane	ND	5.00									
2-Hexanone	ND	10.0									
4-Methyl-2-pentanone	ND	10.0									
Acetone	ND	50.0									
Benzene	ND	5.00									
Bromodichloromethane	ND	5.00									
Bromoform	ND	5.00									
Bromomethane	ND	5.00									
Carbon disulfide	ND	5.00									
Carbon tetrachloride	ND	5.00									
Chlorobenzene	ND	5.00									
Chloroethane	ND	5.00									
Chloroform	ND	5.00									
Chloromethane	ND	5.00									
cis-1,2-Dichloroethene	ND	5.00									
cis-1,3-Dichloropropene	ND	5.00									
Dibromochloromethane	ND	5.00									
Ethylbenzene	ND	5.00									
m,p-Xylene	ND	5.00									
Methyl ethyl ketone	ND	25.0									

Qualifiers:

*	Value exceeds Maximum Contaminant Level	E	Value above quantitation range	H	Holding times for preparation or analys
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	P	Second column confirmation exceeds	R	RPD outside accepted recovery limits
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits		

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QC SUMMARY REPORT

WO#: **1302705**

26-Mar-13

Client: URS Corp.
Project: Detrex / 13816274 **BatchID:** **R43004**

Sample ID: **BLK** SampType: **MBLK** TestCode: **SW_8260LIQ** Units: **µg/L** Prep Date: RunNo: **43004**
Client ID: **PBW** Batch ID: **R43004** TestNo: **SW8260B** Analysis Date: **3/1/2013** SeqNo: **628044**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methylene chloride	ND	5.00									
o-Xylene	ND	5.00									
Styrene	ND	5.00									
Tetrachloroethene	ND	5.00									
Toluene	ND	5.00									
trans-1,2-Dichloroethene	ND	5.00									
trans-1,3-Dichloropropene	ND	5.00									
Trichloroethene	ND	5.00									
Vinyl acetate	ND	10.0									
Vinyl chloride	ND	5.00									
Surr: 4-Bromofluorobenzene	21.8		25.00		87.4	80	120				
Surr: Dibromofluoromethane	27.2		25.00		109	80	120				
Surr: Toluene-d8	23.2		25.00		92.6	80	120				

Sample ID: **ccv 20 ug/l** SampType: **CCV** TestCode: **sw_8260liq** Units: **µg/L** Prep Date: RunNo: **43004**
Client ID: **CCV** Batch ID: **R43004** TestNo: **SW8260B** Analysis Date: **3/1/2013** SeqNo: **628045**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1-Trichloroethane	21.9	5.00	20.00	0	109	80	120				
1,1,2,2-Tetrachloroethane	18.4	5.00	20.00	0	91.9	80	120				
1,1,2-Trichloroethane	19.6	5.00	20.00	0	98.0	80	120				
1,1-Dichloroethane	20.7	5.00	20.00	0	104	80	120				
1,1-Dichloroethene	21.3	5.00	20.00	0	107	80	120				
1,2-Dichloroethane	21.5	5.00	20.00	0	107	80	120				
1,2-Dichloropropane	20.2	5.00	20.00	0	101	80	120				
2-Hexanone	77.4	10.0	80.00	0	96.7	80	120				

Qualifiers:

*	Value exceeds Maximum Contaminant Level	E	Value above quantitation range	H	Holding times for preparation or analys
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	P	Second column confirmation exceeds	R	RPD outside accepted recovery limits
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits		

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QC SUMMARY REPORT

WO#: **1302705**

26-Mar-13

Client: URS Corp.
Project: Detrex / 13816274

BatchID: **R43004**

Sample ID: **ccv 20 ug/l** SampType: **CCV** TestCode: **sw_8260liq** Units: **µg/L** Prep Date: RunNo: **43004**
Client ID: **CCV** Batch ID: **R43004** TestNo: **SW8260B** Analysis Date: **3/1/2013** SeqNo: **628045**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
4-Methyl-2-pentanone	81.4	10.0	80.00	0	102	80	120				
Acetone	92.8	50.0	80.00	0	116	80	120				
Benzene	21.0	5.00	20.00	0	105	80	120				
Bromodichloromethane	21.0	5.00	20.00	0	105	80	120				
Bromoform	21.4	5.00	20.00	0	107	80	120				
Bromomethane	26.1	5.00	20.00	0	131	80	120				S
Carbon disulfide	21.7	5.00	20.00	0	108	80	120				
Carbon tetrachloride	22.4	5.00	20.00	0	112	80	120				
Chlorobenzene	20.1	5.00	20.00	0	101	80	120				
Chloroethane	21.6	5.00	20.00	0	108	80	120				
Chloroform	20.1	5.00	20.00	0	100	80	120				
Chloromethane	21.8	5.00	20.00	0	109	80	120				
cis-1,2-Dichloroethene	21.6	5.00	20.00	0	108	80	120				
cis-1,3-Dichloropropene	19.6	5.00	20.00	0	98.2	80	120				
Dibromochloromethane	21.4	5.00	20.00	0	107	80	120				
Ethylbenzene	20.0	5.00	20.00	0	99.8	80	120				
m,p-Xylene	43.7	5.00	40.00	0	109	80	120				
Methyl ethyl ketone	90.3	25.0	80.00	0	113	80	120				
Methylene chloride	21.4	5.00	20.00	0	107	80	120				
o-Xylene	20.7	5.00	20.00	0	104	80	120				
Styrene	19.2	5.00	20.00	0	96.0	80	120				
Tetrachloroethene	26.7	5.00	20.00	0	134	80	120				S
Toluene	20.6	5.00	20.00	0	103	80	120				
trans-1,2-Dichloroethene	21.9	5.00	20.00	0	110	80	120				
trans-1,3-Dichloropropene	19.4	5.00	20.00	0	97.2	80	120				
Trichloroethene	21.3	5.00	20.00	0	107	80	120				

Qualifiers:

*	Value exceeds Maximum Contaminant Level	E	Value above quantitation range	H	Holding times for preparation or analys
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	P	Second column confirmation exceeds	R	RPD outside accepted recovery limits
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits		

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QC SUMMARY REPORT

WO#: **1302705**

26-Mar-13

Client: URS Corp.
Project: Detrex / 13816274

BatchID: **R43004**

Sample ID: **ccv 20 ug/l** SampType: **CCV** TestCode: **sw_8260liq** Units: **µg/L** Prep Date: RunNo: **43004**
Client ID: **CCV** Batch ID: **R43004** TestNo: **SW8260B** Analysis Date: **3/1/2013** SeqNo: **628045**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Vinyl acetate	38.9	10.0	40.00	0	97.3	80	120				
Vinyl chloride	24.0	5.00	20.00	0	120	80	120				
Surr: 4-Bromofluorobenzene	24.8		25.00		99.4	80	120				
Surr: Dibromofluoromethane	24.3		25.00		97.3	80	120				
Surr: Toluene-d8	24.7		25.00		98.8	80	120				

Sample ID: **1302705-005bdup** SampType: **DUP** TestCode: **sw_8260liq** Units: **µg/Kg** Prep Date: RunNo: **43004**
Client ID: **MW-13-2** Batch ID: **R43004** TestNo: **SW8260B** Analysis Date: **3/1/2013** SeqNo: **628059**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1-Trichloroethane	ND	24,100,000						0	0	20	
1,1,2,2-Tetrachloroethane	128,000,000	24,100,000						109,600,000	15.3	20	
1,1,2-Trichloroethane	ND	24,100,000						0	0	20	R
1,1-Dichloroethane	ND	24,100,000						0	0	20	
1,1-Dichloroethene	ND	24,100,000						0	0	20	
1,2-Dichloroethane	ND	24,100,000						0	0	20	
1,2-Dichloropropane	ND	24,100,000						0	0	20	
2-Hexanone	ND	48,200,000						0	0	20	
4-Methyl-2-pentanone	ND	48,200,000						0	0	20	
Acetone	ND	241,000,000						0	0	20	
Benzene	ND	24,100,000						0	0	20	
Bromodichloromethane	ND	24,100,000						0	0	20	
Bromoform	ND	24,100,000						0	0	20	
Bromomethane	ND	24,100,000						0	0	20	
Carbon disulfide	ND	24,100,000						0	0	20	
Carbon tetrachloride	ND	24,100,000						0	0	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level	E	Value above quantitation range	H	Holding times for preparation or analys
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	P	Second column confirmation exceeds	R	RPD outside accepted recovery limits
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits		

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Website: www.precisionanalytical.com

QC SUMMARY REPORT

WO#: **1302705**

26-Mar-13

Client: URS Corp.
Project: Detrex / 13816274 **BatchID:** **R43004**

Sample ID: **1302705-005bdup** SampType: **DUP** TestCode: **sw_8260liq** Units: **µg/Kg** Prep Date: RunNo: **43004**
Client ID: **MW-13-2** Batch ID: **R43004** TestNo: **SW8260B** Analysis Date: **3/1/2013** SeqNo: **628059**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chlorobenzene	ND	24,100,000						0	0	20	
Chloroethane	ND	24,100,000						0	0	20	
Chloroform	34,100,000	24,100,000						0	200	20	R
Chloromethane	ND	24,100,000						0	0	20	
cis-1,2-Dichloroethene	ND	24,100,000						0	0	20	R
cis-1,3-Dichloropropene	ND	24,100,000						0	0	20	
Dibromochloromethane	ND	24,100,000						0	0	20	
Ethylbenzene	ND	24,100,000						0	0	20	
m,p-Xylene	ND	24,100,000						0	0	20	
Methyl ethyl ketone	ND	120,000,000						0	0	20	
Methylene chloride	ND	24,100,000						0	0	20	R
o-Xylene	ND	24,100,000						0	0	20	
Styrene	ND	24,100,000						0	0	20	
Tetrachloroethene	31,900,000	24,100,000						28,850,000	9.90	20	
Toluene	ND	24,100,000						0	0	20	
trans-1,2-Dichloroethene	ND	24,100,000						0	0	20	
trans-1,3-Dichloropropene	ND	24,100,000						0	0	20	
Trichloroethene	165,000,000	24,100,000						176,800,000	6.95	20	
Vinyl acetate	ND	48,200,000						0	0	20	
Vinyl chloride	ND	24,100,000						0	0	20	
Surr: 4-Bromofluorobenzene	106,000,000		120,500,000		87.6	80	120		0	20	
Surr: Dibromofluoromethane	135,000,000		120,500,000		112	80	120		0	20	
Surr: Toluene-d8	114,000,000		120,500,000		94.8	80	120		0	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level	E	Value above quantitation range	H	Holding times for preparation or analys
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	P	Second column confirmation exceeds	R	RPD outside accepted recovery limits
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits		

