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YEAR 1 (2015) ANNUAL MONITORED NATURAL ATTENUATION REPORT

OPERABLE UNIT 3

Swope Oil and Chemical Superfund Site
Pennsauken Township, New Jersey

Submitted by

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EXECUTIVE SUMMARY

Geosyntec Consultants, Inc. (Geosyntec) has prepared this Year 1 (2015) Annual Monitored Natural Attenuation Report (Annual MNA Report) on behalf of the Swope Site Cleanup Committee (Committee) for the Swope Oil and Chemical Superfund Site (Site) in Pennsauken Township, New Jersey. This Annual MNA Report has been prepared to provide the United States Environmental Protection Agency (USEPA) with information regarding activities completed between August 2014 and December 2015 related to the Monitored Natural Attenuation (MNA) remedy for volatile organic compound (VOC) impacts to shallow groundwater (Operable Unit 3 [OU3]) at the Site, and to assess the progress of the OU3 remedy. 2015 is the first year of OU3 MNA remedy implementation following the installation of the OU1 Cap on the Site.

The activities completed in 2015 related to the implementation of the OU3 MNA remedy include the following:

- The replacement of the roadboxes for all eleven (11) Site-associated flush-mounted monitoring wells;
- The redevelopment of a shallow aquifer monitoring well;
- The survey of all Site-associated monitoring wells;
- The updating of the Quality Assurance Project Plan (QAPP);
- The deployment of additional Snap Sampler® passive groundwater sampling devices in two (2) deep aquifer monitoring wells to permit the split-sampling of these locations with USEPA;
- The completion of four (4) quarterly shallow aquifer sampling events and an annual deep aquifer sampling event;
- The collection of continuous shallow aquifer groundwater elevation data for the month preceding the quarterly shallow aquifer sampling events;
- The analysis of the groundwater elevation data to establish the predominant flow pattern in the shallow aquifer groundwater during the month period preceding each of the 2015 quarterly shallow aquifer sampling events; and
- The review and analysis of the 2015 shallow aquifer analytical data to assess whether conditions in the shallow aquifer continue to be conducive for the reductive dechlorination of chlorinated ethenes (i.e., tetrachloroethene [PCE] and trichloroethene [TCE]), and whether there is evidence that the natural attenuation of chlorinated ethenes is occurring.

The 2015 OU3 MNA remedy monitoring findings can be summarized as follows:

- The hydraulic gradient in the shallow aquifer at the Site is fairly flat with little variation in groundwater elevation between wells;
- In 2015, the predominant groundwater flow direction onto the Site was from the southeast (i.e., from MW-10S) and from the north/northeast (i.e., from GM-02S and GM-05S). Generally, these flows converge in the southeastern portion of the Site with the water table forming a saddle shape before flowing downgradient;
- Groundwater flows from the Site generally towards the west;
- Shallow aquifer groundwater flow conditions vary in response to local groundwater pumping;
- Due to the variability of the shallow aquifer groundwater flow conditions, the hydraulic position of some wells relative to the Site also varies;
- Groundwater geochemical conditions observed in the shallow aquifer in the vicinity of the Site are conducive to the reductive dechlorination of chlorinated ethenes;
- The concentrations of PCE and TCE detected in shallow groundwater in 2015 were consistent with the concentrations detected in October 2012, prior to the installation of the OU1 Cap;
- The 2015 shallow groundwater analytical results indicate that off-Site PCE and TCE sources continue to impact shallow groundwater beneath the Site;
- The 2015 deep groundwater analytical results indicate that the concentrations of PCE and TCE are generally decreasing;
- The 2015 Mann-Kendall analysis results indicate that concentrations of PCE and TCE in shallow groundwater are stable or have no discernable trend at upgradient and on-Site locations, and that concentrations of the reductive dechlorination daughter products, vinyl chloride (VC) and ethene, are stable downgradient of the Site; and
- To date, the post-Cap dataset is too small to yield statistically significant results for a first-order attenuation rate analysis.

1. INTRODUCTION

1.1 Overview

This Annual MNA Report has been prepared to provide USEPA with information regarding activities completed between August 2014 and December 2015 related to the MNA remedy for VOC impacts to shallow groundwater (OU3) at the Site, and to assess the progress of the OU3 remedy. 2015 is the first year of OU3 MNA remedy implementation.

This Annual MNA Report has been prepared to fulfill certain requirements of the following governing documents for the Site:

- *Record of Decision, Swope Oil and Chemical Company Superfund Site, Operable Unit 3 – Groundwater Remediation*, USEPA (OU3 ROD) (USEPA, 2010);
- *Final (100%) Remedial Design Report, OU3 Remedial Action*, Geosyntec (OU3 100% Design) (Geosyntec, 2013a);
- *Remedial Action Work Plan, OU1/OU3 Remedial Action, Swope Superfund Site*, Geosyntec (RAWP) (Geosyntec, 2014a);
- *Operation and Maintenance Plan, Swope Superfund Site*, Geosyntec (O&M Plan) (Geosyntec, 2014b); and
- *Remedial Action Report, OU1/OU3, Swope Superfund Site*, Geosyntec (RAR) (Geosyntec, 2015a).

This Annual MNA Report was prepared by Ms. Emily Jacesko and Mr. Scott Douglas, both of Geosyntec. This document was reviewed by Dr. Mary DeFlaun, also of Geosyntec, in accordance with the firm's internal peer review policy.

1.2 Report Organization

The remainder of this Annual MNA Report is organized as follows:

- Section 2: Project Background Information;
- Section 3: OU3 Remedy Overview;
- Section 4: 2015 OU3 MNA Remedy Activities;
- Section 5: Hydraulic Monitoring;
- Section 6: Groundwater Monitoring Results;

- Section 7: Data Usability;
- Section 8: Conclusions;
- Section 9: Recommendations; and
- Section 10: References.

2. PROJECT BACKGROUND INFORMATION

2.1 Site Description

The Site, USEPA ID#NJD041743220, is located at 8281 National Highway in an industrial area of Pennsauken Township, Camden County, New Jersey. The Site consists of an approximately 1.9-acre parcel of land where a chemical reclamation facility once operated (Swope Oil Property or Property). The Site location is shown in **Figure 1**.

A chain link fence surrounds the Site. As shown on **Figure 2**, the Site is bounded to the north and east by railroad tracks and warehouses and to the southeast by National Highway. A property occupied by the Merchantville Pennsauken Water Commission (MPWC) abuts the Site to the west. The nearest residential areas to the Site are in the Townships of Delair and Morrisville, located about 0.5 miles west and 0.8 miles southeast of the Site, respectively.

2.2 Site History

Historical records indicate that the Site operated as a chemical reclamation facility from 1965 through 1979, reportedly handling solvents, oils, printing inks, phosphate esters, hydraulic fluids, paints, and varnishes. The Site is one of several sites in and around Pennsauken Township that have elevated levels of VOCs in the soil and groundwater.

Several phases of soil and groundwater investigation and remediation have been implemented since the initiation of Site activities in 1985; the 2015 RAR provides a brief summary of these activities.

In 2014, a multi-layer impermeable Resource Conservation and Recovery Act (RCRA) cap was constructed over the entire Site (the Cap). The Cap was installed to address impacts to shallow soils (OU1). OU1 Cap construction was completed in July 2014 and was certified complete by USEPA in a letter dated 5 August 2014. In August 2014, following the completion of OU1 Cap construction, dedicated groundwater sampling and hydraulic monitoring equipment was installed in each of the existing fourteen (14) shallow Site monitoring wells; the 2015 RAR describes these activities. The OU3 MNA remedy groundwater sampling and hydraulic monitoring program was initiated in early 2015.

2.3 Conceptual Site Model

2.3.1 Hydrostratigraphy

The Site and regional hydrostratigraphy has been the subject of detailed investigations and evaluations for decades. A thorough discussion of the hydrostratigraphy is presented in the *Supplemental Investigation Report* (Geosyntec, 2009). As described in the OU3 100% Design, the subsurface hydrostratigraphy beneath the Site can be summarized as follows:

- The Site is underlain by the Potomac-Raritan-Magothy (PRM) aquifer system which consists of the three major hydrostratigraphic units: the Upper PRM, the Middle PRM, and the Lower PRM;
- The shallow water table aquifer (shallow aquifer) occurs in the Middle PRM (Raritan formation). The deep aquifer occurs in the Lower PRM (Potomac Group sediments). The Middle and Lower PRM are separated by an aquitard, which is approximately 35 feet thick beneath the Site, but varies in thickness regionally;
- Groundwater occurs under water table conditions in the Middle PRM unit at approximately 70 to 80 feet below ground surface (bgs) and under semi-confined to confined conditions within the Lower PRM unit at approximately 170 feet bgs; and
- The deep aquifer at the Site exists in the Lower PRM aquifer (Potomac Group sediments), and is separated from the shallow aquifer (Middle PRM) by an aquitard. The Potomac Group consists primarily of medium to coarse grained sand and gravel with some thin, discontinuous clay layers. The Potomac Group is approximately 70 feet thick in the vicinity of the Site and the Site deep monitoring wells were installed within this stratum.

2.3.2 Groundwater Flow Conditions

As described in USEPA's 2012 *Five-Year Review Report* for the Site (USEPA, 2012) and the OU3 100% Design, the natural groundwater flow direction at the Site is northward towards the Delaware River. However, pumping induced gradients associated with groundwater withdrawals for water supply in Camden County have altered the groundwater flow patterns in both the shallow and deep aquifers at the Site and surrounding area. In general, groundwater flow in the deep aquifer has been consistently to the south under the influence of pumping wells near to Camden. Groundwater flow conditions in the shallow aquifer have been found to be more variable as they are strongly affected by changes in the pumping rates of nearby well fields.

Transducer studies conducted in 2008/2009 and in 2012 clarified the variable groundwater flow conditions in the shallow aquifer. The 2008/2009 transducer study resolved historically conflicting groundwater flow interpretations that had been developed during the prior twenty-five year remedial investigation period, and the findings of the 2012 study, conducted as part of the Pre-Design Investigation (PDI), were consistent with those of the 2008/2009 study. Figures from the OU3 100% Design that illustrate the findings of the 2008/2009 and 2012 transducer studies are included in **Appendix A**. The 2008/2009 and 2012 shallow aquifer transducer studies found that the hydraulic gradient in the shallow aquifer at the Site is fairly flat and groundwater flows slowly under the Site. The studies also found that the water table at the Site formed a saddle shape, with groundwater in the shallow aquifer flowing onto the Site from both the north and the south, and then converging and flowing from the Site towards the west. Because the shallow aquifer in the vicinity of the Site is influenced by local groundwater pumping, and because the direction of pumping relative to the Site and the volume of pumping varies with time, the pattern of shallow groundwater flow at the Site also varies with time.

On the basis of the findings of the 2008/2009 and 2012 transducer studies, and as presented in the OU3 100% Design, the fourteen (14) Site-associated shallow aquifer monitoring wells were grouped based on their identified hydraulic positions relative to the Site as follows:

- On-Site wells: GM-01S, GM-03RS, MW-01, MW-02, and MW-04;
- Off-Site upgradient wells: GM-02S and MW-10S;
- Off-Site downgradient wells: GM-07S, GM-08S, and MW-09S; and
- Off-Site sidegradient wells: GM-05S, GM-06S, MW-07, and MW-11S.

The analysis of transducer data collected in 2015 indicates that due to the variability of the shallow aquifer groundwater flow conditions, the hydraulic position of some wells relative to the Site also varies. The analysis of the 2015 transducer data is discussed in Section 5 below.

2.3.3 Historic VOC Plume Conditions

The OU3 100% Design includes a detailed discussion of the historic VOC plume conditions (i.e., prior to the installation of the OU1 Cap). Summaries of this information as it relates to the shallow aquifer and the deep aquifer in the vicinity of the Site are presented below. Tables and figures from the OU3 100% Design relevant to the understanding of the historic VOC plume conditions are included in **Appendix A**.

2.3.3.1 Shallow Aquifer

VOCs, specifically PCE, TCE, and cis-1,2-dichloroethene (cDCE), have historically been detected at low levels in the shallow aquifer beneath the Site. These compounds have also been historically detected in wells located hydraulically upgradient from the Site. These regional VOC impacts have been well documented over decades of remedial investigations and have been acknowledged by USEPA (2012). The potential for on-Site VOC impacts has been mitigated, and it is anticipated that the low-level VOC concentrations in the shallow aquifer potentially associated with the Site will naturally attenuate, provided that these on-Site conditions are not exacerbated by off-Site or "background" groundwater conditions in the area. VOCs in shallow groundwater at upgradient locations represent a continuous potential source of VOCs to shallow groundwater beneath the Site.

2.3.3.2 Deep Aquifer

Deep aquifer groundwater monitoring wells upgradient of the Site have historically exhibited VOC concentrations greater than concentrations on or downgradient from the Site. As a result of these historic conditions, USEPA acknowledged that contaminants in the on-Site deep wells are likely the result of upgradient sources. Therefore, the OU3 ROD requires only yearly monitoring in the deep aquifer.