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QC SUMMARY REPORT

WO#: **1302705**

26-Mar-13

Client: URS Corp.
Project: Detrex / 13816274

BatchID: **R43004**

Sample ID: **1302705-006bms** SampType: **ms** TestCode: **sw_8260liq** Units: **µg/Kg** Prep Date: RunNo: **43004**
Client ID: **GP-15** Batch ID: **R43004** TestNo: **SW8260B** Analysis Date: **3/1/2013** SeqNo: **628061**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethene	102,000,000	24,400,000	97,570,000	0	105	75	125				
Benzene	102,000,000	24,400,000	97,570,000	0	105	83	117				
Chlorobenzene	101,000,000	24,400,000	97,570,000	0	104	77	123				
Toluene	103,000,000	24,400,000	97,570,000	0	106	80	120				
Trichloroethene	160,000,000	24,400,000	97,570,000	44,780,000	118	79	121				
Surr: 4-Bromofluorobenzene	122,000,000		122,000,000		100	80	120				
Surr: Dibromofluoromethane	120,000,000		122,000,000		98.3	80	120				
Surr: Toluene-d8	121,000,000		122,000,000		99.0	80	120				

Sample ID: **1302705-006bmsd** SampType: **msd** TestCode: **sw_8260liq** Units: **µg/Kg** Prep Date: RunNo: **43004**
Client ID: **GP-15** Batch ID: **R43004** TestNo: **SW8260B** Analysis Date: **3/1/2013** SeqNo: **628062**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethene	97,700,000	24,400,000	97,570,000	0	100	75	125	102,200,000	4.49	20	
Benzene	98,300,000	24,400,000	97,570,000	0	101	83	117	102,000,000	3.75	20	
Chlorobenzene	97,400,000	24,400,000	97,570,000	0	99.9	77	123	101,000,000	3.59	20	
Toluene	98,700,000	24,400,000	97,570,000	0	101	80	120	103,200,000	4.45	20	
Trichloroethene	157,000,000	24,400,000	97,570,000	44,780,000	115	79	121	160,100,000	1.91	20	
Surr: 4-Bromofluorobenzene	121,000,000		122,000,000		99.6	80	120		0	20	
Surr: Dibromofluoromethane	120,000,000		122,000,000		98.0	80	120		0	20	
Surr: Toluene-d8	120,000,000		122,000,000		98.8	80	120		0	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level	E	Value above quantitation range	H	Holding times for preparation or analys
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	P	Second column confirmation exceeds	R	RPD outside accepted recovery limits
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QC SUMMARY REPORT

WO#: **1302705**

26-Mar-13

Client: URS Corp.
Project: Detrex / 13816274

BatchID: **R43004**

Sample ID: **ccv 20 ug/l** SampType: **ccv** TestCode: **sw_8260liq** Units: **µg/L** Prep Date: RunNo: **43004**
Client ID: **CCV** Batch ID: **R43004** TestNo: **SW8260B** Analysis Date: **3/1/2013** SeqNo: **628063**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1-Trichloroethane	20.9	5.00	20.00	0	105	80	120				
1,1,2,2-Tetrachloroethane	18.6	5.00	20.00	0	93.0	80	120				
1,1,2-Trichloroethane	19.5	5.00	20.00	0	97.4	80	120				
1,1-Dichloroethane	20.1	5.00	20.00	0	101	80	120				
1,1-Dichloroethene	20.5	5.00	20.00	0	103	80	120				
1,2-Dichloroethane	21.1	5.00	20.00	0	106	80	120				
1,2-Dichloropropane	19.5	5.00	20.00	0	97.6	80	120				
2-Hexanone	80.2	10.0	80.00	0	100	80	120				
4-Methyl-2-pentanone	81.2	10.0	80.00	0	101	80	120				
Acetone	95.4	50.0	80.00	0	119	80	120				
Benzene	20.2	5.00	20.00	0	101	80	120				
Bromodichloromethane	20.7	5.00	20.00	0	104	80	120				
Bromoform	21.2	5.00	20.00	0	106	80	120				
Bromomethane	24.3	5.00	20.00	0	121	80	120				S
Carbon disulfide	20.8	5.00	20.00	0	104	80	120				
Carbon tetrachloride	21.0	5.00	20.00	0	105	80	120				
Chlorobenzene	19.5	5.00	20.00	0	97.7	80	120				
Chloroethane	21.2	5.00	20.00	0	106	80	120				
Chloroform	19.6	5.00	20.00	0	98.2	80	120				
Chloromethane	21.1	5.00	20.00	0	106	80	120				
cis-1,2-Dichloroethene	21.0	5.00	20.00	0	105	80	120				
cis-1,3-Dichloropropene	19.2	5.00	20.00	0	95.8	80	120				
Dibromochloromethane	21.2	5.00	20.00	0	106	80	120				
Ethylbenzene	19.1	5.00	20.00	0	95.3	80	120				
m,p-Xylene	41.5	5.00	40.00	0	104	80	120				
Methyl ethyl ketone	92.0	25.0	80.00	0	115	80	120				

Qualifiers:

*	Value exceeds Maximum Contaminant Level	E	Value above quantitation range	H	Holding times for preparation or analys
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response	N	Tentatively identified compounds
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QC SUMMARY REPORT

WO#: **1302705**

26-Mar-13

Client: URS Corp.
Project: Detrex / 13816274

BatchID: **R43004**

Sample ID: **ccv 20 ug/l** SampType: **ccv** TestCode: **sw_8260liq** Units: **µg/L** Prep Date: RunNo: **43004**
Client ID: **CCV** Batch ID: **R43004** TestNo: **SW8260B** Analysis Date: **3/1/2013** SeqNo: **628063**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methylene chloride	21.2	5.00	20.00	0	106	80	120				
o-Xylene	20.3	5.00	20.00	0	102	80	120				
Styrene	18.7	5.00	20.00	0	93.7	80	120				
Tetrachloroethene	29.1	5.00	20.00	0	145	80	120				S
Toluene	19.8	5.00	20.00	0	99.0	80	120				
trans-1,2-Dichloroethene	21.2	5.00	20.00	0	106	80	120				
trans-1,3-Dichloropropene	19.1	5.00	20.00	0	95.6	80	120				
Trichloroethene	20.6	5.00	20.00	0	103	80	120				
Vinyl acetate	37.1	10.0	40.00	0	92.8	80	120				
Vinyl chloride	23.6	5.00	20.00	0	118	80	120				
Surr: 4-Bromofluorobenzene	24.8		25.00		99.2	80	120				
Surr: Dibromofluoromethane	24.6		25.00		98.2	80	120				
Surr: Toluene-d8	24.7		25.00		98.8	80	120				

Sample ID: **ccv 20 ug/l** SampType: **CCV** TestCode: **sw_8260liq** Units: **µg/L** Prep Date: RunNo: **43004**
Client ID: **CCV** Batch ID: **R43004** TestNo: **SW8260B** Analysis Date: **3/1/2013** SeqNo: **629241**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Tetrachloroethene	17.6	5.00	20.00	0	87.9	80	120				

Qualifiers:

*	Value exceeds Maximum Contaminant Level	E	Value above quantitation range	H	Holding times for preparation or analys
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	P	Second column confirmation exceeds	R	RPD outside accepted recovery limits
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits		

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QC SUMMARY REPORT

WO#: **1302705**

26-Mar-13

Client: URS Corp.
Project: Detrex / 13816274

BatchID: **R43004**

Sample ID: **lcs 20 ug/l** SampType: **LCS** TestCode: **EPA_624AQ** Units: **µg/L** Prep Date: RunNo: **43004**
Client ID: **LCSW** Batch ID: **R43004** TestNo: **SW8260B** Analysis Date: **3/1/2013** SeqNo: **628046**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1-Trichloroethane	22.4	5.00	20.00	0	112	52	162				
1,1,2,2-Tetrachloroethane	18.6	5.00	20.00	0	93.0	46	157				
1,1,2-Trichloroethane	20.6	5.00	20.00	0	103	52	150				
1,1-Dichloroethane	20.4	5.00	20.00	0	102	59	155				
1,1-Dichloroethene	21.0	5.00	20.00	0	105	1	234				
1,2-Dichloroethane	21.9	5.00	20.00	0	109	49	155				
1,2-Dichloropropane	19.9	5.00	20.00	0	99.3	1	210				
Benzene	20.5	5.00	20.00	0	103	37	151				
Bromodichloromethane	21.3	5.00	20.00	0	106	35	155				
Bromoform	20.8	5.00	20.00	0	104	45	169				
Bromomethane	30.4	5.00	20.00	0	152	1	242				
Carbon tetrachloride	22.0	5.00	20.00	0	110	70	140				
Chlorobenzene	20.2	5.00	20.00	0	101	37	160				
Chloroethane	20.4	5.00	20.00	0	102	14	230				
Chloroform	19.4	5.00	20.00	0	96.9	51	138				
Chloromethane	20.3	5.00	20.00	0	101	1	273				
cis-1,3-Dichloropropene	21.8	5.00	20.00	0	109	1	227				
Dibromochloromethane	20.5	5.00	20.00	0	103	53	149				
Ethylbenzene	19.8	5.00	20.00	0	98.9	37	162				
Methylene chloride	20.7	5.00	20.00	0	103	1	221				
Tetrachloroethene	33.6	5.00	20.00	0	168	64	148				S
Toluene	20.8	5.00	20.00	0	104	47	150				
trans-1,2-Dichloroethene	21.8	5.00	20.00	0	109	54	156				
trans-1,3-Dichloropropene	20.3	5.00	20.00	0	102	17	183				
Trichloroethene	21.6	5.00	20.00	0	108	71	157				
Vinyl chloride	21.3	5.00	20.00	0	106	1	251				

Qualifiers:

*	Value exceeds Maximum Contaminant Level	E	Value above quantitation range	H	Holding times for preparation or analys
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	P	Second column confirmation exceeds	R	RPD outside accepted recovery limits
RL	Reporting Detection Limit (PQL)	S	Spike outside acceptance limits		

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QC SUMMARY REPORT

WO#: **1302705**

26-Mar-13

Client: URS Corp.
Project: Detrex / 13816274 **BatchID:** **R43004**

Sample ID: **lcs 20 ug/l** SampType: **LCS** TestCode: **EPA_624AQ** Units: **µg/L** Prep Date: RunNo: **43004**
Client ID: **LCSW** Batch ID: **R43004** TestNo: **SW8260B** Analysis Date: **3/1/2013** SeqNo: **628046**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: 4-Bromofluorobenzene	25.2		25.00		101	80	120				
Surr: Dibromofluoromethane	24.0		25.00		96.0	80	120				
Surr: Toluene-d8	24.6		25.00		98.4	80	120				

Sample ID: **lcsd 20 ug/l** SampType: **LCSD** TestCode: **EPA_624AQ** Units: **µg/L** Prep Date: RunNo: **43004**
Client ID: **LCSS02** Batch ID: **R43004** TestNo: **SW8260B** Analysis Date: **3/1/2013** SeqNo: **628047**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1-Trichloroethane	21.2	5.00	20.00	0	106	52	162	22.37	5.14	20	
1,1,2,2-Tetrachloroethane	18.3	5.00	20.00	0	91.7	46	157	18.61	1.52	20	
1,1,2-Trichloroethane	20.0	5.00	20.00	0	99.8	52	150	20.63	3.25	20	
1,1-Dichloroethane	19.8	5.00	20.00	0	98.8	59	155	20.45	3.48	20	
1,1-Dichloroethene	20.0	5.00	20.00	0	100	1	234	21.03	4.77	20	
1,2-Dichloroethane	21.5	5.00	20.00	0	107	49	155	21.87	1.89	20	
1,2-Dichloropropane	19.2	5.00	20.00	0	95.9	1	210	19.86	3.54	20	
Benzene	19.8	5.00	20.00	0	99.0	37	151	20.54	3.72	20	
Bromodichloromethane	20.8	5.00	20.00	0	104	35	155	21.27	2.14	20	
Bromoform	20.4	5.00	20.00	0	102	45	169	20.82	1.94	20	
Bromomethane	28.5	5.00	20.00	0	143	1	242	30.37	6.32	20	
Carbon tetrachloride	20.9	5.00	20.00	0	104	70	140	21.98	5.04	20	
Chlorobenzene	19.3	5.00	20.00	0	96.7	37	160	20.17	4.25	20	
Chloroethane	19.4	5.00	20.00	0	97.0	14	230	20.42	5.07	20	
Chloroform	18.9	5.00	20.00	0	94.4	51	138	19.37	2.62	20	
Chloromethane	19.7	5.00	20.00	0	98.6	1	273	20.29	2.90	20	
cis-1,3-Dichloropropene	21.0	5.00	20.00	0	105	1	227	21.77	3.46	20	
Dibromochloromethane	20.0	5.00	20.00	0	100	53	149	20.52	2.62	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level	E	Value above quantitation range	H	Holding times for preparation or analys
J	Analyte detected below quantitation limits	M	Manual Integration used to determine area response	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	P	Second column confirmation exceeds	R	RPD outside accepted recovery limits
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QC SUMMARY REPORT

WO#: **1302705**

26-Mar-13

Client: URS Corp.
Project: Detrex / 13816274

BatchID: **R43004**

Sample ID: **lcsd 20 ug/l** SampType: **LCSD** TestCode: **EPA_624AQ** Units: **µg/L** Prep Date: RunNo: **43004**
Client ID: **LCSS02** Batch ID: **R43004** TestNo: **SW8260B** Analysis Date: **3/1/2013** SeqNo: **628047**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Ethylbenzene	18.8	5.00	20.00	0	94.2	37	162	19.78	4.92	20	
Methylene chloride	20.2	5.00	20.00	0	101	1	221	20.67	2.25	20	
Tetrachloroethene	32.5	5.00	20.00	0	163	64	148	33.62	3.26	20	S
Toluene	19.8	5.00	20.00	0	99.0	47	150	20.75	4.64	20	
trans-1,2-Dichloroethene	20.7	5.00	20.00	0	104	54	156	21.85	5.31	20	
trans-1,3-Dichloropropene	19.8	5.00	20.00	0	99.1	17	183	20.31	2.44	20	
Trichloroethene	20.4	5.00	20.00	0	102	71	157	21.56	5.48	20	
Vinyl chloride	21.5	5.00	20.00	0	108	1	251	21.26	1.31	20	
Surr: 4-Bromofluorobenzene	25.1		25.00		100	80	120		0	20	
Surr: Dibromofluoromethane	24.0		25.00		95.9	80	120		0	20	
Surr: Toluene-d8	24.3		25.00		97.1	80	120		0	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level	E	Value above quantitation range	H	Holding times for preparation or analys
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ND	Not Detected at the Reporting Limit	P	Second column confirmation exceeds	R	RPD outside accepted recovery limits
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Operator    : CSS
Acquired    : 12 Mar 2013   8:17 pm using AcqMethod BNAS.M
Instrument :   sv gcms
Sample Name: 1302637-001a 40x
Misc Info   : samp sw_8270oil
Vial Number: 9
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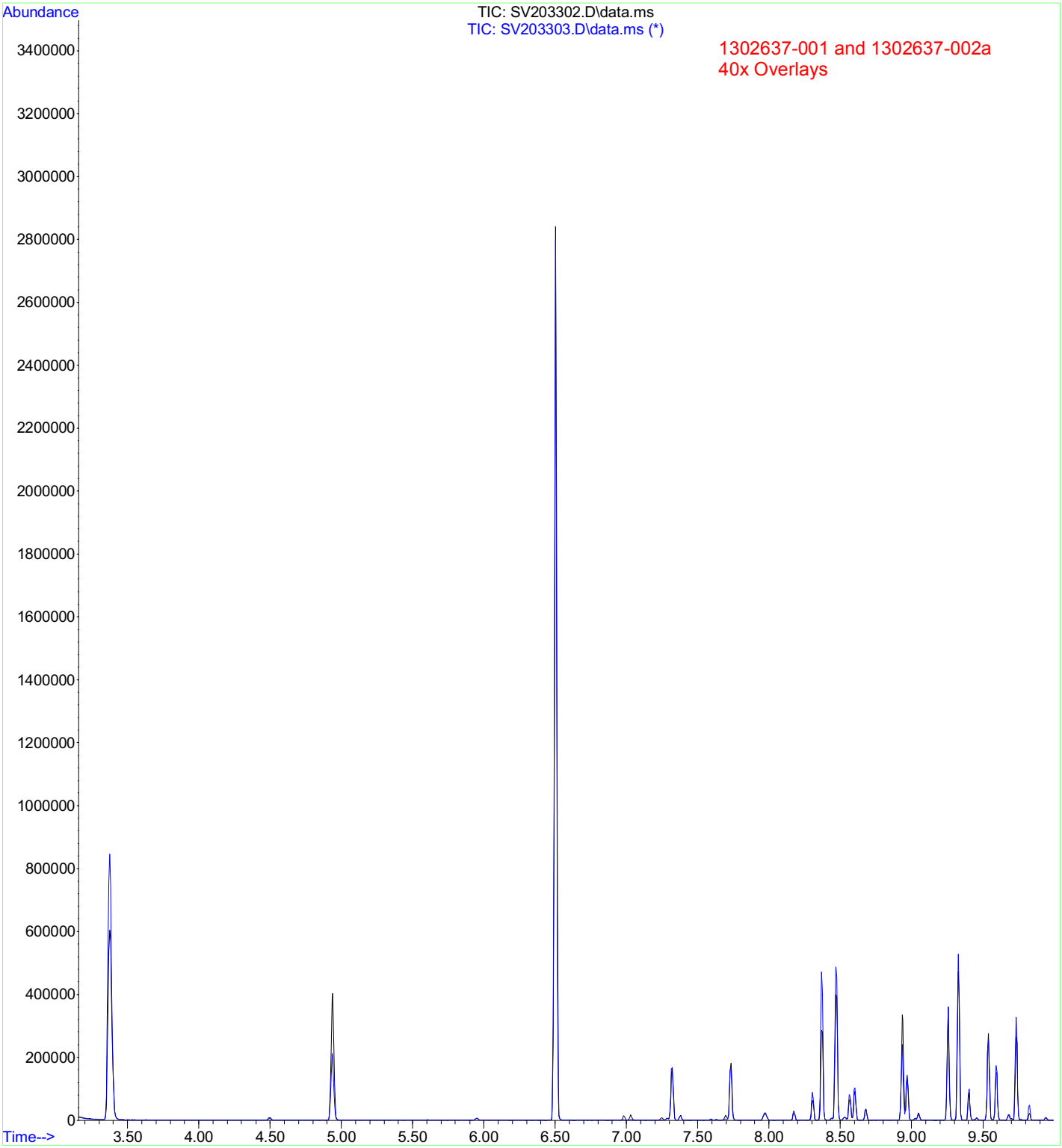