3. OU3 REMEDY OVERVIEW

3.1 Summary of the OU3 Remedy

The OU3 remedy was selected by USEPA with the concurrence of the New Jersey Department of Environmental Protection (NJDEP). The OU3 remedy presented in the OU3 ROD includes the following primary components:

1. MNA for the shallow aquifer;
2. Groundwater monitoring for the deep aquifer; and
3. Establishment of a Classification Exception Area (CEA), which is an institutional control, to minimize the potential for exposure to contaminated groundwater until the aquifer meets the cleanup goals.

The OU3 MNA remedy for shallow groundwater was initiated following the final inspection of the completed OU1 Cap. In August 2014, as described in the 2015 RAR, dedicated groundwater sampling and hydraulic monitoring equipment were installed in each of the existing fourteen (14) shallow aquifer monitoring wells. The first OU3 remedy shallow aquifer MNA groundwater sampling event was completed in the first quarter (Q1) of 2015.

Snap Sampler passive groundwater sampling devices were deployed in the eight (8) deep aquifer monitoring wells in October 2012, and additional Snap Samplers® were installed in two (2) deep wells in September 2015. The first annual deep aquifer monitoring groundwater sampling event was completed in October 2015.

The application for the Site CEA was submitted as Appendix D of the RAWP, and the CEA was established by NJDEP effective 4 February 2014.

3.2 Performance Standards for the OU3 MNA Remedy

The applicable cleanup standards for the OU3 MNA remedy are the State of New Jersey Class II-A Ground Water Quality Standards (NJGWQSs [II-A]) or the Federal Maximum Concentration Limits (MCLs), whichever is lower. PCE, TCE, and cDCE, are the primary Site compounds of concern (COCs) subject to the MNA performance evaluation.

USEPA acknowledged in the OU3 ROD that off-Site groundwater VOC sources exist in the immediate area of the Site at levels above NJGWQSs. Section XII of the Statement of Work (i.e., Appendix A of the *Administrative Settlement Agreement and Order on Consent for the*

Development of the Remedial Design, Operable Unit 1 (USEPA, 2011)) describes a process by which the Committee may propose to modify the performance standards after five (5) years of sampling.

3.3 Applicable or Relevant and Appropriate Regulations for OU3

Applicable state regulations include the NJDEP *Technical Requirements for Site Remediation* (TRSR) promulgated as N.J.A.C. 7:26E (NJDEP, 2012). These regulations provide requirements for conducting remedial investigations and remedial actions at a site. The applicable cleanup standards for groundwater at the Site are the NJGWQSs promulgated as N.J.A.C. 7:9C (NJDEP, 2014). These standards provide the basis for protection of ambient groundwater quality in New Jersey through the establishment of constituent standards for groundwater pollutants. They are equivalent to or more stringent than the federally promulgated MCLs. Sampling protocols for collection of groundwater and other environmental media are outlined in NJDEP's *Field Sampling Procedures Manual* (FSPM) (NJDEP, 2005). Applicable federal standards include the Safe Drinking Water Act (SDWA) promulgated as 40 CFR 141-149 (2008). These standards provide the basis for protection of drinking water and would become the applicable cleanup standards for groundwater at the Site if MCLs were to be made more stringent than NJGWQSs.

4. 2015 OU3 MNA REMEDY ACTIVITIES

4.1 Chronology and Description of Events

The table below summarizes the activities that have been completed since the initiation of the OU3 MNA remedy.

Date	Description
August 2014	Shallow well dedicated equipment installation and transducer check
January 2015	Pre-Q1 shallow well sampling event transducer check
February 2015	Flush-mounted monitoring well roadbox replacement (GM-02S, GM-02D, GM-05S, and GM-06S)
March 2015	Transducer check; Q1 2015 shallow well sampling event; roadbox re-replacement (GM-02S and GM-02D); GM-02S well redevelopment, and monitoring well survey
May 2015	Pre-Q2 shallow well sampling event transducer check
June 2015	Q2 2015 shallow well sampling event
August 2015	Flush-mounted monitoring well roadbox replacement (MW-07, GM-05D, GM-06D, GM-08S, GM-08D, MW-09S, and MW-11S)
September 2015	Pre-Q3 shallow well sampling event transducer check; and deployment of additional Snap Samplers for split sampling deep wells GM-01D and GM-04D with USEPA
October 2015	QAPP updated; Q3 2015 shallow well sampling event; annual deep aquifer monitoring sampling event; and pre-Q4 shallow well sampling event transducer deployment
November-December 2015	Q4 2015 shallow well sampling event

4.2 Roadbox Replacement, GM-02S Well Redevelopment, and Well Survey

Between February and August 2015, the roadboxes for all Site-associated flush-mounted monitoring wells were replaced by Summit Drilling, a New Jersey licensed well driller. The roadboxes were replaced in order to maintain the physical integrity of the Site-associated monitoring well network. In February 2015, when the roadbox for well GM-02S was replaced, it was also necessary to replace a PVC collar that is fitted over the top of the well and that helps to

prevent foreign materials from entering the well. The replacement of the GM-02S PVC collar prompted the need to resurvey the top of the well casing (including the PVC collar). In March 2015, the top of the casings of all 22 of the Site-associated monitoring wells were surveyed by New Jersey licensed surveyor Dennis W. Sklar, Inc., in order to provide a consistent benchmark for the hydraulic monitoring of the Site monitoring wells during the implementation of the OU3 MNA remedy. The March 2015 Site-associated monitoring well survey data is included in **Appendix B**.

On 9 March 2015, at the time of the Q1 2015 shallow well sampling event, it was discovered that the recently replaced GM-02S and GM-02D roadboxes had been destroyed. GM-02S and GM-02D are located in the parking lot area of a warehouse building and despite the placement of traffic cones, the newly replaced roadboxes were destroyed, likely by a snowplow or other vehicle. The GM-02S and GM-02D roadboxes were replaced again on 12 March 2015. In addition, because the damage to the roadbox may have allowed surface runoff to enter the well, GM-02S was redeveloped by pumping prior to the collection of the Q1 2015 groundwater samples from the well. GM-02D was not redeveloped at that time because the well was not scheduled to be sampled for several months, by which time ambient conditions were expected to have been reestablished. Summit Drilling redeveloped GM-02S by purging the well using an electric submersible pump. During the redevelopment of GM-02S approximately 4.5 well volumes were purged from the well; groundwater quality parameters were recorded at five (5) minute intervals until the parameters stabilized to within ranges specified in the *Field Sampling Plan* (FSP) for the Site (Geosyntec, 2013b). The GM-02S redevelopment groundwater quality parameter monitoring record is included in **Appendix C**. Following the redevelopment of GM-02S, the well was purged and sampled using a bladder pump and low-flow techniques for collection of the Q1 2015 groundwater samples.

4.3 QAPP Update

In October 2015, the *Quality Assurance Project Plan* (QAPP) for the Site was updated to include the analysis of shallow aquifer groundwater samples for 1,4-dioxane by USEPA Method SW-846 8270D SIM (Geosyntec, 2015b). 1,4-dioxane was historically included as an analyte for USEPA Method 624 for the analysis of aqueous samples for VOCs. However, in 2013, 1,4-dioxane was removed from the Method 624 analyte list. For this reason, shallow aquifer groundwater samples collected in March and June 2015 (Q1 and Q2) were not analyzed for 1,4-dioxane. Shallow aquifer groundwater samples collected in October and December 2015 (Q3 and Q4) were analyzed for 1,4-dioxane. The updated QAPP was submitted to USEPA in October 2015.

4.4 Shallow Aquifer MNA Quarterly Groundwater Sampling Events

Shallow aquifer MNA quarterly groundwater sampling events were completed in 2015 in March (Q1), June (Q2), October (Q3), and November-December (Q4). The quarterly sampling events were conducted in accordance with the OU3 100% Design, the RAWP, and the associated FSP and QAPP, as follows:

- Approximately 1 month prior to Q1 and Q2 2015 shallow well sampling events, a visit was made to the Site to verify the ongoing operation of the pressure transducers. Approximately 1 month prior to the sampling events in Q3 and Q4 2015, transducers were deployed in the shallow wells;[1]
- A synoptic round of manual groundwater level gauging measurements was completed at the start of each quarterly shallow well sampling event;
- During each shallow well quarterly sampling event, the fourteen (14) shallow wells that comprise the Site-associated shallow aquifer monitoring well network were purged and sampled using the dedicated bladder pumps installed in each well and following USEPA low-flow sampling protocols;
- During the purging of each shallow well, periodic measurements were made of the depth to groundwater as well as the following groundwater quality parameters: pH, temperature, specific conductance, dissolved oxygen (DO), oxidation-reduction potential (ORP), and turbidity. Samples were collected from the shallow wells only after the groundwater quality parameters had stabilized to within ranges specified in the FSP; and
- During each shallow well quarterly sampling event, the fourteen (14) Site-associated shallow wells were sampled for laboratory analysis for VOCs, 1,4-dioxane (Q3 and Q4 only), iron and manganese (total and dissolved), total suspended solids (TSS), total alkalinity, dissolved hydrocarbon gases (methane, ethane, and ethene), total organic carbon (TOC), sulfate, and nitrate, by analytical methods specified in the QAPP.

[1] Originally, it was planned to leave the transducers in the shallow wells between sampling events and then to perform transducer checks approximately 1 month or more prior to each event. However, it was determined that the desiccant could not protect the transducers from moisture over the long term and therefore the transducers could not be left in the wells between sampling events. Thus, beginning after the Q2 2015 sampling event, the transducers were only deployed in the shallow wells for the 1-month periods preceding the Q3 and Q4 2015 sampling events. These issues and response actions are discussed in detail in **Appendix F**.

The stabilized groundwater quality parameter measurements for each shallow well for each quarterly sampling event are summarized in **Table 1**. The monitoring well low-flow purging and sampling records from each quarterly sampling event are included in **Appendix C**.

4.4.1 Q1 2015

The Q1 2015 shallow well sampling event was conducted between 9 and 12 March 2015. During the Q1 event, shallow wells MW-01, MW-04, MW-07, and MW-10S were split-sampled between Geosyntec and USEPA. For the reason described above, the Q1 shallow aquifer groundwater samples were not analyzed for 1,4-dioxane.

4.4.2 Q2 2015

The Q2 2015 shallow well sampling event was conducted between 8 and 10 June 2015. For the reason described above, the Q2 shallow aquifer groundwater samples were not analyzed for 1,4-dioxane.

4.4.3 Q3 2015

The Q3 2015 shallow well sampling event was conducted between 5 and 8 October 2015. During the Q3 event, shallow wells MW-01, MW-04, MW-07, and MW-10S were split-sampled between Geosyntec and USEPA.

4.4.4 Q4 2015

The Q4 2015 shallow well sampling event was conducted between 30 November and 3 December 2015.

4.5 Deep Aquifer Monitoring Activities

4.5.1 Additional Snap Sampler Deployment

On 10 September 2015, under the oversight of USEPA, Geosyntec deployed three (3) additional Snap Samplers and associated 40-milliliter (mL) sample collection bottles in each of two (2) Site-associated deep aquifer monitoring wells, GM-01D and GM-04D. With the additional Snap Samplers added, there are now seven (7) Snap Samplers deployed in well GM-01D and five (5) Snap Samplers deployed in well GM-04D. Two (2) Snap Samplers are deployed in each of the remaining six (6) Site-associated deep aquifer monitoring wells. The Snap Samplers in each deep well are hung single-file (i.e., in a line) in the middle of the screened interval of each well. The

additional Snap Samplers were deployed in wells GM-01D and GM-04D at the behest of USEPA in order to permit the splitting of groundwater samples from these two (2) deep wells between Geosyntec and USEPA.

4.5.2 Deep Aquifer Monitoring Annual Sampling Event

The 2015 deep aquifer monitoring annual sampling event was completed in October 2015. The deep aquifer monitoring samples were collected from the deep wells using the Snap Samplers and were submitted for laboratory analysis for VOCs in accordance with the FSP and QAPP. Samples collected from deep wells GM-01D and GM-04D were split between Geosyntec and USEPA. Due to issues with the GM-01D Snap Samplers and the presence of fine sediment in the well, a duplicate sample could not be collected from GM-01D as per the QAPP. A summary of the October 2015 deep aquifer sampling event, which discusses the issues encountered, is included as **Appendix D**.

5. HYDRAULIC MONITORING

5.1 Groundwater Elevation Data Collection

5.1.1 Shallow Aquifer

As per the OU3 100% Design, programmable pressure transducers were used to collect instantaneous groundwater elevation measurements continuously at a frequency of one reading every 2 minutes at each of the fourteen (14) Site-associated shallow wells for at least 1 month preceding each shallow aquifer sampling event. The transducers were calibrated based on top of well casing elevation survey measurements and manual depth to water measurements collected at least 1 month prior to each quarterly shallow well sampling event. Then, at the beginning of each quarterly shallow well sampling event, prior to the commencement of purging and sampling activities, manual depth to water measurements were again collected (**Table 2**). The transducer data, along with manual well gauging measurements and top of well casing elevation survey measurements, were incorporated into a Microsoft Access database for processing and analysis. Each transducer dataset was adjusted for sensor drift; the transducer data drift correction methodology is described in **Appendix E**. The moisture intrusion issues that caused several transducers to malfunction, as well as the steps taken to mitigate those issues are described in **Appendix F**.

5.1.2 Deep Aquifer

Manual groundwater level gauging measurements were collected at each of the eight (8) Site-associated deep aquifer monitoring wells prior to the collection of the annual deep aquifer monitoring samples in October 2015. The deep well gauging measurements are summarized in **Table 3**.

5.2 2015 Shallow Aquifer Groundwater Flow Conditions

The 2015 drift-corrected transducer datasets were analyzed by methods described in **Appendix G** to establish the patterns of shallow aquifer groundwater flow that predominated during the 1-month period preceding each of the 2015 quarterly shallow well sampling events.

Generally consistent with the findings of the 2008/2009 and 2012 transducer studies, the findings of the analysis of the 2015 drift-corrected transducer datasets indicate the following:

- The hydraulic gradient in the shallow aquifer at the Site is fairly flat;

- Groundwater typically flows onto the Site from the southeast (i.e., from the direction of MW-10S) and from the north/northeast (i.e., from the directions of GM-02S and GM-05S) converging in the southeastern portion of the Site;
- Groundwater flows from the Site generally towards the west; and
- Shallow aquifer groundwater flow conditions likely vary in response to variable local groundwater pumping.

The 2015 transducer data analysis findings also indicate that the direction of shallow aquifer groundwater flow across and from the Site varies between northwest, west, west-southwest, and southwest. As a result, wells that have previously been identified as being upgradient from the Site are sometimes sidegradient from the Site and *vice versa* (i.e., GM-02S, GM-05S, and to a lesser extent MW-10S). In addition, because of the variability in the predominant direction of groundwater flow across and from the Site, wells located to the northwest, west, west-southwest, and southwest of the southwestern Site property boundary (i.e., GM-07S, GM-08S, MW-07, MW-09S, and MW-11S) can be considered either downgradient or sidegradient to groundwater flow from the Site. However, while these findings indicate minor variability in the shallow aquifer groundwater flow conditions, groundwater consistently flows on to the Site from the southeast (i.e., from the direction of MW-10S), and from the north/northeast (i.e., from the direction of GM-02S and GM-05S). Upgradient off-Site sources of VOC impacts to groundwater are known to exist to the southeast and to the north/northeast of the Site.

On the basis of the analysis of the 2015 transducer data, for the purposes of this report the fourteen (14) Site-associated shallow aquifer monitoring wells were grouped based on their identified typical hydraulic position(s) relative to the Site as follows:

- On-Site wells: GM-01S, GM-03RS, MW-01, MW-02, and MW-04;
- Off-Site upgradient wells: GM-02S, GM-05S and MW-10S;
- Off-Site downgradient/sidegradient wells: GM-08S, MW-07, MW-09S, and MW-11S; and
- Off-Site sidegradient wells: GM-06S and GM-07S.

The approximate percentages of the time that groundwater flowed onto the Site from the southeast and from the north/northeast in 2015 were assessed by calculating the percentages of the time that groundwater flowed onto the Site from the directions of MW-10S and GM-02S/GM-05S, respectively, during the month preceding each of the four (4) quarterly shallow well sampling events completed in 2015. In addition, a similar analysis was conducted to assess the direction of groundwater flowing from the Site. The following table summarizes the findings:

	Q1 2015	Q2 2015	Q3 2015	Q4 2015
Locations Hydraulically Upgradient of Site	MW-10S 100% GM-05S 92%	MW-10S 53% GM-05S 41%	MW-10S 100% GM-05S 37% GM-02S 37%	MW-10S 100% GM-05S 100%
Location Most Hydraulically Downgradient of Site	MW-11S 97%	MW-11S 92% MW-07 7%	GM-08S 39% MW-07 38% GM-03RS 17%	GM-01S 78% GM-03RS 14% GM-08S 8%

Note: % refers to the percentage of time in that particular month for that location. Results that indicated a pattern of less than 5% were not reported.

Plots of the drift-corrected transducer data collected in the month preceding each of the 2015 quarterly shallow well sampling events are presented in **Figures 3a** through **3d**,[2] and groundwater potentiometric surface maps created based on the drift-corrected transducer measurements collected at midnight (0:00) on the first day of each 2015 quarterly shallow well sampling event[3] are presented on **Figures 4a** through **4d**.[4]

[2] As discussed in **Appendix F**, transducer datasets that exhibited aberrant readings due to transducer malfunctions were not included in the analysis of pre-sampling event shallow aquifer groundwater flow patterns.
[3] Choosing to illustrate the groundwater potentiometric surface contours as they existed at midnight on the first day of each quarterly shallow well sampling event was done to be consistent with the OU3 100% Design.
[4] Since, as noted in the OU3 100% Design, MW-01 is screened at a depth consistent with other shallow monitoring wells while MW-02 is screened at a shallower interval, MW-02 transducer measurements were not used to create the groundwater surface elevation maps presented on **Figures 4a** through **4d**.

6. GROUNDWATER MONITORING RESULTS

6.1 Shallow Aquifer Groundwater Quality Parameters

In 2015, measurements of groundwater quality parameters, including pH, temperature, specific conductance, dissolved oxygen (DO), oxidative-reduction potential (ORP), and turbidity were collected at each shallow well during each quarterly shallow well sampling event. The stabilized groundwater quality parameter values for each shallow well for each sampling event are presented in **Table 1.** The ranges of the groundwater quality parameters most pertinent to the evaluation of MNA in the shallow aquifer are as follows:

- pH ranged from 3.99 to 7.22;
- DO ranged from 0.38 to 8.94 milligrams per liter (mg/L); and
- ORP ranged from -63.2 to 422.9 millivolts (mV).

The 2015 shallow aquifer groundwater quality parameter measurements were consistent with those collected during previous groundwater sampling (**Appendix A**).

6.2 Shallow Aquifer Geochemical Conditions

In 2015, the geochemical conditions present at each shallow well were evaluated at the time of each quarterly shallow well sampling event via the collection and analysis of groundwater samples for total and dissolved iron and manganese, TSS, alkalinity, dissolved hydrocarbon gases (methane, ethane, and ethene), TOC, sulfate, and nitrate. The geochemical parameter analytical results are presented in **Table 4** and on **Figure 5**, and can be summarized as follows:

- Total iron concentrations ranged from 0.0023 to 46.9 mg/L, and dissolved iron concentrations ranged from 0.00071 to 48.7 mg/L. The highest concentrations of total and dissolved iron were detected at downgradient/sidegradient well MW-09S;
- Total manganese concentrations ranged from 0.0067 to 3.38 mg/L, and dissolved manganese concentrations ranged from 0.0029 to 3.45 mg/L. The highest concentrations of total and dissolved manganese were detected at sidegradient well GM-07S;
- Nitrate concentrations ranged from 0.0026 to 3.5 mg/L. The highest nitrate concentration was detected at upgradient well GM-05S and the lowest nitrate concentration was detected at on-Site well GM-03RS;

- Sulfate concentrations ranged from 1.7 to 34.4 mg/L. The highest sulfate concentration was detected at downgradient well MW-09S and the lowest sulfate concentration was detected at downgradient/sidegradient well MW-07;
- Methane concentrations ranged from less than 0.037 to 94 micrograms per liter (µg/L). The highest methane concentration was detected at downgradient/sidegradient well MW-09S;
- Ethane concentrations ranged from 0.002 to an estimated (J-qualified) concentration of 0.14 µg/L. The highest ethane concentration was detected at sidegradient well GM-07S;
- Ethene concentrations ranged from 0.003 to 0.48 µg/L. The highest ethene concentration was detected at downgradient/sidegradient well MW-09S;
- TOC concentrations ranged from 0.61 to 4.5 mg/L. The highest TOC concentration was detected at upgradient well GM-05S;
- Total alkalinity concentrations ranged from 1.5 to 95.8 mg/L. The highest total alkalinity concentration was detected at downgradient/sidegradient well MW-09S; and
- TSS concentrations ranged from 0.0012 to 0.033 mg/L. The highest TSS concentration was detected at downgradient/sidegradient well MW-09S.

In the shallow aquifer, iron and manganese primary exist in the soluble (i.e., reduced) state, indicating the existence of reducing geochemical conditions. The presence of methane on-Site and at downgradient locations is an indicator of strongly reducing conditions as methanogenesis generally occurs only after the electron acceptors oxygen, nitrate, and sulfate have been depleted in groundwater. Ethane and ethene are the end products of reductive dechlorination of chlorinated ethanes/ethenes and have historically been and continue to be detected on-Site and at downgradient locations (**Appendix A**). The predominance of dissolved iron and manganese in Site groundwater, and the presence of methane, ethane, and ethene on-Site and at downgradient locations are indicative of strongly reducing geochemical conditions that are conducive to the reductive dechlorination of PCE and TCE in the shallow aquifer.

6.3 Distribution of VOCs in Groundwater

Shallow and deep aquifer 2015 groundwater sample analytical results are summarized and compared to NJGWQSs and USEPA MCLs on **Tables 4** and **5**, and the analytical results for PCE, TCE, cDCE, and VC are presented on **Figures 5** and **6**. In addition, isoconcentration maps illustrating the 2015 spatial distributions of PCE, TCE, cDCE, and VC in the shallow aquifer are

presented on **Figures 7a** through **10d**.[5] Copies of 2015 laboratory analytical reports, chain-of-custody forms, and laboratory quality assurance/quality control documentation are provided in **Appendix H**.

6.3.1 Shallow Aquifer

6.3.1.1 PCE

In 2015, consistent with the October 2012 data, PCE was detected at a concentration slightly above the NJGWQS of 1.0 µg/L at eleven (11) of the fourteen (14) shallow aquifer wells. At these wells detected PCE concentrations ranged from 1.1 to 5.5 µg/L. PCE was below the NJGWQS at sidegradient well GM-06S, and downgradient/sidegradient wells GM-08S and MW-07. The concentrations of PCE detected at upgradient wells GM-05S and MW-10S in 2015 were consistent with those detected on-Site at wells GM-01S, GM-03RS, MW-01, MW-02, and MW-04. The presence of PCE in groundwater at concentrations above the NJGWQS at locations upgradient of the Site is indicative of an ongoing off-Site source of PCE impacts to shallow groundwater beneath the Site.

6.3.1.2 *TCE*

In 2015, consistent with the October 2012 data, TCE was detected above the NJGWQS of 1.0 µg/L at twelve (12) of the fourteen (14) shallow aquifer wells. At these wells detected TCE concentrations ranged from 1.1 to 115 µg/L. TCE was below the NJGWQS at sidegradient well GM-06S and downgradient/sidegradient well GM-08S. In 2015 the highest concentration of TCE was detected at off-Site, upgradient well MW-10S (115 µg/L), this concentration is >2.5 X the highest on-Site concentration of TCE. The highest on-Site concentrations of TCE were detected at wells MW-04 (45.7 µg/L) and GM-03RS (17.6 µg/L), which are located on the southeasterly portion of the Site, downgradient from MW-10S. The presence of TCE in groundwater at concentrations significantly above the MCL and NJGWQS at MW-10S, which is upgradient of the Site, is indicative of an ongoing off-Site source of TCE impacts to shallow groundwater beneath the Site.

[5] As noted in the OU3 100% Design, MW-01 is screened at a depth consistent with other shallow monitoring wells on-Site, whereas MW-02 is screened at a shallower interval. MW-02 had been slated for abandonment in favor of retaining MW-01, but variability between COC data for MW-01 and MW-02 deferred those plans. The higher concentration of each COC for MW-01 and MW-02 was used for isoconcentration contour figures in the OU3 100% Design; **Figures 7a** through **10d** follow this protocol.

6.3.1.3 cDCE

In 2015, cDCE concentrations in the shallow aquifer were below the NJGWQS/MCL of 70 µg/L at all locations. Comparing by well, the concentrations of cDCE detected in the shallow aquifer in 2015 were consistent with or lower than the concentrations detected in October 2012. At on-Site wells GM-01S, MW-01, and MW-04, and at downgradient/sidegradient wells GM-08S, MW-07, MW-09S, and MW-11S, 2015 concentrations of cDCE were consistent with October 2012 concentrations. At on-Site wells GM-03RS and MW-02, upgradient wells GM-05S and MW-10S, and sidegradient wells GM-06S and GM-07S, 2015 concentrations of cDCE were lower than October 2012 concentrations. The concentrations of cDCE detected at upgradient well GM-02S were higher than the October 2012 concentration. In 2015, the highest concentrations of cDCE were detected at upgradient well MW-10S, and the next highest concentrations were detected at on-Site well GM-03RS, which is downgradient of MW-10S.

cDCE is an intermediate in the reductive dechlorination of PCE and TCE, and the presence of cDCE in shallow groundwater indicates that the reductive dechlorination of the parent compounds is occurring.