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File        :C:\msdchem\1\DATA\0312D\SV203302.D
Operator    : CSS
Acquired    : 12 Mar 2013   8:17 pm using AcqMethod BNAS.M
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Sample Name: 1302637-001a 40x
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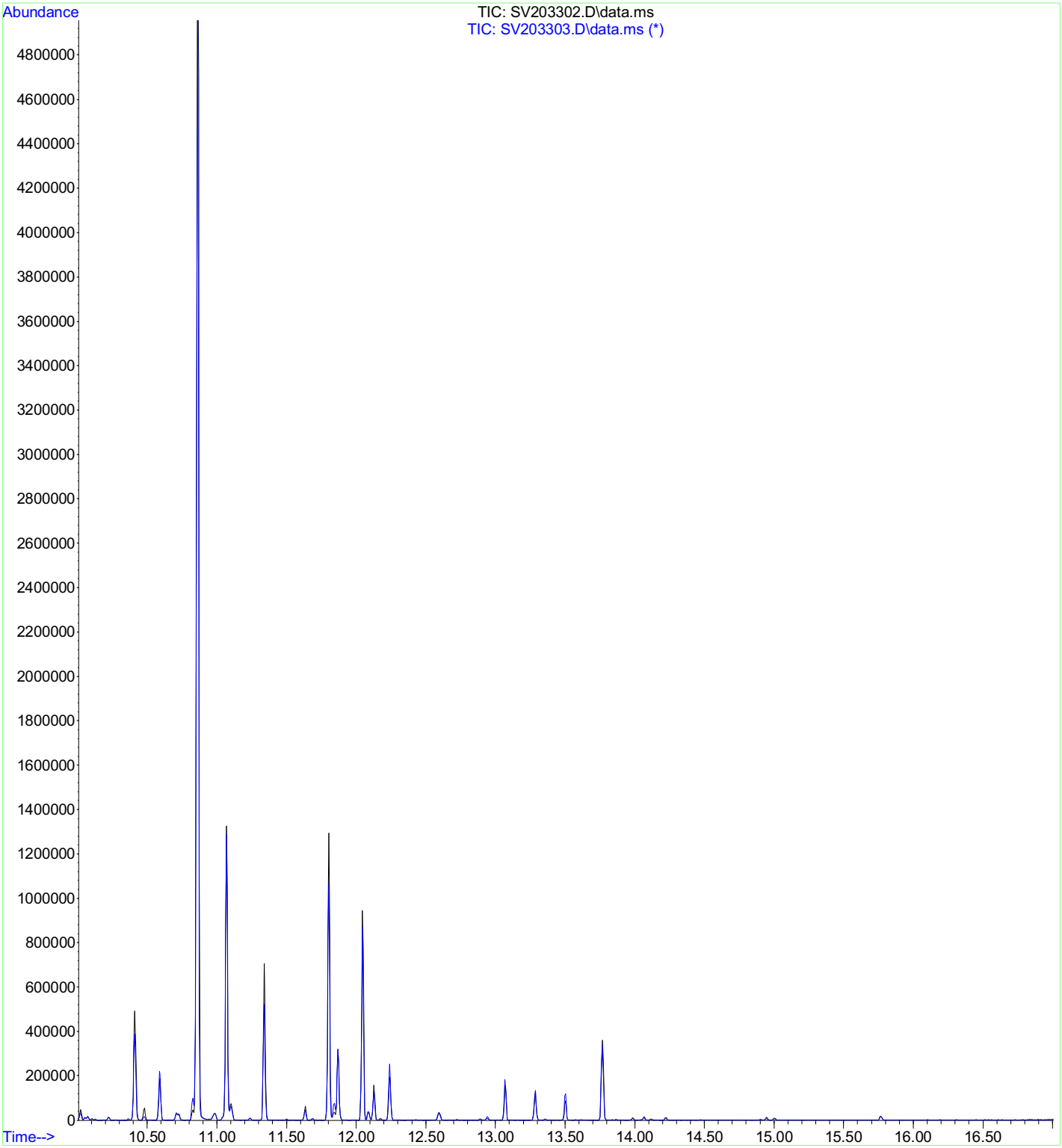
Vial Number: 9
```



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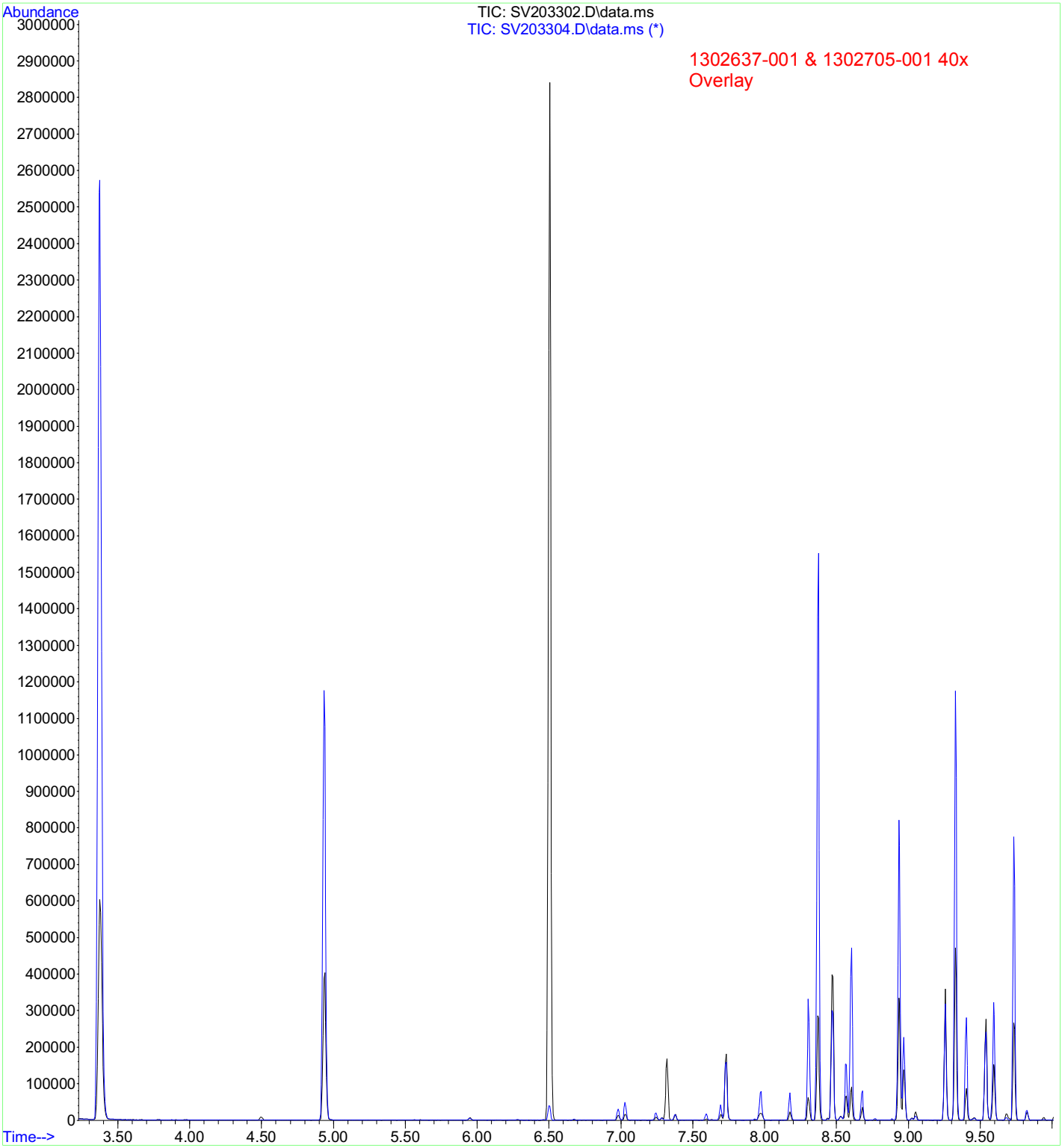
File        :C:\msdchem\1\DATA\0312D\SV203302.D
Operator    : CSS
Acquired    : 12 Mar 2013   8:17 pm using AcqMethod BNAS.M
Instrument :   sv gcms
Sample Name: 1302637-001a 40x
Misc Info   : samp sw_8270oil
Vial Number: 9
```