6.3.1.4 VC

In 2015, VC concentrations in the shallow aquifer on-Site were below the NJGWQS of 1 µg/L at all locations. VC was detected at downgradient/sidegradient well MW-09S in Q1 slightly above the MCL of 2 µg/L, and in Q2 and Q3 above the NJGWQS, but below the MCL.

VC is the last intermediate before the complete reductive dechlorination of PCE and TCE to ethene, and the presence of VC in shallow groundwater indicates that the reductive dechlorination of the parent compounds is occurring at the Site.

6.3.2 Deep Aquifer

In 2015, the concentration of PCE in six (6) of the eight (8) deep aquifer monitoring wells were lower than 2012 levels, and the concentrations of TCE in four (4) of the eight (8) deep aquifer wells were lower than 2012 levels. The overall concentration trends for PCE and TCE in the deep aquifer are generally declining. The October 2015 deep aquifer sampling event results can be summarized as follows:

- PCE was detected slightly above the NJGWQS of 1.0 µg/L at five (5) of the eight (8) deep aquifer wells. At these wells detected PCE concentrations ranged from 1.8 to 7.5 µg/L, with the highest concentration detected at upgradient well GM-06D;

- TCE was detected slightly above the NJGWQS of 1.0 µg/L at seven (7) of the eight (8) deep aquifer wells. At these wells detected PCE concentrations ranged from 1.4 to 12 µg/L, with the highest concentrations detected at off-Site wells GM-06D, GM-07D, and GM-08D; and
- cDCE was detected below the NJGWQS of 70 µg/L at all eight (8) deep aquifer wells.

The deep aquifer exists within the Lower PRM, which is separated from the shallow aquifer by an aquitard approximately 35 feet thick beneath the Site. The existence of PCE, TCE, and cDCE in the deep aquifer continues to evidence a more regional presence for VOC impacts.

6.4 Mann-Kendall Analysis of VOCs in Shallow Groundwater

Shallow aquifer groundwater concentration data for analyte of interest-shallow well combinations were analyzed using the Mann-Kendall trend analysis (Mann, 1945; Kendall, 1975). The Mann-Kendall trend test is a non-parametric method for determining whether or not a constituent (in this case, the concentration of the analyte) is exhibiting an increasing or decreasing trend with time.

The Mann-Kendall statistic (S) is calculated by scoring all possible pairs of measurements in a data set. If the concentration of an individual analyte at an earlier time is lower than the concentration at a later time, it is assigned a value of 1. An earlier concentration that is greater than a later concentration is given a value of -1 and if both the earlier and later analyte concentrations are equal, the value assigned will be zero. Non-detect concentrations can be treated by assigning them a value of half the detection limit. These values added together result in a calculated value for S; a positive S value indicates an increasing trend over time, a negative value of S indicates a decreasing trend and values of S near zero indicates no trend in the data over time.

The Mann-Kendall analysis was conducted for PCE, TCE, cDCE, VC, and ethene concentrations detected at the fourteen (14) shallow wells. Mann-Kendall analysis results are summarized in **Table 6** and **Appendix I**. The findings from the Mann-Kendall analysis are as follows:

- Concentrations of PCE, TCE and their degradation products cDCE, VC, and ethene at upgradient well MW-10S and sidegradient well GM-02S are stable or have no discernible trend;
- PCE concentrations are decreasing at on-Site well MW-02, and are stable or have no discernible trend at the other on- or off-Site shallow wells;
- TCE concentrations are decreasing at sidegradient well GM-07S, increasing at sidegradient well GM-06S, and are stable or have no discernible trend at the other on- or off-Site shallow wells;

- cDCE concentrations are decreasing at on-Site well GM-03RS, increasing at upgradient well GM-05S and sidegradient well GM-06S, and are stable or have no discernible trend at other on- or off-Site shallow wells;
- VC concentrations are decreasing at on-Site well GM-03RS and are stable at downgradient/sidegradient well MW-09S; and
- Ethene concentrations are stable at downgradient/sidegradient well MW-09S.

In general, the 2015 Mann-Kendall analysis results indicate that post-Cap concentrations of PCE and TCE in shallow groundwater are stable or have no discernable trend at upgradient and on-Site locations, and that concentrations of the reductive dechlorination daughter products VC and ethene are stable at downgradient/sidegradient well MW-09S.

6.5 VOC Attenuation Rates in Shallow Groundwater

To evaluate the natural attenuation process in groundwater, first-order natural attenuation rates were derived for all shallow wells where the concentration of a COC was greater than 10 µg/L in 2015. Among the Site COCs, only TCE and cDCE were detected at concentrations greater than 10 µg/L in 2015. The calculated attenuation rates are summarized in **Table 7** and **Appendix J**.

To compare the pre- and post-OU1 Cap conditions, attenuation rates were calculated for historic (i.e., pre-Cap) data, dating back to the oldest sampling date available for a COC, as well as for recent (i.e., post-Cap) data, following the USEPA guidance on *Calculation and Use of First-Order Rate Constants for Monitored Natural Attenuation Studies* (USEPA, 2002). The guidance notes that, "it is difficult to extract rate constants that are statistically significant with fewer than six (6) sampling dates or with a sampling interval of less than three years." Because this report summarizes the results of only the first year of OU3 MNA remedy implementation, the current post-Cap dataset is limited to four (4) sampling dates. Therefore, post-Cap attenuation rates calculated based only on the first four (4) sampling dates may not be statistically significant, and thus the time to attainment of remediation goals was not reevaluated here.

6.5.1 TCE

Attenuation rate analysis for TCE was conducted for seven (7) shallow monitoring wells: GM-03RS, GM-07S, MW-02, MW-04, MW-09S, MW-10S, and MW-11S. The results of the post-Cap TCE attenuation rate analysis are as follows:

- On-Site wells (GM-03RS, MW-02, and MW-04): The attenuation rate analysis indicates that TCE attenuation is not currently occurring at GM-03RS and MW-04, but that TCE attenuation is occurring at MW-02;
- Off-Site upgradient well (MW-10S): The attenuation rate analysis indicates that TCE attenuation is occurring at MW-10S;
- Off-Site downgradient/sidegradient wells (MW-09S and MW-11S): The attenuation rate analysis indicates that TCE attenuation is occurring at MW-09S and is not currently occurring at MW-11S; and
- Off-Site sidegradient well (GM-07S): The attenuation rate analysis indicates that TCE attenuation is occurring at GM-07S.

6.5.2 cDCE

Attenuation rate analysis for cDCE was conducted for six (6) shallow monitoring wells: GM-02S, GM-03RS, GM-07S, MW-02, MW-09S, and MW-10S. The results of the post-Cap cDCE attenuation rate analysis are as follows:

- On-Site wells (GM-03RS and MW-02): The attenuation rate analysis indicates that cDCE attenuation is occurring at GM-03RS and MW-02;
- Off-Site upgradient wells (MW-10S): The attenuation rate analysis indicates that cDCE attenuation is not currently occurring at MW-10S;
- Off-Site downgradient/sidegradient well (MW-09S): The attenuation rate analysis indicates that cDCE attenuation is not currently occurring at MW-09S. and
- Off-Site sidegradient wells (GM-02S and GM-07S): The attenuation rate analysis indicates that cDCE attenuation is not currently occurring at GM-02S and GM-07S.

Post-Cap first-order natural attenuation rates will continue to be calculated for Annual MNA Reports based on the cumulative post-Cap dataset. The time to attainment of remediation goals will be reevaluated in subsequent years when the post-Cap dataset is of a size that can yield statistically significant conclusions.

7. DATA USABILITY

Groundwater, field blank, trip blank and field duplicate samples were reported in Contract Laboratory Program (CLP) Data Packages received from Accutest Laboratories in Dayton, New Jersey and Pace Analytical Energy Services, LLC, in Pittsburgh, Pennsylvania. The Q1 and Q2 samples were analyzed as per the 2013 QAPP (Geosyntec, 2013c); while the Q3 and Q4 samples were analyzed as per the revised 2015 QAPP (Geosyntec, 2015b).

A Stage 2A validation was performed on 100% of the data. None of the data were rejected; however, qualifications were applied to some of the data based on the results of the associated quality control samples. The samples were assessed against the results from the associated method blanks, laboratory control samples, matrix spike/matrix spike duplicate samples, laboratory duplicates, surrogate recoveries, serial dilutions, and post digestion spikes as applicable to the analysis. Analyte qualifications are listed in **Appendix H** by sample delivery group (SDG) and analytical test.

8. CONCLUSIONS

The 2015 OU3 MNA remedy monitoring findings are summarized as follows:

- The hydraulic gradient in the shallow aquifer at the Site is fairly flat;
- In 2015, the predominant groundwater flow direction onto the Site was from the southeast (i.e., from MW-10S) and from the north/northeast (i.e., from GM-02S and GM-05S). Generally, these flows converge in the southeastern portion of the Site with the water table forming a saddle shape before flowing downgradient;
- Groundwater generally flows from the Site towards the west;
- Shallow aquifer groundwater flow conditions likely vary in response to local groundwater pumping but are generally consistent with the results of previous transducer studies;
- As evident by the reducing conditions, formation of daughter products and decreasing concentrations in certain wells, groundwater geochemical conditions in the shallow aquifer in the vicinity of the Site are conducive to the reductive dechlorination of PCE and TCE;
- The concentrations of PCE and TCE detected in shallow groundwater in 2015 were consistent with the concentrations detected in October 2012, prior to the installation of the OU1 Cap;
- The 2015 shallow groundwater analytical results indicate that off-Site VOC sources continue to impact shallow groundwater beneath the Site;
- The 2015 deep groundwater analytical results indicate that the concentrations of PCE and TCE in deep groundwater are generally decreasing;
- The 2015 Mann-Kendall analysis results indicate that concentrations of PCE and TCE in shallow groundwater are stable or have no discernable trend at upgradient and on-Site locations, and that concentrations of the reductive dechlorination daughter products VC and ethene are stable at downgradient/sidegradient well MW-09S; and
- To date, the post-Cap dataset is too small to yield statistically significant results for a first-order attenuation rate analysis.

9. RECOMMENDATIONS

9.1 Shallow Aquifer MNA Sampling Schedule

As presented in the OU3 100% Design, the MNA sampling program consists of quarterly sampling of the fourteen (14) shallow monitoring wells during the first two (2) years to assess seasonal effects and evaluate post-Cap installation conditions. The schedule anticipates semi-annual sampling through the fifth year of the MNA remedy and annual sampling thereafter, if necessary, to assess shallow groundwater contaminant attenuation. The MNA sampling will continue in accordance with the provisions set forth in the Statement of Work with monitoring conducted until the performance standards are not exceeded for a period of three (3) consecutive years (USEPA, 2011). The future monitoring schedule may be modified based upon the results of the monitoring data and the progress of the remedy.

Geosyntec recommends no change to the MNA groundwater sampling program at this time.

9.2 Deep Aquifer Monitoring Schedule

Deep aquifer monitoring wells will continue to be sampled on an annual basis.

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TABLES

Table 1: Groundwater Quality Parameters Summary
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

Geosyntec Consultants

Field Parameters	MW-01				MW-02				MW-04			
	Q1 2015	Q2 2015	Q3 2015	Q4 2015	Q1 2015	Q2 2015	Q3 2015	Q4 2015	Q1 2015	Q2 2015	Q3 2015	Q4 2015
Temperature (^{0}C)	13.68	15.98	14.88	13.77	12.98	16.28	15.5	13.27	14.02	16.94	15.86	14.48
pH	5.71	5.62	5.66	5.75	5.36	5.38	5.36	5.35	5.43	4.11	5.09	5.37
Specific Conductance (mS/cm)	0.160	0.145	0.152	0.110	0.175	0.187	0.182	0.194	0.136	0.094	0.113	0.095
Dissolved Oxygen (mg/L)	1.45	1.51	0.55	2.18	1.81	2.66	0.6	0.72	3.59	5.47	3.99	5.11
Oxidation/Reduction Potential (mV)	223.8	293.8	266.6	204.6	97.7	314.7	220.0	191.0	266.9	302.2	300.9	285.4
Turbidity (NTU)	0.41	0.24	0.15	0.14	18.0	9.06	1.17	0.74	1.97	1.61	2.20	0.23

Field Parameters	MW-07				MW-09S				MW-10S			
	Q1 2015	Q2 2015	Q3 2015	Q4 2015	Q1 2015	Q2 2015	Q3 2015	Q4 2015	Q1 2015	Q2 2015	Q3 2015	Q4 2015
Temperature (^{0}C)	13.72	15.41	14.64	14.51	13.59	16.38	14.93	14.29	13.56	15.51	14.20	13.67
pH	6.21	3.99	5.01	5.04	6.40	5.97	7.22	6.32	4.35	4.60	4.71	4.79
Specific Conductance (mS/cm)	0.031	0.123	0.130	0.044	0.411	0.343	0.317	0.144	0.404	0.254	0.444	0.108
Dissolved Oxygen (mg/L)	8.94	7.37	5.51	7.50	0.69	0.89	0.64	0.91	6.45	4.91	6.51	2.00
Oxidation/Reduction Potential (mV)	191.4	342.9	231.9	137.6	-63.2	-30.2	13.6	-44.7	372.0	422.9	242.2	241.7
Turbidity (NTU)	17.5	1.31	1.65	1.22	6.09	19.9	7.54	8.61	0.56	0.31	0.26	0.23

Field Parameters	MW-11S				GM-01S				GM-02S			
	Q1 2015	Q2 2015	Q3 2015	Q4 2015	Q1 2015	Q2 2015	Q3 2015	Q4 2015	Q1 2015	Q2 2015	Q3 2015	Q4 2015
Temperature (^{0}C)	15.05	17.77	17.11	15.33	13.64	14.97	14.73	14.15	14.73	17.67	16.87	15.77
pH	5.34	4.82	5.17	5.16	5.04	5.07	5.00	5.04	6.23	5.88	5.6	5.83
Specific Conductance (mS/cm)	0.076	0.072	0.058	0.038	0.079	0.119	0.106	0.070	1.527	0.421	0.27	0.222
Dissolved Oxygen (mg/L)	8.46	7.27	6.71	7.49	0.65	0.74	0.38	1.48	2.03	0.92	0.68	0.89
Oxidation/Reduction Potential (mV)	267.8	307.8	283.4	297.1	300.9	377.9	269.4	272.4	99.2	160.9	208.6	266.2
Turbidity (NTU)	4.22	2.75	4.07	18.4	0.50	0.31	0.35	0.13	12.4	0.98	0.19	0.85

2015 Quarterly event dates:
Q1- March 2015
Q2- June 2015
Q3- October 2015
Q4- December 2015

Table 1: Groundwater Quality Parameters Summary
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

Geosyntec Consultants

Field Parameters	GM-03RS				GM-05S				GM-06S			
	Q1 2015	Q2 2015	Q3 2015	Q4 2015	Q1 2015	Q2 2015	Q3 2015	Q4 2015	Q1 2015	Q2 2015	Q3 2015	Q4 2015
Temperature (^{0}C)	13.95	16.50	15.92	13.71	14.38	16.02	15.75	14.96	14.18	15.51	14.99	14.66
pH	5.22	5.13	4.96	4.94	5.80	5.10	4.92	5.36	5.59	5.52	5.66	5.41
Specific Conductance (mS/cm)	0.120	0.115	0.072	0.092	0.187	0.114	0.113	0.060	0.226	0.222	0.215	0.224
Dissolved Oxygen (mg/L)	1.04	0.72	0.75	0.82	3.55	4.38	4.30	3.20	0.70	0.72	0.41	0.50
Oxidation/Reduction Potential (mV)	169.6	218.9	193.5	146.8	196.9	240.8	237.0	282.6	200.5	188.2	207.8	227.0
Turbidity (NTU)	0.42	0.97	1.67	1.75	11.5	0.57	0.42	0.00	0.58	0.69	0.47	0.73

Field Parameters	GM-07S				GM-08S			
	Q1 2015	Q2 2015	Q3 2015	Q4 2015	Q1 2015	Q2 2015	Q3 2015	Q4 2015
Temperature (^{0}C)	13.54	15.14	14.45	13.69	13.90	16.05	15.1	14.57
pH	4.54	4.78	4.36	4.55	6.29	6.30	6.41	6.06
Specific Conductance (mS/cm)	0.337	0.369	0.433	0.357	0.116	0.148	0.087	0.079
Dissolved Oxygen (mg/L)	2.50	1.80	3.95	1.44	2.54	1.16	1.01	1.00
Oxidation/Reduction Potential (mV)	317.2	217.0	264.1	357.4	-13.5	96.1	30.5	39.5
Turbidity (NTU)	2.97	0.82	5.57	5.90	29.7	14.0	8.52	9.69

Table 2: Shallow Aquifer Groundwater Elevation Data
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

Well ID	Well Diameter (in.)	Total Depth of Well (ft. bgs)	Screened Interval (ft. bgs)	Depth to Water Measuring Point Elevation (ft. MSL)	Quarter 1			Quarter 2			Quarter 3			Quarter 4		
					Depth to Water Measurement Date	Depth to Water (ft. bmp)	Potentiometric Surface Elevation (ft. MSL)	Depth to Water Measurement Date	Depth to Water (ft. bmp)	Potentiometric Surface Elevation (ft. MSL)	Depth to Water Measurement Date	Depth to Water (ft. bmp)	Potentiometric Surface Elevation (ft. MSL)	Depth to Water Measurement Date	Depth to Water (ft. bmp)	Potentiometric Surface Elevation (ft. MSL)
GM-01S	4	130	110-130	66.49	3/9/2015	73.47	-6.98	6/8/2015	73.08	-6.59	10/5/2015	72.95	-6.46	11/30/2015	72.93	-6.44
GM-02S	4	130	110-130	59.44	3/9/2015	66.44	-7.00	6/8/2015	65.87	-6.43	10/5/2015	65.82	-6.38	11/30/2015	65.59	-6.15
GM-03RS	4	130	110-130	69.46	3/9/2015	76.35	-6.89	6/8/2015	75.96	-6.50	10/5/2015	76.05	-6.59	11/30/2015	75.88	-6.42
GM-05S	4	127	107-127	51.51	3/9/2015	58.28	-6.77	6/8/2015	57.80	-6.29	10/5/2015	57.81	-6.30	11/30/2015	57.58	-6.07
GM-06S	4	130	110-130	60.19	3/9/2015	67.18	-6.99	6/8/2015	66.78	-6.59	10/5/2015	66.68	-6.49	11/30/2015	66.47	-6.28
GM-07S	4	130	110-130	65.37	3/9/2015	72.20	-6.83	6/8/2015	71.84	-6.47	10/5/2015	71.92	-6.55	11/30/2015	71.76	-6.39
GM-08S	4	130	110-130	69.67	3/9/2015	76.60	-6.93	6/8/2015	76.22	-6.55	10/5/2015	76.31	-6.64	11/30/2015	76.21	-6.54
MW-01	4	130	110-130	68.64	3/9/2015	75.58	-6.94	6/8/2015	75.17	-6.53	10/5/2015	75.12	-6.48	11/30/2015	75.07	-6.43
MW-02	4	102	77-102	69.02	3/9/2015	75.91	-6.89	6/8/2015	75.57	-6.55	10/5/2015	75.59	-6.57	11/30/2015	75.43	-6.41
MW-04	4	130	110-130	63.30	3/9/2015	70.16	-6.86	6/8/2015	69.75	-6.45	10/5/2015	69.73	-6.43	11/30/2015	69.64	-6.34
MW-07	4	115	95-115	69.77	3/9/2015	76.80	-7.03	6/8/2015	76.42	-6.65	10/5/2015	76.33	-6.56	11/30/2015	76.16	-6.39
MW-09S	4	130	120-130	69.57	3/9/2015	76.49	-6.92	6/8/2015	76.19	-6.62	10/5/2015	76.18	-6.61	11/30/2015	75.98	-6.41
MW-10S	4	133	123-133	70.81	3/9/2015	77.62	-6.81	6/8/2015	77.27	-6.46	10/5/2015	77.31	-6.50	11/30/2015	77.05	-6.24
MW-11S	4	127	117-127	69.56	3/9/2015	76.71	-7.15	6/8/2015	76.41	-6.85	10/5/2015	76.08	-6.52	11/30/2015	76.04	-6.48

Notes:
ft. - Feet
in. - Inches
bgs - Below ground surface
MSL - Mean sea level
bmp - Below measuring point
Negative elevation values indicate values below mean sea level

Table 3: Deep Aquifer Groundwater Elevation Data
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

Well ID	Well Diameter (in.)	Total Depth of Well (ft. bgs)	Screened Interval (ft. bgs)	Depth to Water Measuring Point Elevation (ft. MSL)	Depth to Water Measurement Date	Depth to Water (ft. bmp)	Potentiometric Surface Elevation (ft. MSL)
GM-01D	4	195	175-195	66.44	10/5/2015	73.56	-7.12
GM-02D	4	197	177-197	59.38	10/5/2015	66.22	-6.84
GM-03D	4	195	175-195	65.30	10/5/2015	72.73	-7.43
GM-04D	4	190	170-190	63.86	10/5/2015	71.17	-7.31
GM-05D	4	195	175-195	52.00	10/5/2015	59.09	-7.09
GM-06D	4	200	180-200	59.81	10/5/2015	66.89	-7.08
GM-07D	4	200	180-200	64.95	10/5/2015	71.28	-6.33
GM-08D	4	205	185-205	68.66	10/5/2015	76.56	-7.90

Notes:
ft. - Feet
in. - Inches
bgs - Below ground surface
MSL - Mean sea level
bmp - Below measuring point
Negative elevation values indicate values below mean sea level

Table 4: Shallow Aquifer Analytical Data
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

Well ID	CAS Number	Units	NJ Groundwater Quality Standard 2015	US EPA MCLs	GM-01S				
Sample Date					October 2012	3/10/2015	6/10/2015	10/6/2015	12/3/2015
Field Sample ID					GM-1S.20121004	GM-01S.20150310	GM-1S.20150610	GM-01S.20151006	GM-1S.20151203
Sample Matrix					Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Dissolved Gases									
Ethane	74-84-0	ug/l			4.0 U	0.0020 U	0.0020	0.0025 J	0.10 U
Ethene	74-85-1	ug/l			3.0 U	0.0030 U	0.0030	0.0040 U	0.10 U
Methane	74-82-8	ug/l			2.0 U	0.042 U	0.74 J	0.037 U	1.2
General Chemistry									
Alkalinity, Total	ALK	ug/l			8,300	4,400	4,700	3,700	5000 U
Nitrate	14797-55-8	ug/l	10000	10000	1,600	1,700	1,700	1,500	1,900
Nitrate and Nitrite	OER-100-51	ug/l	10000			1,700	1,700	1,500	1,900
Nitrite	14797-65-0	ug/l	1000	1000		10 U	3	10 U	10 U
Sulfate	14808-79-8	ug/l	250000		5,000	10,800	11,800	7,900	8,000
Total Organic Carbon		ug/l			1000 U	940	930	450	1000 U
Total Suspended Solids	TSS	mg/l				4.0 U	4.0	4.0 U	4.0 U
Metals									
Iron Dissolved	7439-89-6	ug/l	300		200 U	6.1	4.0	6.6	50.0 U
Iron	7439-89-6	ug/l	300		380	12.3	5.0	10.1	50.0 U
Manganese Dissolved	7439-96-5	ug/l	50		117	96.4	132	139	128
Manganese	7439-96-5	ug/l	50		124	95.8	133	151	125
VOCs									
1,1,1-Trichloroethane	71-55-6	ug/l	30	200	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	79-34-5	ug/l	1		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	79-00-5	ug/l	3	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichlorotrifluoroethane (Freon 113)	76-13-1	ug/l	20000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,1-Dichloroethane	75-34-3	ug/l	50		0.30 J	0.45 J	0.51 J	0.38 J	0.26 J
1,1-Dichloroethene	75-35-4	ug/l	1	7	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,2,3-Trichlorobenzene	87-61-6	ug/l			5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2,4-Trichlorobenzene	120-82-1	ug/l	9	70	5.00 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2-Dibromo-3-chloropropane	96-12-8	ug/l	0.02	0.2	***5.0 U***	***2.0 U***	***2.0 U***	***2.0 U***	***2.0 U***
1,2-Dibromoethane	106-93-4	ug/l	0.03	0.05	***5.0 U***	***1.0 U***	***1.0 U***	***1.0 U***	***1.0 U***
1,2-Dichlorobenzene	95-50-1	ug/l	600	600	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	107-06-2	ug/l	2	5	***5.0 U***	1.0 U	0.21 J	1.0 U	1.0 U
1,2-Dichloropropane	78-87-5	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	541-73-1	ug/l	600		5.00 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	106-46-7	ug/l	75	75	5.00 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dioxane	123-91-1	ug/l	0.4		***100 U***			0.14 J	0.276
2-Hexanone	591-78-6	ug/l	300		10 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone	108-10-1	ug/l			10 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	67-64-1	ug/l	6000		10 U	5.0 U	2.6 J	5.0 U	5.0 U
Benzene	71-43-2	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Bromochloromethane	74-97-5	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	75-27-4	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	75-25-2	ug/l	4		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	74-83-9	ug/l	10		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon disulfide	75-15-0	ug/l	700		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	56-23-5	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	108-90-7	ug/l	50	100	5.0 U	1.0 U	0.26 J	1.0 U	1.0 U
Chloroethane	75-00-3	ug/l	5		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	67-66-3	ug/l	70		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloromethane	74-87-3	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	156-59-2	ug/l	70	70	0.81 J	0.70 J	1.3	0.96 J	0.81 J
cis-1,3-Dichloropropene	10061-01-5	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	110-82-7	ug/l			5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Cyclohexane, Methyl-	108-87-2	ug/l			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Dibromochloromethane	124-48-1	ug/l	1		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane	75-71-8	ug/l	1000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Ethylbenzene	100-41-4	ug/l	700	700	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Isopropylbenzene	98-82-8	ug/l	700		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methyl acetate	79-20-9	ug/l	7000		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl ethyl ketone (2-Butanone)	78-93-3	ug/l	300		10 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl tert butyl ether	1634-04-4	ug/l	70		1.3 J	2.1	5.6	1.9	1.7
Methylene chloride	75-09-2	ug/l	3	5	***5.00 U***	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	100-42-5	ug/l	100	100	0.31 J	2.0 U	2.0 U	2.0 U	2.0 U
Tetrachloroethene	127-18-4	ug/l	1	5	***5.0 U***	0.96 J	1.2	1.3	1.2
Toluene	108-88-3	ug/l	600	1000	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	156-60-5	ug/l	100	100	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	10061-02-6	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	79-01-6	ug/l	1	5	2.6 J	3.2	2	2.1	2.1
Trichlorofluoromethane	75-69-4	ug/l	2000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Vinyl Chloride	75-01-4	ug/l	1	2	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (m,p)	179601-23-1	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (o)	95-47-6	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (Total)	1330-20-7	ug/l	1000	10000		1.0 U	1.0 U	1.0 U	1.0 U