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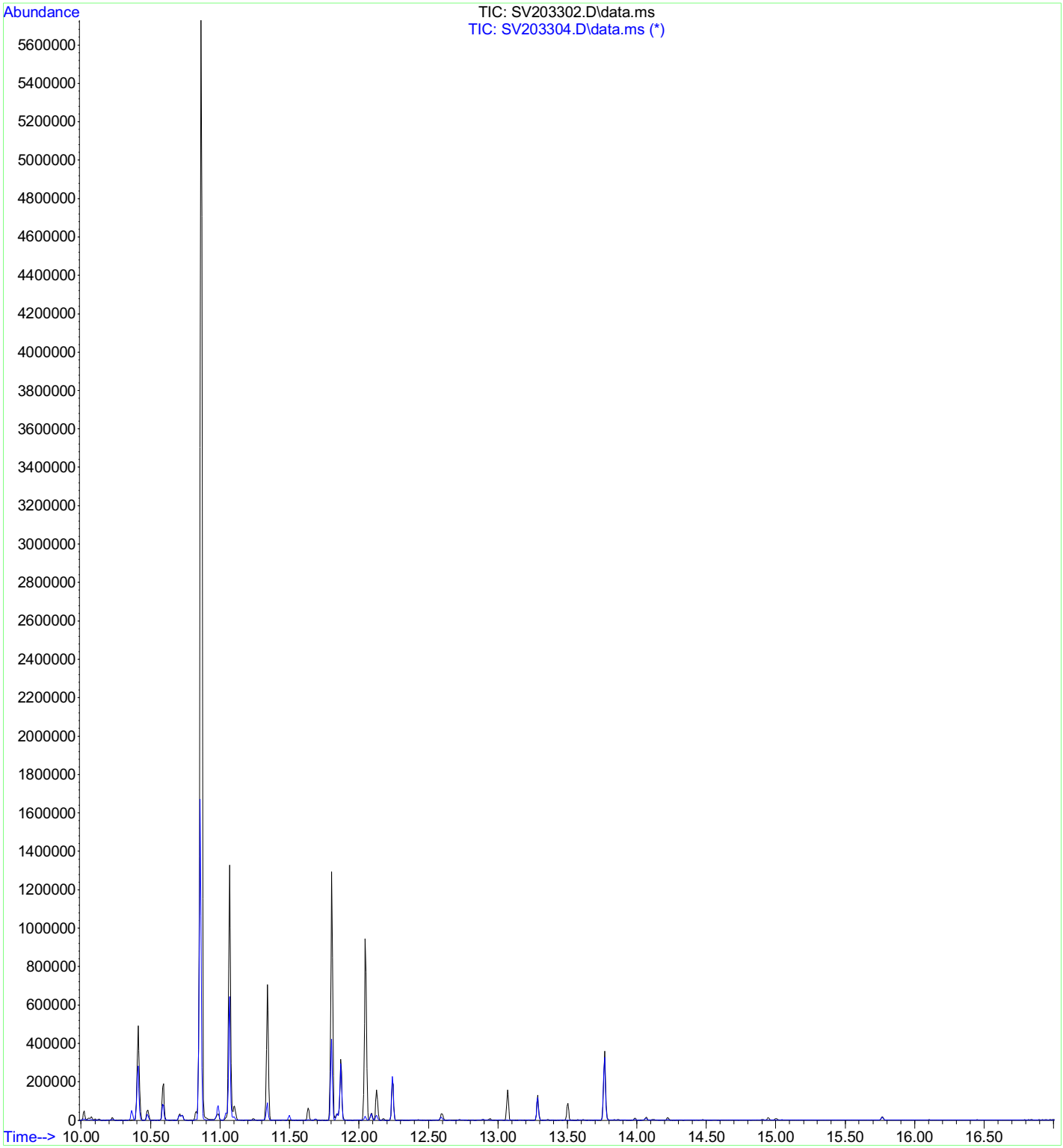
File       :C:\msdchem\1\DATA\0312D\SV203302.D
Operator   : CSS
Acquired   : 12 Mar 2013   8:17 pm using AcqMethod BNAS.M
Instrument :   sv gcms
Sample Name: 1302637-001a 40x
Misc Info  : samp sw_8270oil
Vial Number: 9
```



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Operator    : CSS
Acquired    : 12 Mar 2013   8:17 pm using AcqMethod BNAS.M
Instrument :   sv gcms
Sample Name: 1302637-001a 40x
Misc Info   : samp sw_8270oil
Vial Number: 9
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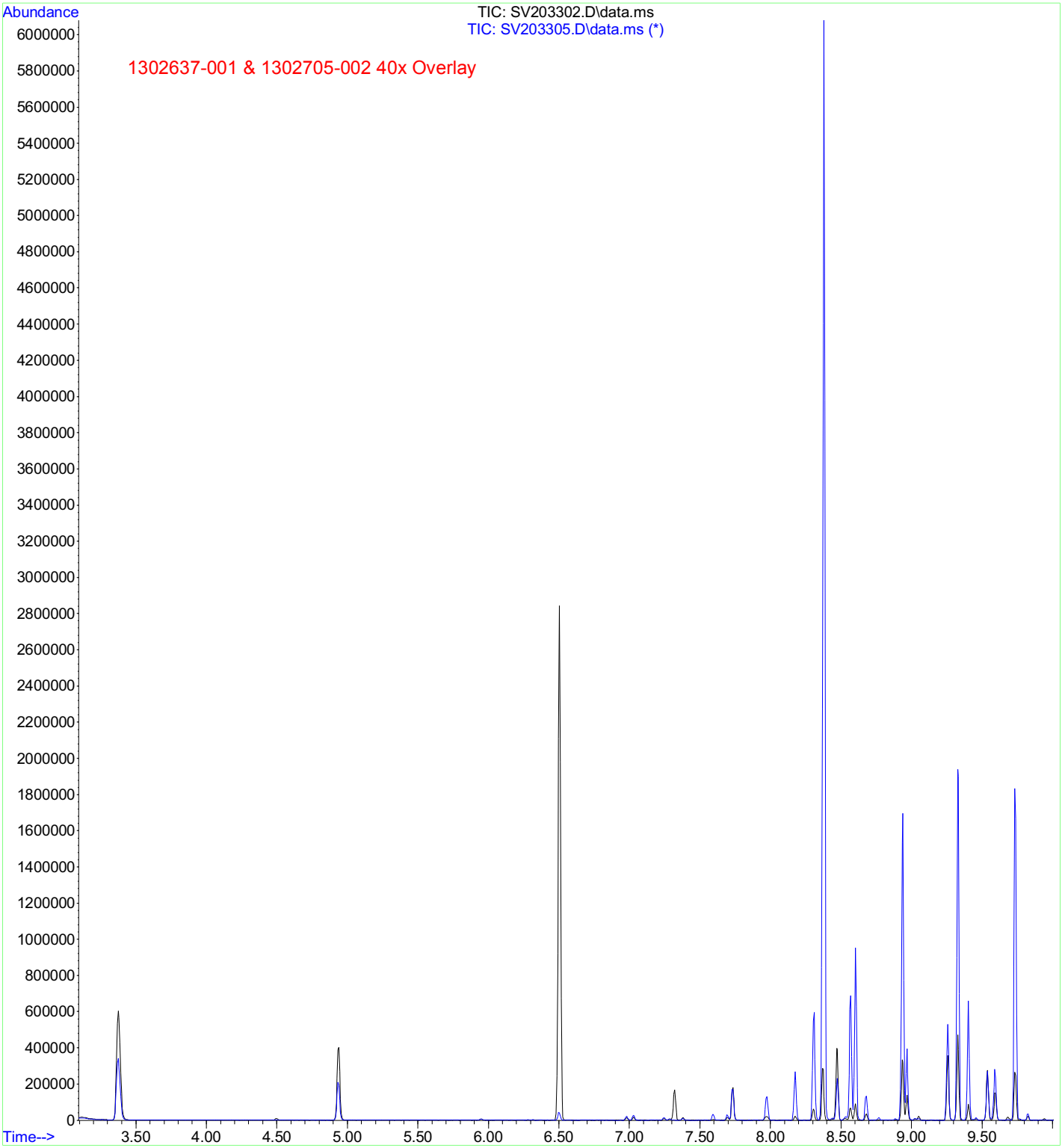

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File        :C:\msdchem\1\DATA\0312D\SV203302.D
Operator    : CSS
Acquired    : 12 Mar 2013   8:17 pm using AcqMethod BNAS.M
Instrument :   sv gcms
Sample Name: 1302637-001a 40x
Misc Info   : samp sw_8270oil
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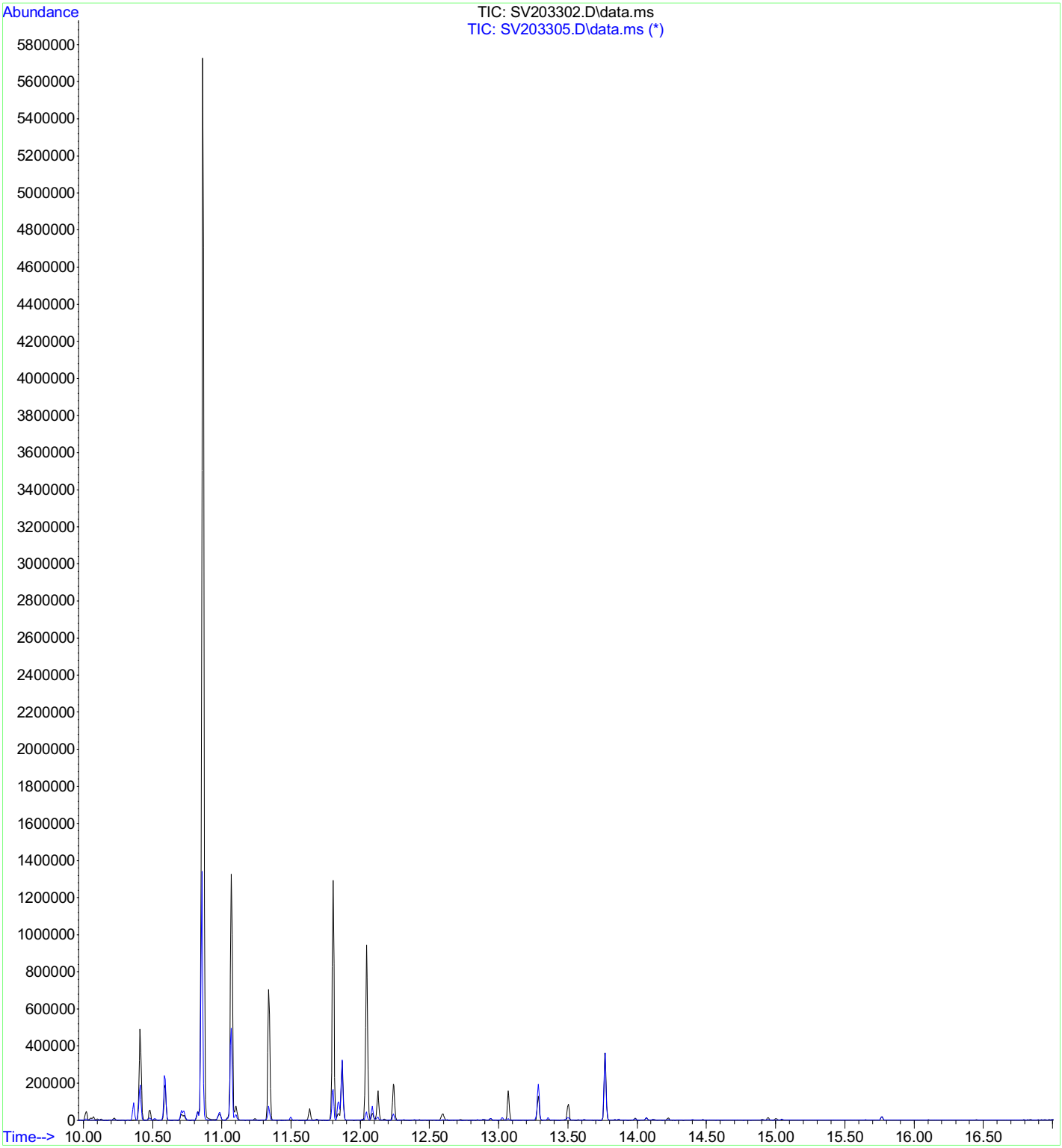

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Operator    : CSS
Acquired    : 12 Mar 2013   8:17 pm using AcqMethod BNAS.M
Instrument :   sv gcms
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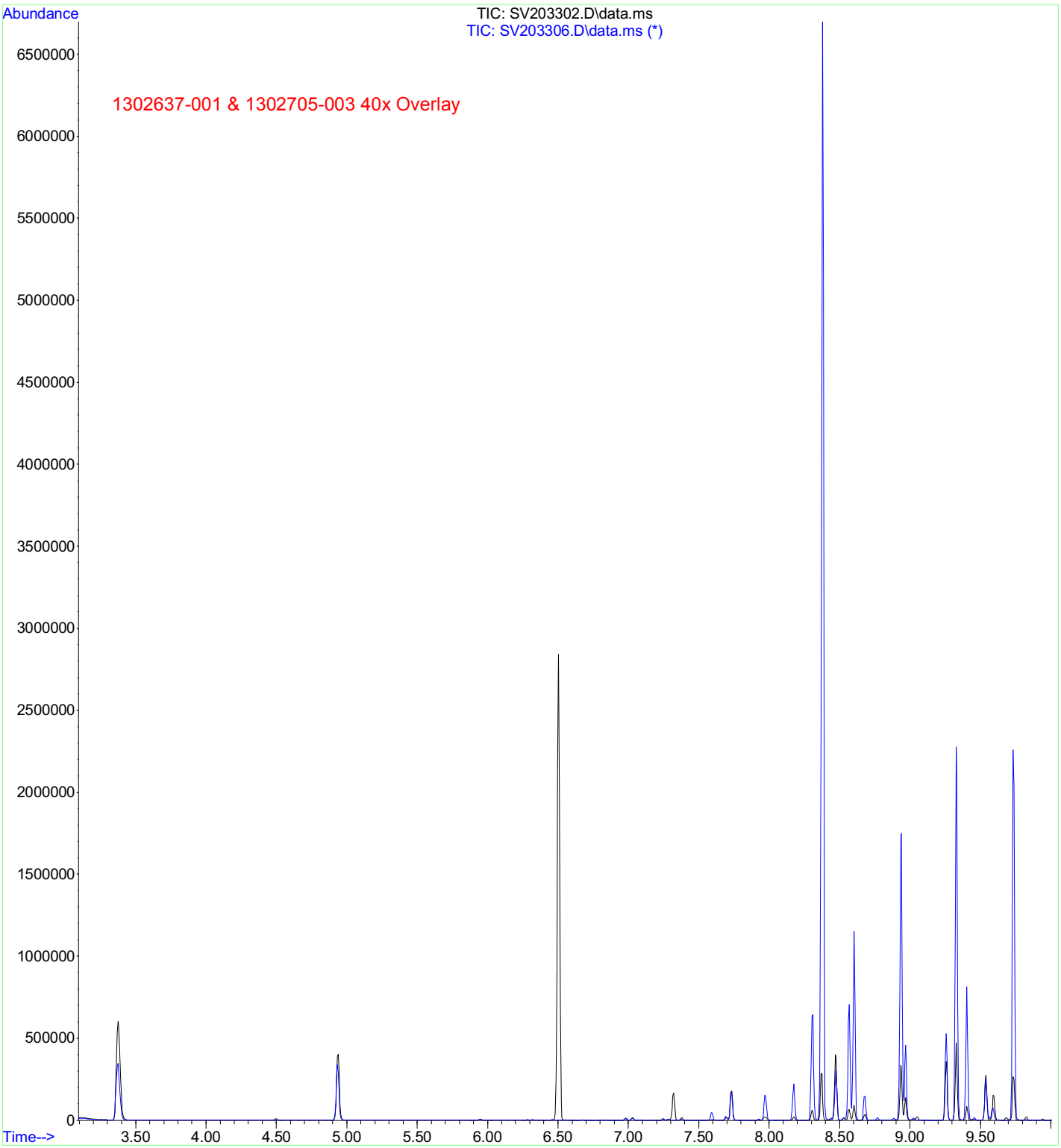

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Instrument :   sv gcms
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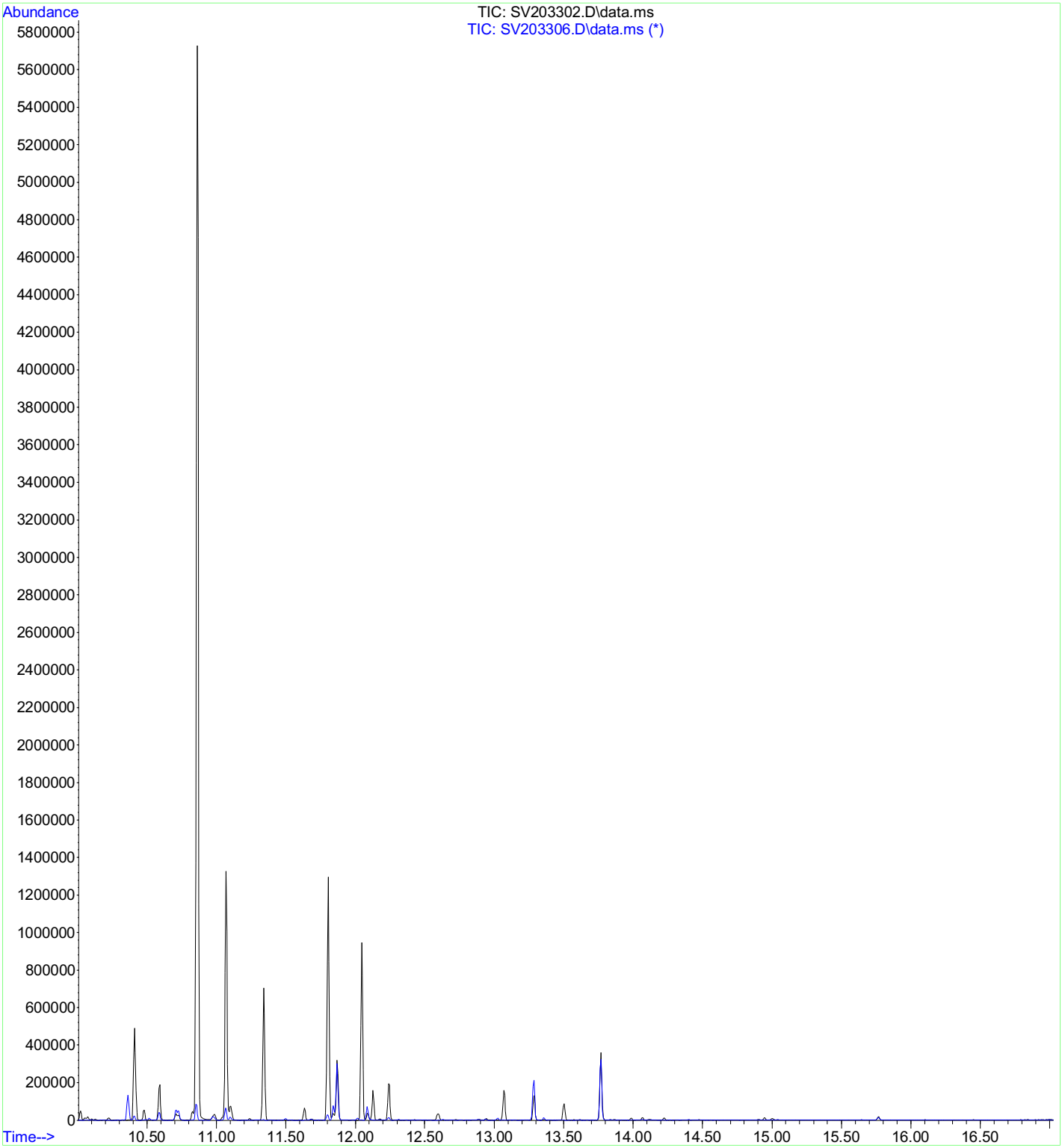

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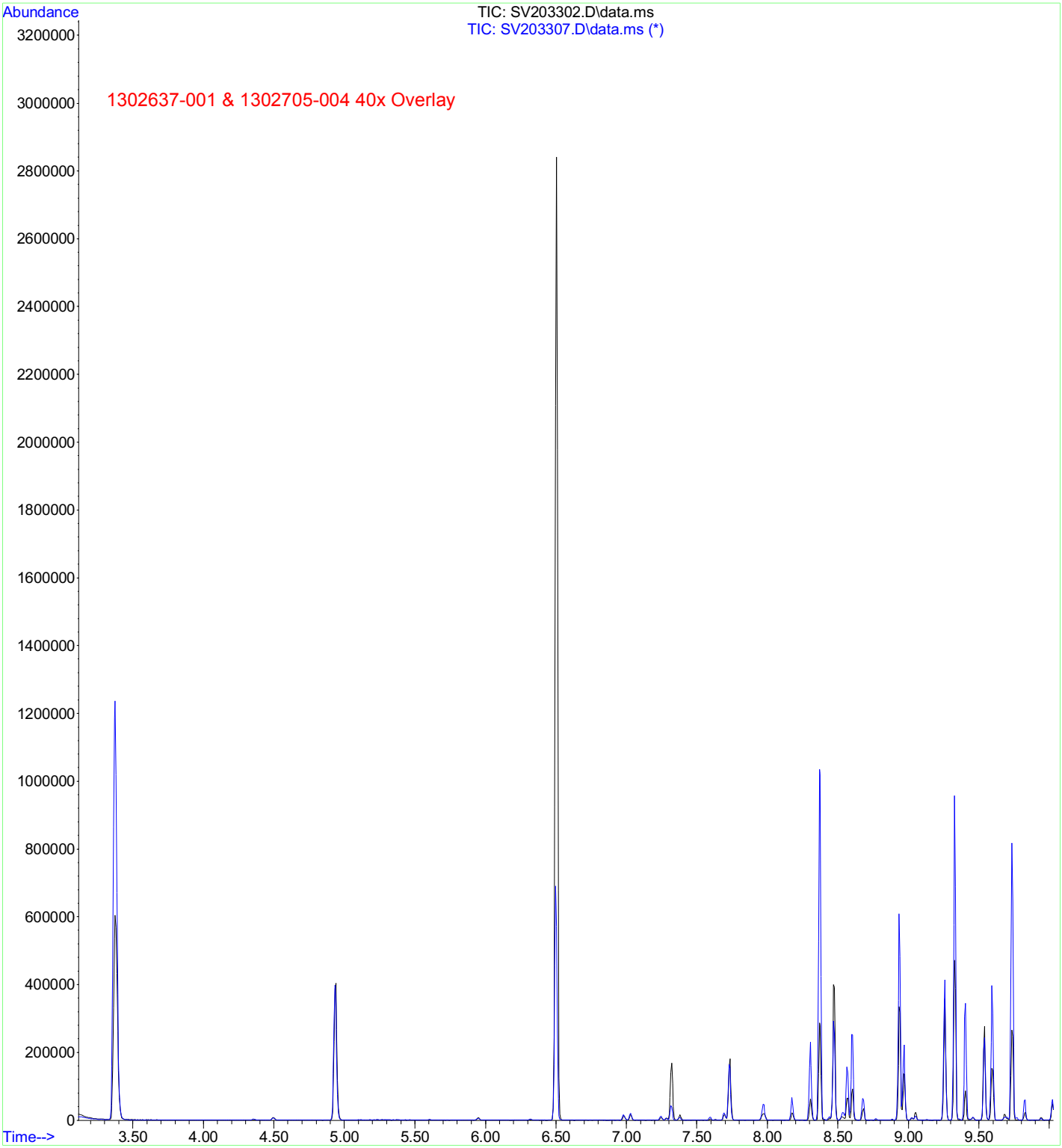

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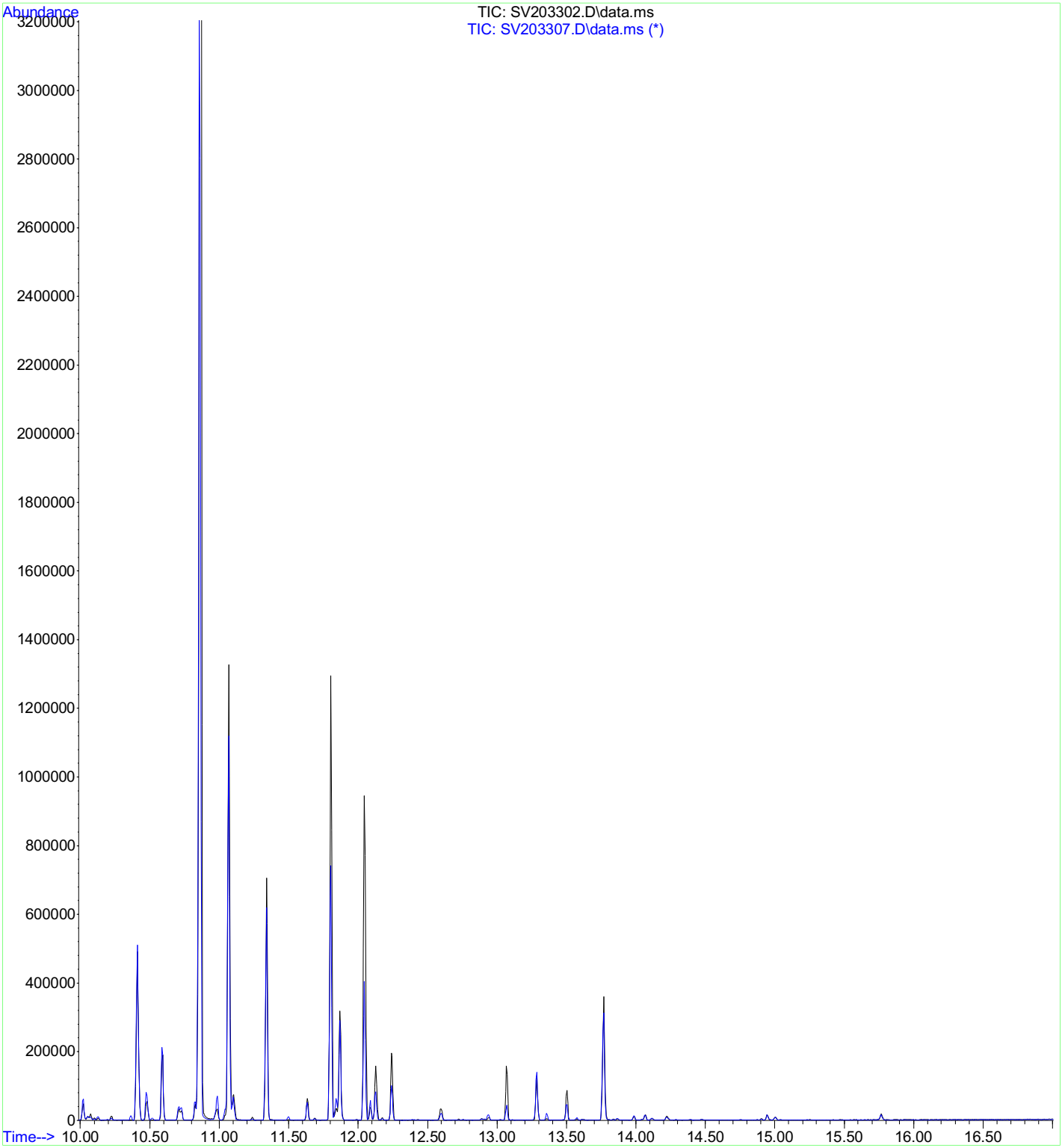

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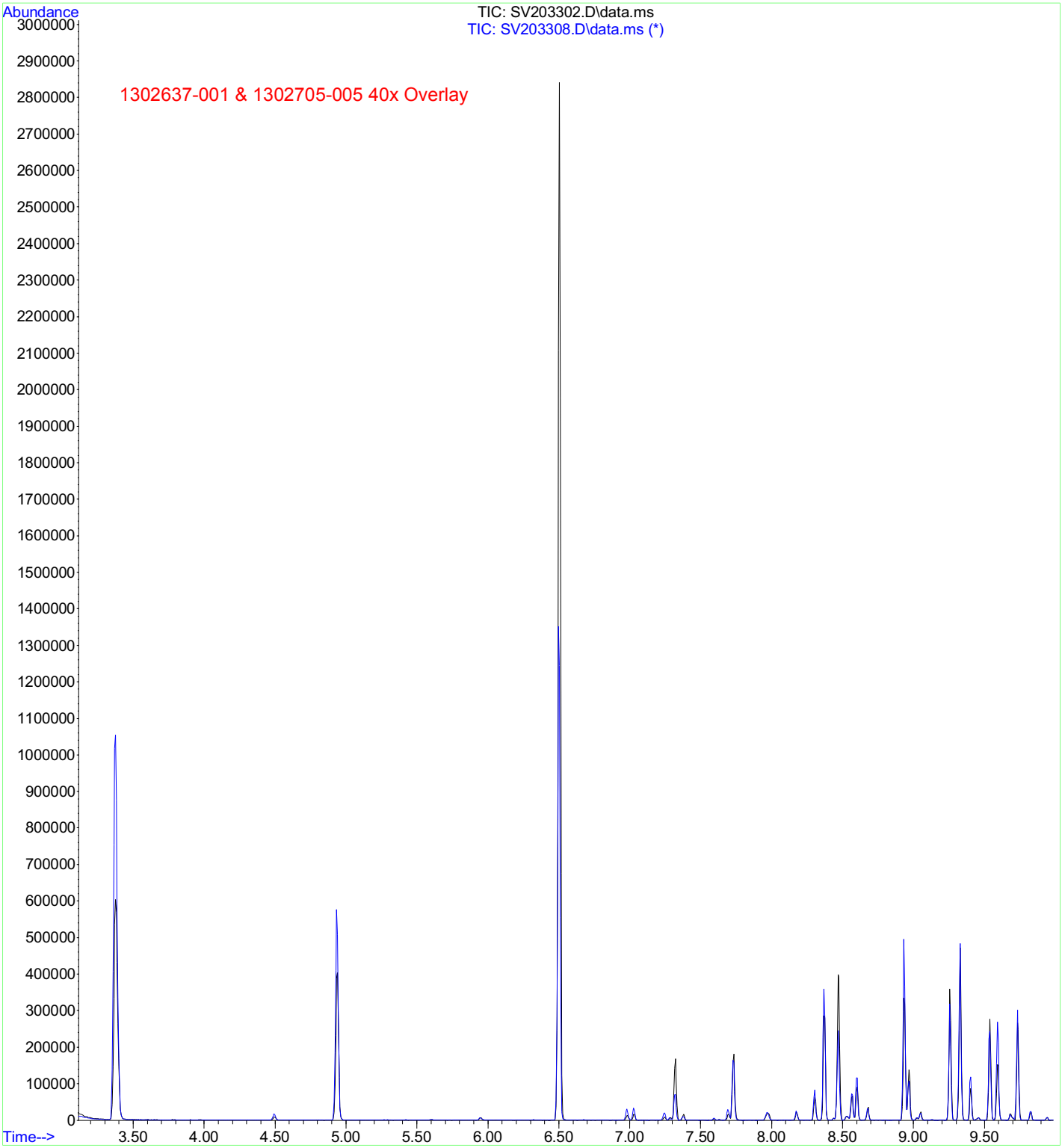

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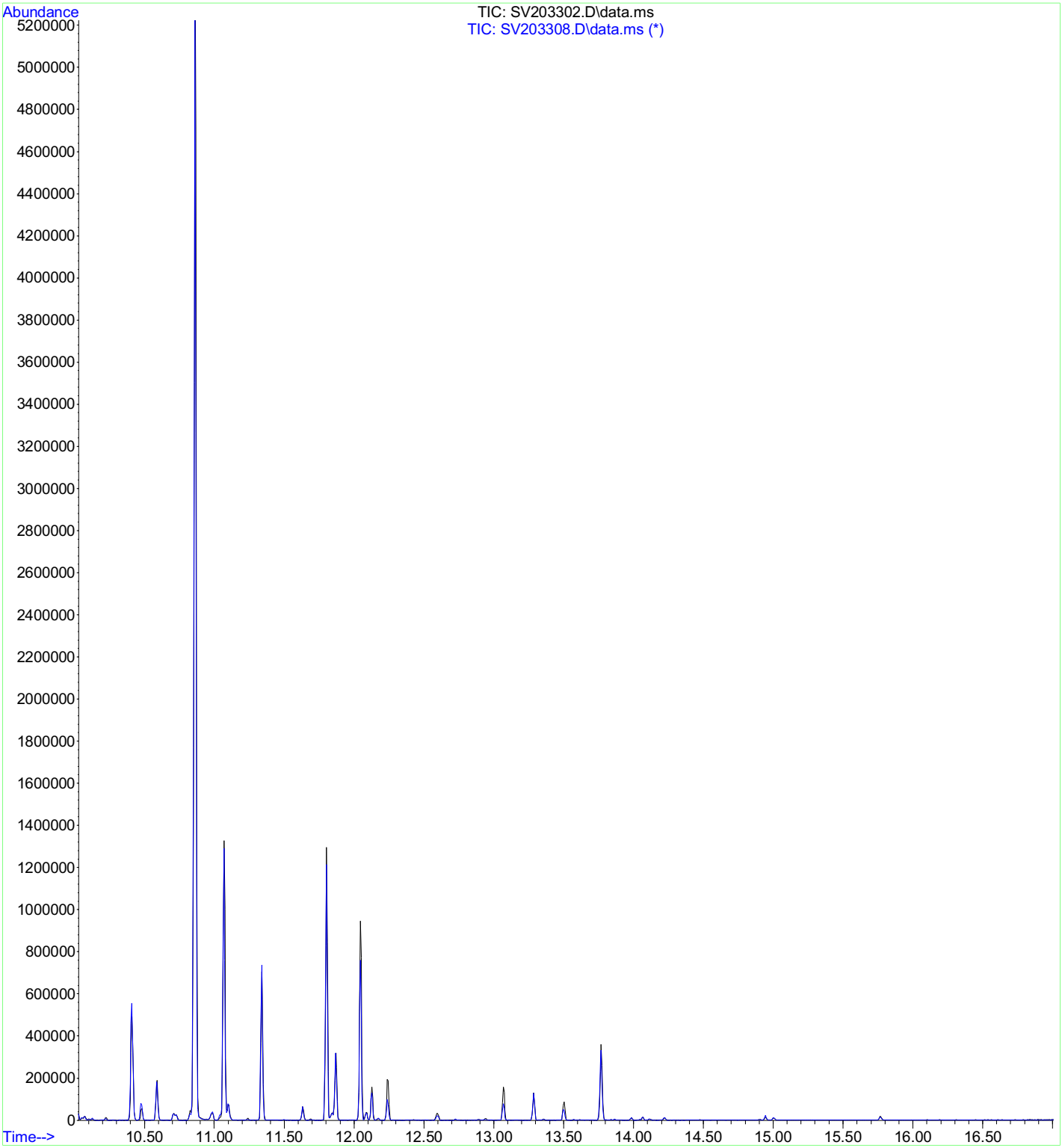

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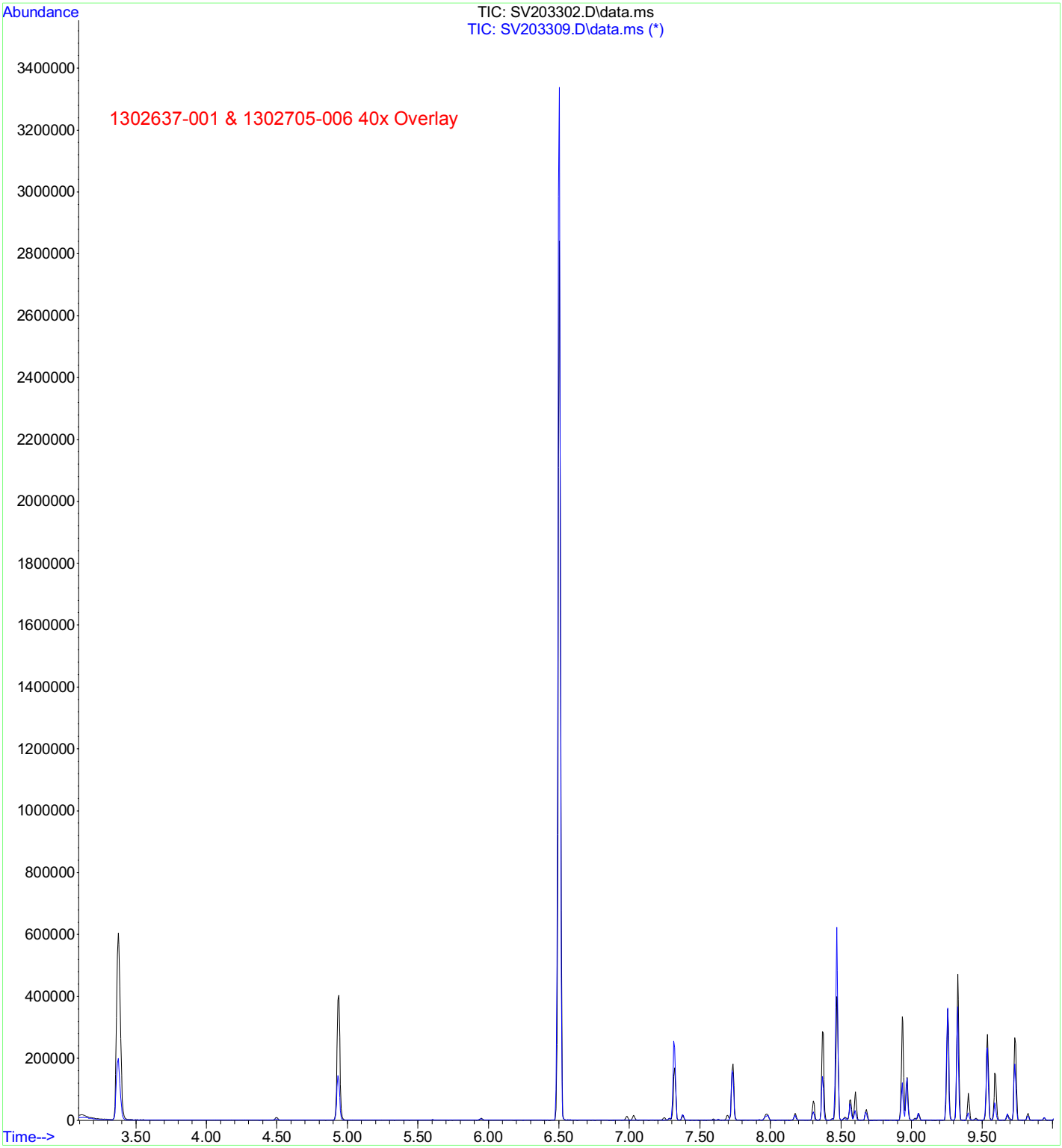

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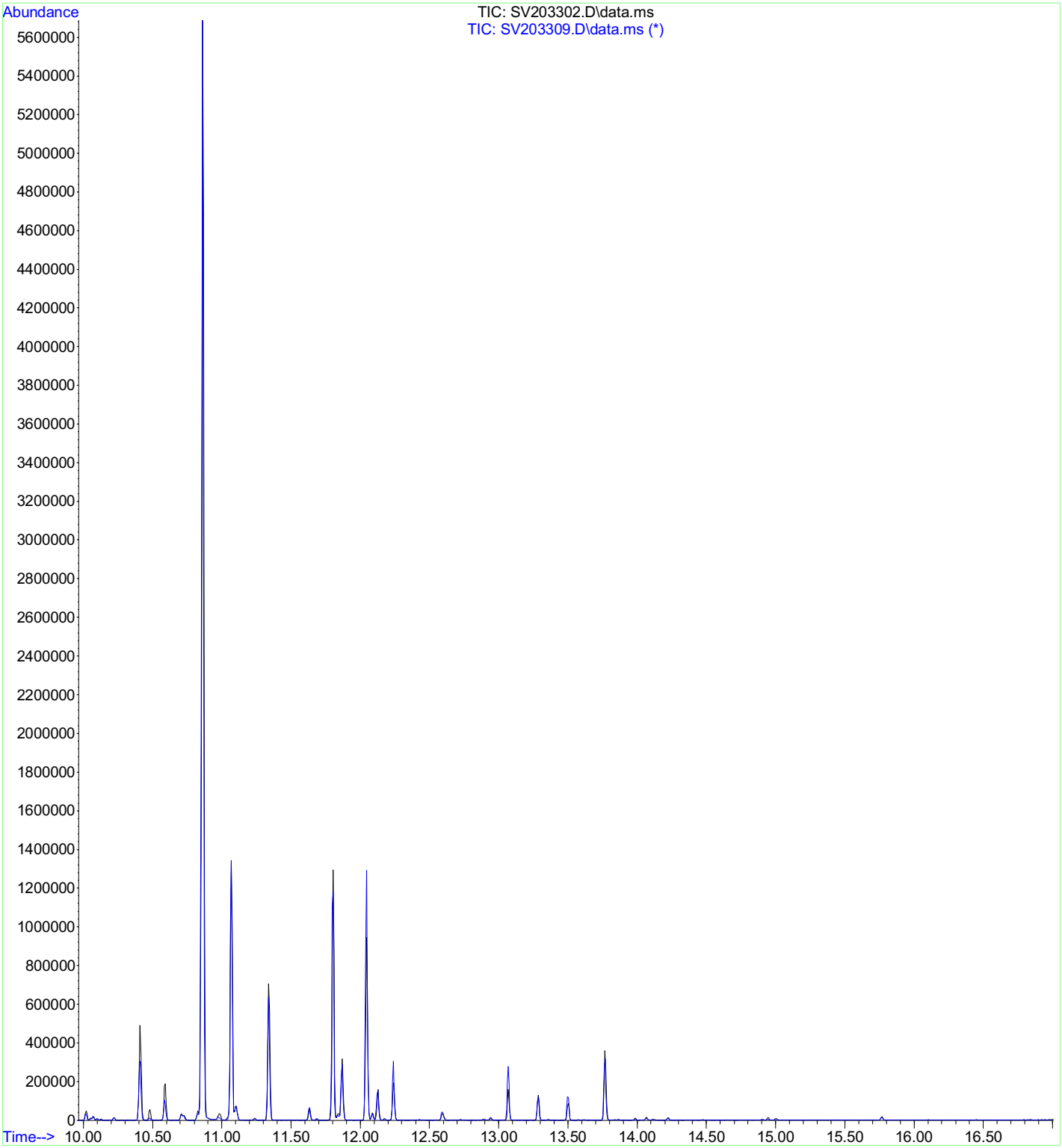

PRECISION ANALYTICAL, INC.

4450 JOHNSTON PARKWAY, UNIT B • CLEVELAND, OH 44128
(216) 663-0808 • FAX (216) 663-0656

LABORATORY WORK ORDER # 1302.705

☒ Check if same as Report To

REPORT TO: CONTACT & COMPANY: Martin Schmidt / URS Corporation	INVOICE TO: NAME
ADDRESS: 1375 Euclid Avenue Suite 600	ADDRESS
CITY: Cleveland; STATE: OH; ZIP CODE: 44115	CITY; STATE; ZIP CODE
PHONE NO.: 216-622-2400; FAX NO.: 216-622-2464	PHONE NO.; FAX NO.
EMAIL: Martin.schmidt@URS.com; PROJECT NAME/NUMBER: Detrex / 138/6274	PO#: ; QUOTE #: 1555

Turnaround Time: ☒ Std. Rush: ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. Authorizing signature

Special Instructions & QC Requirements (additional charge for QC): also send results to anton.heitger@URS.com use 1302037 tooverlay & karen.cingel@URS.com

TEMP (°C)

VISIBLE ICE (circle) YES NO

Sample Disposal (A fee will be assessed if samples are retained longer than 1 month & disposed of by lab)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