Notes:

-- Not analyzed

Concentrations which exceed the NJDEP GWQS are highlighted blue

Concentrations which exceed the NJDEP GWQS & USEPA GW Maximum Contaminant Level (MCLs) are highlighted blue and **bold**

Non-detectable concentrations which exceed any standard are *italicized and brown*

J - Estimated value

U - Non-detectable

Table 4: Shallow Aquifer Analytical Data
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

Well ID	CAS Number	Units	NJ Groundwater Quality Standard 2015	US EPA MCLs	GM-02S				
Sample Date					October 2012	3/12/2015	6/10/2015	10/8/2015	12/3/2015
Field Sample ID					GM-2S.20121008	GM-2S.20150312	GM-2S.20150610	GM-02S.20151008	GM-2S.20151203
Sample Matrix					Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Dissolved Gases									
Ethane	74-84-0	ug/l			4.0 U	0.025	0.0020 U	0.0020 U	0.10 U
Ethene	74-85-1	ug/l			3.0 U	0.026	0.0030 U	0.0040 U	0.10 U
Methane	74-82-8	ug/l			3.1	6.5	4.7	9.3	4.2
General Chemistry									
Alkalinity, Total	ALK	ug/l			37,700	54,900	44,100	29,400	45,200
Nitrate	14797-55-8	ug/l	10000	10000	490	1,800	1,200	640	1,300
Nitrate and Nitrite	OER-100-51	ug/l	10000			1,800	1,200	640	1,300
Nitrite	14797-65-0	ug/l	1000	1000		10 U	10 U	10 U	10 U
Sulfate	14808-79-8	ug/l	250000		27,800	32,000	29,300	31,500	30,000
Total Organic Carbon		ug/l			1,400	1,900	1,400	1,100	1000 U
Total Suspended Solids	TSS	mg/l				10.0	8.0	4.0 U	1.4
Metals									
Iron Dissolved	7439-89-6	ug/l	300		200 U	140	20.6	50.0 U	50.0 U
Iron	7439-89-6	ug/l	300		802	908	29.5	50.0 U	50.0 U
Manganese Dissolved	7439-96-5	ug/l	50		424	208	223	644	655
Manganese	7439-96-5	ug/l	50		488	204	215	660	624
VOCs									
1,1,1-Trichloroethane	71-55-6	ug/l	30	200	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	79-34-5	ug/l	1		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	79-00-5	ug/l	3	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichlorotrifluoroethane (Freon 113)	76-13-1	ug/l	20000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,1-Dichloroethane	75-34-3	ug/l	50		0.69 J	2.0	2.4	4.4	3.0
1,1-Dichloroethene	75-35-4	ug/l	1	7	***5.0 U***	1.0 U	0.19 J	0.24 J	1.0 U
1,2,3-Trichlorobenzene	87-61-6	ug/l			5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2,4-Trichlorobenzene	120-82-1	ug/l	9	70	5.00 U	2.0 U	2.0 U	2.0 U	0.24 J
1,2-Dibromo-3-chloropropane	96-12-8	ug/l	0.02	0.2	***5.0 U***	***2.0 U***	***2.0 U***	***2.0 U***	***2.0 U***
1,2-Dibromoethane	106-93-4	ug/l	0.03	0.05	***5.0 U***	***1.0 U***	***1.0 U***	***1.0 U***	***1.0 U***
1,2-Dichlorobenzene	95-50-1	ug/l	600	600	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	107-06-2	ug/l	2	5	***5.0 U***	1.0 U	1.0 U	0.34 J	1.0 U
1,2-Dichloropropane	78-87-5	ug/l	1	5	***5.0 U***	0.87 J	1.1	1.7	1.2
1,3-Dichlorobenzene	541-73-1	ug/l	600		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	106-46-7	ug/l	75	75	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dioxane	123-91-1	ug/l	0.4		***100 U***			0.55	0.625
2-Hexanone	591-78-6	ug/l	300		10 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone	108-10-1	ug/l			10 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	67-64-1	ug/l	6000		21	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	71-43-2	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	0.18 J	1.0 U
Bromochloromethane	74-97-5	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	75-27-4	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	75-25-2	ug/l	4		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	74-83-9	ug/l	10		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon disulfide	75-15-0	ug/l	700		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	56-23-5	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	108-90-7	ug/l	50	100	5.0 U	0.25 J	0.32 J	0.44 J	0.30 J
Chloroethane	75-00-3	ug/l	5		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	67-66-3	ug/l	70		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloromethane	74-87-3	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	156-59-2	ug/l	70	70	1.6 J	5.9	7.8	12.4	9.0
cis-1,3-Dichloropropene	10061-01-5	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	110-82-7	ug/l			5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Cyclohexane, Methyl-	108-87-2	ug/l			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Dibromochloromethane	124-48-1	ug/l	1		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane	75-71-8	ug/l	1000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Ethylbenzene	100-41-4	ug/l	700	700	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Isopropylbenzene	98-82-8	ug/l	700		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methyl acetate	79-20-9	ug/l	7000		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl ethyl ketone (2-Butanone)	78-93-3	ug/l	300		10 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl tert butyl ether	1634-04-4	ug/l	70		17	18.5	29.4	42.6	26.8
Methylene chloride	75-09-2	ug/l	3	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	100-42-5	ug/l	100	100	5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Tetrachloroethene	127-18-4	ug/l	1	5	0.36 J	2	1.7	1.9	2.1
Toluene	108-88-3	ug/l	600	1000	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	156-60-5	ug/l	100	100	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	10061-02-6	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	79-01-6	ug/l	1	5	0.48 J	3.5	3.4	4.6	3.8
Trichlorofluoromethane	75-69-4	ug/l	2000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Vinyl Chloride	75-01-4	ug/l	1	2	***5.0 U***	0.33 J	0.50 J	0.86 J	0.45 J
Xylene (m,p)	179601-23-1	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (o)	95-47-6	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (Total)	1330-20-7	ug/l	1000	10000		1.0 U	1.0 U	1.0 U	1.0 U

Notes:

-- Not analyzed

Concentrations which exceed the NJDEP GWQS are highlighted blue

Concentrations which exceed the NJDEP GWQS & USEPA GW Maximum Contaminant Level (MCLs) are highlighted blue and **bold**

Non-detectable concentrations which exceed any standard are *italicized and brown*

J - Estimated value

U - Non-detectable

Table 4: Shallow Aquifer Analytical Data
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

Well ID	CAS Number	Units	NJ Groundwater Quality Standard 2015	US EPA MCLs	GM-03RS				
Sample Date					October 2012	3/11/2015	6/9/2015	10/6/2015	11/30/2015
Field Sample ID					GM-3RS.20121008	GM-03RS.20150311	GM-3RS.20150609	GM-03RS.20151006	GM-03RS.20151130
Sample Matrix					Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Dissolved Gases									
Ethane	74-84-0	ug/l			4.0 U	0.0020 U	0.0020 U	0.019 J	0.10 U
Ethene	74-85-1	ug/l			3.0 U	0.033	0.0030 U	0.0040 U	0.10 U
Methane	74-82-8	ug/l			66	60	27	46	4.3
General Chemistry									
Alkalinity, Total	ALK	ug/l			12,500	10,300	8,400	9,100	7,700
Nitrate	14797-55-8	ug/l	10000	10000	100 U	53	260	250	290
Nitrate and Nitrite	OER-100-51	ug/l	10000			55	260	250	290
Nitrite	14797-65-0	ug/l	1000	1000		2	10 U	10 U	10 U
Sulfate	14808-79-8	ug/l	250000		13,500	17,600	13,300	13,700	13,100
Total Organic Carbon		ug/l			1000 U	1,400	1,200	710	1000 U
Total Suspended Solids	TSS	mg/l				3.0	5.0	4.0 U	4.0 U
Metals									
Iron Dissolved	7439-89-6	ug/l	300		571	660	276	599	126
Iron	7439-89-6	ug/l	300		691	667	336	665	171
Manganese Dissolved	7439-96-5	ug/l	50		567	516	531	497	465
Manganese	7439-96-5	ug/l	50		622	493	509	491	468
VOCs									
1,1,1-Trichloroethane	71-55-6	ug/l	30	200	0.82 J	1.0 U	0.20 J	0.21 J	0.23 J
1,1,2,2-Tetrachloroethane	79-34-5	ug/l	1		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	79-00-5	ug/l	3	5	0.21 J	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichlorotrifluoroethane (Freon 113)	76-13-1	ug/l	20000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,1-Dichloroethane	75-34-3	ug/l	50		7.6	5.6	4.4	3.7	3.0
1,1-Dichloroethene	75-35-4	ug/l	1	7	***5.0 U***	0.82 J	0.62 J	0.61 J	0.47 J
1,2,3-Trichlorobenzene	87-61-6	ug/l			5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2,4-Trichlorobenzene	120-82-1	ug/l	9	70	5.00 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2-Dibromo-3-chloropropane	96-12-8	ug/l	0.02	0.2	***5.0 U***	***2.0 U***	***2.0 U***	***2.0 U***	***2.0 U***
1,2-Dibromoethane	106-93-4	ug/l	0.03	0.05	***5.0 U***	***1.0 U***	***1.0 U***	***1.0 U***	***1.0 U***
1,2-Dichlorobenzene	95-50-1	ug/l	600	600	5.0 U	0.22 J	0.22 J	1.0 U	1.0 U
1,2-Dichloroethane	107-06-2	ug/l	2	5	**6.7**	4.5	3.7	3.7	2.8
1,2-Dichloropropane	78-87-5	ug/l	1	5	***5.0 U***	1.0 U	0.20 J	0.20 J	1.0 U
1,3-Dichlorobenzene	541-73-1	ug/l	600		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	106-46-7	ug/l	75	75	5.0 U	0.49 J	0.39 J	0.37 J	0.29 J
1,4-Dioxane	123-91-1	ug/l	0.4		23 J			2.7	2.8
2-Hexanone	591-78-6	ug/l	300		10 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone	108-10-1	ug/l			10 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	67-64-1	ug/l	6000		1.7 J	5.0 U	2.8 J	5.0 U	5.0 U
Benzene	71-43-2	ug/l	1	5	***5.0 U***	0.22 J	1.0 U	1.0 U	1.0 U
Bromochloromethane	74-97-5	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	75-27-4	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	75-25-2	ug/l	4		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	74-83-9	ug/l	10		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon disulfide	75-15-0	ug/l	700		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	56-23-5	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	108-90-7	ug/l	50	100	5.0 U	0.81 J	0.76 J	0.69 J	0.28 J
Chloroethane	75-00-3	ug/l	5		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	67-66-3	ug/l	70		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloromethane	74-87-3	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	156-59-2	ug/l	70	70	42	22.0	20.1	15.5	14.4
cis-1,3-Dichloropropene	10061-01-5	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	110-82-7	ug/l			5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Cyclohexane, Methyl-	108-87-2	ug/l			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Dibromochloromethane	124-48-1	ug/l	1		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane	75-71-8	ug/l	1000		0.20 J	2.0 U	2.0 U	2.0 U	2.0 U
Ethylbenzene	100-41-4	ug/l	700	700	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Isopropylbenzene	98-82-8	ug/l	700		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methyl acetate	79-20-9	ug/l	7000		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl ethyl ketone (2-Butanone)	78-93-3	ug/l	300		10 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl tert butyl ether	1634-04-4	ug/l	70		4.9 J	3.5	2.8	2.8	2.7
Methylene chloride	75-09-2	ug/l	3	5	***5.00 U***	0.23 J	1.0 U	1.0 U	1.0 U
Styrene	100-42-5	ug/l	100	100	5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Tetrachloroethene	127-18-4	ug/l	1	5	**5.9**	2.6	2.3	2.3	1.8
Toluene	108-88-3	ug/l	600	1000	0.10 J	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	156-60-5	ug/l	100	100	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	10061-02-6	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	79-01-6	ug/l	1	5	**18**	**14.7**	**14.8**	**17.6**	**15.2**
Trichlorofluoromethane	75-69-4	ug/l	2000		0.13 J	2.0 U	2.0 U	2.0 U	2.0 U
Vinyl Chloride	75-01-4	ug/l	1	2	***5.0 U***	0.92 J	0.55 J	0.43 J	0.26 J
Xylene (m,p)	179601-23-1	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (o)	95-47-6	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (Total)	1330-20-7	ug/l	1000	10000		1.0 U	1.0 U	1.0 U	1.0 U