ANALYSIS REQUESTED

* P = DNAPL Product

NO.	CUSTOMER SAMPLE IDENTIFICATION	SAMPLE DATE	SAMPLE TIME	Comp	Grab	NO. OF CONT.	MATRIX (Pure Product)	VOC 8260 + TIC's	SVOC 8270 + TIC's	Ion Plot MS matching									
1	MW-6	2/28/13	1135		X	3	P	X	X	X	-1								
2	MW-9	2/28/13	1050		X	3	P	X	X	X	-2								
3	MW-10	2/28/13	1100		X	3	P	X	X	X	-3								
4	MW-8	2/28/13	1310		X	3	P	X	X	X	-4								
5	~~MW-14-3~~	~~2/28/13~~	~~[illegible]~~		~~X~~	~~3~~	~~P~~	~~X~~	~~X~~	~~X~~									
6	MW-13-2	2/28/13	1335		X	3	P	X	X	X	-5								
7	GP-15	2/28/13	1215		X	3	P	X	X	X	-6								
8																			
9																			
10																			
11																			
12																			
13																			

Samplers: (Signature)	Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Relinquished by: (Signature)	Date	Time
[signature]	Chuck Siegel	2-28	1600				
Received by: (Signature)	**Relinquished by: (Signature)**	**Date**	**Time**	**Received in laboratory by: (Signature)**		**Date**	**Time**
Chuck Siegel				Christopher		2/28/13	1600

Form 244
Rev#: 1
5/21/10

PRECISION ANALYTICAL, INC.

Sample Receipt Checklist

Work Order No. 1302.705

RUSH: ☐ Yes ☒ No ☐ NA

Date & Time Received: 2/28/13 1600 Received By: CRW

Date & Time Logged In: 2/28/13 1613 Logged In By: CRW

Date & Time Reviewed: 3/5/13 1008 Reviewed By: CRW

Carrier Name: ☐ PAI ☐ UPS ☐ FedEx ☒ Client ☐ Other/Tracking #

Samples Analyzed In House? ☒ Yes ☐ No Subbed To

Is Chain Of Custody Present? ☒ Yes ☐ No