Notes:

-- Not analyzed

Concentrations which exceed the NJDEP GWQS are highlighted blue

Concentrations which exceed the NJDEP GWQS & USEPA GW Maximum Contaminant Level (MCLs) are highlighted blue and **bold**

Non-detectable concentrations which exceed any standard are *italicized and brown*

J - Estimated value

U - Non-detectable

Table 4: Shallow Aquifer Analytical Data
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

Well ID	CAS Number	Units	NJ Groundwater Quality Standard 2015	US EPA MCLs	GM-05S				
Sample Date					October 2012	3/10/2015	6/10/2015	10/8/2015	12/1/2015
Field Sample ID					GM-05S.20121008	GM-05S.20150310	GM-5S.20150610	GM-05S.20151008	GM-05S.20151201
Sample Matrix					Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Dissolved Gases									
Ethane	74-84-0	ug/l			4.0 U	0.0020 U	0.0020	0.0020 U	0.10 U
Ethene	74-85-1	ug/l			3.0 U	0.0030 U	0.0030	0.0040 U	0.10 U
Methane	74-82-8	ug/l			2.0 U	0.042 U	0.042	0.037 U	0.50 U
General Chemistry									
Alkalinity, Total	ALK	ug/l			21,800	25,500	3,200	3,700	10,200
Nitrate	14797-55-8	ug/l	10000	10000	1,600	2,600	3,500	1,900 J	2,400
Nitrate and Nitrite	OER-100-51	ug/l	10000			2,600	3,500	1,900 J	2,400
Nitrite	14797-65-0	ug/l	1000	1000		10 U	3	10 U	10 U
Sulfate	14808-79-8	ug/l	250000		28,900	18,500	13,800	16,500	26,300
Total Organic Carbon		ug/l			1000 U	4,500	900	1000 U	1000 U
Total Suspended Solids	TSS	mg/l				2.0	4.0 U	4.0 U	4.0 U
Metals									
Iron Dissolved	7439-89-6	ug/l	300		200 U	349	4.7	50.0 U	50 U
Iron	7439-89-6	ug/l	300		107 J	542	11.7	50.0 U	21.6
Manganese Dissolved	7439-96-5	ug/l	50		344	50.2	20.4	79.4	101
Manganese	7439-96-5	ug/l	50		363	50.2	21.0	77.1	95.3
VOCs									
1,1,1-Trichloroethane	71-55-6	ug/l	30	200	5.0 U	0.27 J	0.19 J	0.21 J	0.22 J
1,1,2,2-Tetrachloroethane	79-34-5	ug/l	1		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	79-00-5	ug/l	3	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichlorotrifluoroethane (Freon 113)	76-13-1	ug/l	20000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,1-Dichloroethane	75-34-3	ug/l	50		4.5 J	0.79 J	0.71 J	2.8	2.8
1,1-Dichloroethene	75-35-4	ug/l	1	7	1.4 J	0.37 J	0.23 J	0.62 J	0.63 J
1,2,3-Trichlorobenzene	87-61-6	ug/l			5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2,4-Trichlorobenzene	120-82-1	ug/l	9	70	5.00 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2-Dibromo-3-chloropropane	96-12-8	ug/l	0.02	0.2	***5.0 U***	***2.0 U***	***2.0 U***	***2.0 U***	***2.0 U***
1,2-Dibromoethane	106-93-4	ug/l	0.03	0.05	***5.0 U***	***1.0 U***	***1.0 U***	***1.0 U***	***1.0 U***
1,2-Dichlorobenzene	95-50-1	ug/l	600	600	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	107-06-2	ug/l	2	5	***5.0 U***	1.0 U	1.0 U	1.0 U	0.29 J
1,2-Dichloropropane	78-87-5	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.2	1.1
1,3-Dichlorobenzene	541-73-1	ug/l	600		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	106-46-7	ug/l	75	75	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dioxane	123-91-1	ug/l	0.4		***100 U***			0.35	0.34
2-Hexanone	591-78-6	ug/l	300		10 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone	108-10-1	ug/l			10 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	67-64-1	ug/l	6000		94	5.0 U	4.1 J	5.0 U	5.0 U
Benzene	71-43-2	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Bromochloromethane	74-97-5	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	75-27-4	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	75-25-2	ug/l	4		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	74-83-9	ug/l	10		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon disulfide	75-15-0	ug/l	700		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	56-23-5	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	108-90-7	ug/l	50	100	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	75-00-3	ug/l	5		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	67-66-3	ug/l	70		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloromethane	74-87-3	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	156-59-2	ug/l	70	70	15	1.2	1.7	6.9	7.8
cis-1,3-Dichloropropene	10061-01-5	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	110-82-7	ug/l			5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Cyclohexane, Methyl-	108-87-2	ug/l			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Dibromochloromethane	124-48-1	ug/l	1		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane	75-71-8	ug/l	1000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Ethylbenzene	100-41-4	ug/l	700	700	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Isopropylbenzene	98-82-8	ug/l	700		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methyl acetate	79-20-9	ug/l	7000		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl ethyl ketone (2-Butanone)	78-93-3	ug/l	300		10 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl tert butyl ether	1634-04-4	ug/l	70		26	0.82 J	0.45 J	0.54 J	2.7
Methylene chloride	75-09-2	ug/l	3	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	100-42-5	ug/l	100	100	5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Tetrachloroethene	127-18-4	ug/l	1	5	2.2 J	3.1	2.4	2.7	2.8
Toluene	108-88-3	ug/l	600	1000	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	156-60-5	ug/l	100	100	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	10061-02-6	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	79-01-6	ug/l	1	5	4.6 J	1.4	1.3	3.9	4.6
Trichlorofluoromethane	75-69-4	ug/l	2000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Vinyl Chloride	75-01-4	ug/l	1	2	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (m,p)	179601-23-1	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (o)	95-47-6	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (Total)	1330-20-7	ug/l	1000	10000		1.0 U	1.0 U	1.0 U	1.0 U

Notes:

-- Not analyzed

Concentrations which exceed the NJDEP GWQS are highlighted blue

Concentrations which exceed the NJDEP GWQS & USEPA GW Maximum Contaminant Level (MCLs) are highlighted blue and **bold**

Non-detectable concentrations which exceed any standard are *italicized and brown*

J - Estimated value

U - Non-detectable

Table 4: Shallow Aquifer Analytical Data
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

Well ID	CAS Number	Units	NJ Groundwater Quality Standard 2015	US EPA MCLs	GM-06S				
Sample Date					October 2012	3/10/2015	6/10/2015	10/8/2015	12/1/2015
Field Sample ID					GM-GS.20121008	GM-6S.20150310	GM-6S.20150610	GM-06S.20151008	GM-06S.20151201
Sample Matrix					Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Dissolved Gases									
Ethane	74-84-0	ug/l			4.0 U	0.0020 U	0.0020 U	0.0020 U	0.10 U
Ethene	74-85-1	ug/l			3.0 U	0.0030 U	0.0030 U	0.0040 U	0.10 U
Methane	74-82-8	ug/l			2.0 U	0.36	1.2	1.1	1.8
General Chemistry									
Alkalinity, Total	ALK	ug/l			41,100	21,600	24,200	6,800	25,500
Nitrate	14797-55-8	ug/l	10000	10000	1,800	1,700	1,300	1000 J	1,500
Nitrate and Nitrite	OER-100-51	ug/l	10000			1,700	1,300	1000 J	1,500
Nitrite	14797-65-0	ug/l	1000	1000		10 U	10 U	10 U	10 U
Sulfate	14808-79-8	ug/l	250000		12,100	18,400	27,900	26,600	29,300
Total Organic Carbon		ug/l			1,100	1,100	980	1000 U	1000 U
Total Suspended Solids	TSS	mg/l				4.0 U	2.0	4.0 U	4.0 U
Metals									
Iron Dissolved	7439-89-6	ug/l	300		200 U	27.2	20.6	50.0 U	0.71
Iron	7439-89-6	ug/l	300		200 U	38.2	25.2	50.0 U	7.2
Manganese Dissolved	7439-96-5	ug/l	50		35.1	635	416	418	491
Manganese	7439-96-5	ug/l	50		35.2	641	405	404	500
VOCs									
1,1,1-Trichloroethane	71-55-6	ug/l	30	200	0.16 J	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	79-34-5	ug/l	1		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	79-00-5	ug/l	3	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichlorotrifluoroethane (Freon 113)	76-13-1	ug/l	20000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,1-Dichloroethane	75-34-3	ug/l	50		0.80 J	0.56 J	0.64 J	1.1	1.1
1,1-Dichloroethene	75-35-4	ug/l	1	7	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,2,3-Trichlorobenzene	87-61-6	ug/l			5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2,4-Trichlorobenzene	120-82-1	ug/l	9	70	5.00 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2-Dibromo-3-chloropropane	96-12-8	ug/l	0.02	0.2	***5.0 U***	***2.0 U***	***2.0 U***	***2.0 U***	***2.0 U***
1,2-Dibromoethane	106-93-4	ug/l	0.03	0.05	***5.0 U***	***1.0 U***	***1.0 U***	***1.0 U***	***1.0 U***
1,2-Dichlorobenzene	95-50-1	ug/l	600	600	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	107-06-2	ug/l	2	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	78-87-5	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	0.47 J	0.50 J
1,3-Dichlorobenzene	541-73-1	ug/l	600		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	106-46-7	ug/l	75	75	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dioxane	123-91-1	ug/l	0.4		***100 U***			0.21	0.24
2-Hexanone	591-78-6	ug/l	300		10 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone	108-10-1	ug/l			10 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	67-64-1	ug/l	6000		34	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	71-43-2	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Bromochloromethane	74-97-5	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	75-27-4	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	75-25-2	ug/l	4		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	74-83-9	ug/l	10		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon disulfide	75-15-0	ug/l	700		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	56-23-5	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	108-90-7	ug/l	50	100	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	75-00-3	ug/l	5		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	67-66-3	ug/l	70		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloromethane	74-87-3	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	156-59-2	ug/l	70	70	7.2	0.65 J	1.3	1.9	2.2
cis-1,3-Dichloropropene	10061-01-5	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	110-82-7	ug/l			5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Cyclohexane, Methyl-	108-87-2	ug/l			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Dibromochloromethane	124-48-1	ug/l	1		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane	75-71-8	ug/l	1000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Ethylbenzene	100-41-4	ug/l	700	700	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Isopropylbenzene	98-82-8	ug/l	700		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methyl acetate	79-20-9	ug/l	7000		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl ethyl ketone (2-Butanone)	78-93-3	ug/l	300		10 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl tert butyl ether	1634-04-4	ug/l	70		8.7	4.3	6.6	7.6	11.2
Methylene chloride	75-09-2	ug/l	3	5	***5.00 U***	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	100-42-5	ug/l	100	100	5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Tetrachloroethene	127-18-4	ug/l	1	5	1.3 J	0.37 J	0.28 J	0.39 J	0.50 J
Toluene	108-88-3	ug/l	600	1000	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	156-60-5	ug/l	100	100	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	10061-02-6	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	79-01-6	ug/l	1	5	4.7 J	0.44 J	0.49 J	0.57 J	0.86 J
Trichlorofluoromethane	75-69-4	ug/l	2000		0.15 J	2.0 U	2.0 U	2.0 U	2.0 U
Vinyl Chloride	75-01-4	ug/l	1	2	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (m,p)	179601-23-1	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (o)	95-47-6	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (Total)	1330-20-7	ug/l	1000	10000		1.0 U	1.0 U	1.0 U	1.0 U

Notes:

-- Not analyzed

Concentrations which exceed the NJDEP GWQS are highlighted blue

Concentrations which exceed the NJDEP GWQS & USEPA GW Maximum Contaminant Level (MCLs) are highlighted blue and **bold**

Non-detectable concentrations which exceed any standard are *italicized and brown*

J - Estimated value

U - Non-detectable

Table 4: Shallow Aquifer Analytical Data
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