Is Chain Of Custody Properly Filled Out? ☒ Yes ☐ No

Does Chain Of Custody Match Sample Labels? ☐ Yes ☐ No

Are Samples Past Hold Time? ☐ Yes ☒ No ☐ NA

Are Samples In Proper Containers? ☒ Yes ☐ No Intact? ☒ Yes ☐ No

No. Of Containers? 18 ☒ Glass ☐ Plastic ☐ Baggie ☒ VOA ☐ Micro ☐ Tedlar ☐ Other

When Applicable, Is Headspace Present? ☐ Yes ☐ No MSDS Provided ☐ Yes ☐ No

---

Matrix: ☐ Aqueous ☒ Liquid ☐ Sludge ☐ Solid ☐ Oil ☐ Drinking Water ☐ Soil ☐ Gas ☐ Other

On Ice? 4 °C ☒ Yes ☐ No ☐ NA

Are Samples Preserved? ☐ Yes ☐ No ☐ NA

pH Results:

Metals____ Hardness____ ☐ HN03

CN____ ☐ NaOH

COD____ NH3____ Phenol____ TOC____ TKN/TON____ Phos____ No2No3____ ☐ H2S04

Sulfide____ ☐ NaOH & ZnAcetate

Other

Field Data: ☐ pH ☐ Temp ☐ Flow ☐ TRC ☐ TRC Low ☐ Color ☐ Odor ☐ Turbidity ☐ Other

Explanation of Comments & Problems:

Samples are pure product.

Torkelson Geochemistry, Inc.							
Physical Properties Measurements							
Sample	TGI Job Number	Density of NAPL (gm/ml)	Viscosity of NAPL (centipoise)	Surface Tension Air/Water (dynes/cm)	Interfacial Tension Water/DNAPL (dynes/cm)	Surface Tension Air/NAPL (dynes/cm)	Temperature of Measurements
GP-15	13030	1.6416	5.5	56.6	14.9	39.3	60F
MW-6	13030	1.5604	1.6	63.1	19.7	35.1	60F
MW-8	13030	1.5972	3.0	60.3	21.7	36.1	60F
MW-9	13030	1.5654	2.5	55.4	18.6	37.4	60F
MW-10	13030	1.5595	2.2	64.5	19.7	36.7	60F
MW-13-2	13030	1.6128	3.7	60.6	19.7	36.7	60F
RW-17	13030	1.6254	4.3	57.2	14.7	37.7	60F
RW-19	13030	1.6213	3.8	54.3	11.9	39.9	60F