Well ID	CAS Number	Units	NJ Groundwater Quality Standard 2015	US EPA MCLs	GM-07S					
Sample Date					October 2012	3/11/2015	6/9/2015	10/7/2015	10/7/2015	12/2/2015
Field Sample ID					GM-7S.20121004	GM-07S.20150311	GM-7S.20150609	DUP-1-20151007	GM-7S.20151007	GM-07S.20151202
Sample Matrix					Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Dissolved Gases										
Ethane	74-84-0	ug/l			4.0 U	0.0020 U	0.0020 U	0.14 J	0.0020	0.10 U
Ethene	74-85-1	ug/l			3.0 U	0.0030 U	0.0030 U	0.0040 U	0.0040 U	0.017 J
Methane	74-82-8	ug/l			3.5	0.47	0.66	5.9	5.1	9.8
General Chemistry										
Alkalinity, Total	ALK	ug/l			5000 U	2,900	5000 U	5000 U	5000 U	5000 U
Nitrate	14797-55-8	ug/l	10000	10000	100 U	610	760	600	580	1800 U
Nitrate and Nitrite	OER-100-51	ug/l	10000			610	760	600	580	1800 U
Nitrite	14797-65-0	ug/l	1000	1000		10 U	10 U	2 U	2 U	10 U
Sulfate	14808-79-8	ug/l	250000		20,200	28,600	21,300	21,700	21,100	22,600
Total Organic Carbon		ug/l			1000 U	1000	940	1000 U	1000 U	1000 U
Total Suspended Solids	TSS	mg/l				4.0 U	4.0 U	2.4	1.8	2.0
Metals										
Iron Dissolved	7439-89-6	ug/l	300		872	88.3	20.6	81.0	80.4	88.9
Iron	7439-89-6	ug/l	300		1,070	136	58.1	237	247	258
Manganese Dissolved	7439-96-5	ug/l	50		1,310	2,930	3,450	3,050	3,200	2,990
Manganese	7439-96-5	ug/l	50		1,390	2,980	3,380	3,080	3,320	2,970
VOCs										
1,1,1-Trichloroethane	71-55-6	ug/l	30	200	0.54 J	0.27 J	0.18 J	0.0	0.16 J	0.21 J
1,1,2,2-Tetrachloroethane	79-34-5	ug/l	1		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	79-00-5	ug/l	3	5	0.16 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichlorotrifluoroethane (Freon 113)	76-13-1	ug/l	20000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,1-Dichloroethane	75-34-3	ug/l	50		3.0 J	1.6	1.2	1.6	1.6	1.7
1,1-Dichloroethene	75-35-4	ug/l	1	7	***5.0 U***	0.30 J	0.23 J	0.26 J	0.25 J	0.28 J
1,2,3-Trichlorobenzene	87-61-6	ug/l			5.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2,4-Trichlorobenzene	120-82-1	ug/l	9	70	5.00 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2-Dibromo-3-chloropropane	96-12-8	ug/l	0.02	0.2	***5.0 U***	***2.0 U***	***2.0 U***	***2.0 U***	***2.0 U***	***2.0 U***
1,2-Dibromoethane	106-93-4	ug/l	0.03	0.05	***5.0 U***	***1.0 U***	***1.0 U***	***1.0 U***	***1.0 U***	***1.0 U***
1,2-Dichlorobenzene	95-50-1	ug/l	600	600	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	107-06-2	ug/l	2	5	***5.0 U***	2.6	3.1	2.8	2.8	2.9
1,2-Dichloropropane	78-87-5	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	541-73-1	ug/l	600		5.00 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	106-46-7	ug/l	75	75	5.00 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dioxane	123-91-1	ug/l	0.4		***100 U***			3.4	3.5	4.2
2-Hexanone	591-78-6	ug/l	300		10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone	108-10-1	ug/l			10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	67-64-1	ug/l	6000		10 U	5.0 U	4.1 J	2.4	21.4 J	5.0 U
Benzene	71-43-2	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromochloromethane	74-97-5	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	75-27-4	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	75-25-2	ug/l	4		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	74-83-9	ug/l	10		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon disulfide	75-15-0	ug/l	700		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	56-23-5	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	108-90-7	ug/l	50	100	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	75-00-3	ug/l	5		5.0 U	1.0 U	1.0 U	0.2	0.44 J	1.0 U
Chloroform	67-66-3	ug/l	70		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloromethane	74-87-3	ug/l			5.0 U	1.0 U	1.0 U	0.1	2.6 J	1.0 U
cis-1,2-Dichloroethene	156-59-2	ug/l	70	70	28	12.2	11.9	11.2	11.4	13.0
cis-1,3-Dichloropropene	10061-01-5	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	110-82-7	ug/l			5.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Cyclohexane, Methyl-	108-87-2	ug/l			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Dibromochloromethane	124-48-1	ug/l	1		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane	75-71-8	ug/l	1000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Ethylbenzene	100-41-4	ug/l	700	700	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Isopropylbenzene	98-82-8	ug/l	700		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methyl acetate	79-20-9	ug/l	7000		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl ethyl ketone (2-Butanone)	78-93-3	ug/l	300		10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl tert butyl ether	1634-04-4	ug/l	70		0.16 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methylene chloride	75-09-2	ug/l	3	5	***5.00 U***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	100-42-5	ug/l	100	100	0.20 J	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Tetrachloroethene	127-18-4	ug/l	1	5	***5.0 U***	1.2	1.3	1.3	1.2	1.3
Toluene	108-88-3	ug/l	600	1000	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	156-60-5	ug/l	100	100	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	10061-02-6	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	79-01-6	ug/l	1	5	**10**	**15.5**	**14.5**	**13**	**14**	**13.3**
Trichlorofluoromethane	75-69-4	ug/l	2000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Vinyl Chloride	75-01-4	ug/l	1	2	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (m,p)	179601-23-1	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (o)	95-47-6	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (Total)	1330-20-7	ug/l	1000	10000		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

Notes:

-- Not analyzed

Concentrations which exceed the NJDEP GWQS are highlighted blue

Concentrations which exceed the NJDEP GWQS & USEPA GW Maximum Contaminant Level (MCLs) are highlighted blue and **bold**

Non-detectable concentrations which exceed any standard are *italicized and brown*

J - Estimated value

U - Non-detectable

Table 4: Shallow Aquifer Analytical Data
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

Well ID	CAS Number	Units	NJ Groundwater Quality Standard 2015	US EPA MCLs	GM-08S				
Sample Date					October 2012	3/11/2015	6/9/2015	10/7/2015	12/2/2015
Field Sample ID					GM-8S.20121004	GM-8S.20150311	GM-8S.20150609	GM-8S.20151007	GW-08S.20151202
Sample Matrix					Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Dissolved Gases									
Ethane	74-84-0	ug/l			4.0 U	0.0020 U	0.0020 U	0.0020 U	0.10 U
Ethene	74-85-1	ug/l			3.0 U	0.0030 U	0.0030 U	0.0040 U	0.13
Methane	74-82-8	ug/l			33	2.0	2.2	3.9	30
General Chemistry									
Alkalinity, Total	ALK	ug/l			41,600	33,300	34,700	24,200	10,200
Nitrate	14797-55-8	ug/l	10000	10000	100 U	120	48	32	1500 U
Nitrate and Nitrite	OER-100-51	ug/l	10000			120	48	32	1500 U
Nitrite	14797-65-0	ug/l	1000	1000		10 U	10 U	2 U	10 U
Sulfate	14808-79-8	ug/l	250000		11,900	15,800	11,700	10,100	13,200
Total Organic Carbon		ug/l			1,100	830	770	1000 U	1000 U
Total Suspended Solids	TSS	mg/l				6.0	9.0	3.6	3.2
Metals									
Iron Dissolved	7439-89-6	ug/l	300		6,710	3,040	590	4,110	5,230
Iron	7439-89-6	ug/l	300		33,400	4,900	1,350	4,410	5,350
Manganese Dissolved	7439-96-5	ug/l	50		648	411	506	463	566
Manganese	7439-96-5	ug/l	50		751	409	517	442	589
VOCs									
1,1,1-Trichloroethane	71-55-6	ug/l	30	200	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	79-34-5	ug/l	1		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	79-00-5	ug/l	3	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichlorotrifluoroethane (Freon 113)	76-13-1	ug/l	20000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,1-Dichloroethane	75-34-3	ug/l	50		2.9 J	0.38 J	0.64 J	0.27 J	1.1
1,1-Dichloroethene	75-35-4	ug/l	1	7	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,2,3-Trichlorobenzene	87-61-6	ug/l			5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2,4-Trichlorobenzene	120-82-1	ug/l	9	70	5.00 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2-Dibromo-3-chloropropane	96-12-8	ug/l	0.02	0.2	***5.0 U***	***2.0 U***	***2.0 U***	***2.0 U***	***2.0 U***
1,2-Dibromoethane	106-93-4	ug/l	0.03	0.05	***5.0 U***	***1.0 U***	***1.0 U***	***1.0 U***	***1.0 U***
1,2-Dichlorobenzene	95-50-1	ug/l	600	600	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	107-06-2	ug/l	2	5	***5.0 U***	0.27 J	0.65 J	1.0 U	0.90 J
1,2-Dichloropropane	78-87-5	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	541-73-1	ug/l	600		5.00 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	106-46-7	ug/l	75	75	5.00 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dioxane	123-91-1	ug/l	0.4		***100 U***			0.71	2.9
2-Hexanone	591-78-6	ug/l	300		10 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone	108-10-1	ug/l			10 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	67-64-1	ug/l	6000		10 U	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	71-43-2	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Bromochloromethane	74-97-5	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	75-27-4	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	75-25-2	ug/l	4		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	74-83-9	ug/l	10		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon disulfide	75-15-0	ug/l	700		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	56-23-5	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	108-90-7	ug/l	50	100	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	75-00-3	ug/l	5		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	67-66-3	ug/l	70		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloromethane	74-87-3	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	156-59-2	ug/l	70	70	0.28 J	0.22 J	0.27 J	1.0 U	0.52 J
cis-1,3-Dichloropropene	10061-01-5	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	110-82-7	ug/l			5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Cyclohexane, Methyl-	108-87-2	ug/l			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Dibromochloromethane	124-48-1	ug/l	1		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane	75-71-8	ug/l	1000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Ethylbenzene	100-41-4	ug/l	700	700	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Isopropylbenzene	98-82-8	ug/l	700		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methyl acetate	79-20-9	ug/l	7000		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl ethyl ketone (2-Butanone)	78-93-3	ug/l	300		10 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl tert butyl ether	1634-04-4	ug/l	70		0.23 J	1.0 U	1.0 U	1.0 U	1.0 U
Methylene chloride	75-09-2	ug/l	3	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	100-42-5	ug/l	100	100	0.24 J	2.0 U	2.0 U	2.0 U	2.0 U
Tetrachloroethene	127-18-4	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	108-88-3	ug/l	600	1000	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	156-60-5	ug/l	100	100	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	10061-02-6	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	79-01-6	ug/l	1	5	0.43 J	0.43 J	0.37 J	0.29 J	0.60 J
Trichlorofluoromethane	75-69-4	ug/l	2000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Vinyl Chloride	75-01-4	ug/l	1	2	***5.0 U***	1.0 U	1.0 U	1.0 U	0.30 J
Xylene (m,p)	179601-23-1	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (o)	95-47-6	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (Total)	1330-20-7	ug/l	1000	10000		1.0 U	1.0 U	1.0 U	1.0 U

Notes:

-- Not analyzed

Concentrations which exceed the NJDEP GWQS are highlighted blue

Concentrations which exceed the NJDEP GWQS & USEPA GW Maximum Contaminant Level (MCLs) are highlighted blue and **bold**

Non-detectable concentrations which exceed any standard are ***italicized and brown***

J - Estimated value

U - Non-detectable

Table 4: Shallow Aquifer Analytical Data
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

Well ID	CAS Number	Units	NJ Groundwater Quality Standard 2015	US EPA MCLs	MW-01				
Sample Date					October 2012	3/10/2015	6/10/2015	10/6/2015	12/3/2015
Field Sample ID					MW-1.20121002	MW-1.20150310	MW-1.20150610	MW-01.20151006	MW-1.20151203
Sample Matrix					Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Dissolved Gases									
Ethane	74-84-0	ug/l			4.0 U	0.0020 U	0.0020 U	0.014 J	0.10 U
Ethene	74-85-1	ug/l			3.0 U	0.0030 U	0.0030 U	0.0040 U	0.10 U
Methane	74-82-8	ug/l			3.1	7.3	20	14	11
General Chemistry									
Alkalinity, Total	ALK	ug/l			21,200	29,400	26,300	32,100	34,700
Nitrate	14797-55-8	ug/l	10000	10000	1000 H	360	850	430	530
Nitrate and Nitrite	OER-100-51	ug/l	10000			360	860	430	530
Nitrite	14797-65-0	ug/l	1000	1000		2	5	10 U	10 U
Sulfate	14808-79-8	ug/l	250000		15,500	11,500	15,200	11,600	12,400
Total Organic Carbon		ug/l			1000 U	920	900	590	1000 U
Total Suspended Solids	TSS	mg/l				2.0	4.0 U	4.0 U	4.0 U
Metals									
Iron Dissolved	7439-89-6	ug/l	300		161 J	8.0	2.7	2.2	50.0 U
Iron	7439-89-6	ug/l	300		273	6.4	2.3	5.3	64.3
Manganese Dissolved	7439-96-5	ug/l	50		315	600	424	574	471
Manganese	7439-96-5	ug/l	50		326	606	439	589	478
VOCs									
1,1,1-Trichloroethane	71-55-6	ug/l	30	200	0.28 J	0.22 J	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	79-34-5	ug/l	1		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	79-00-5	ug/l	3	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichlorotrifluoroethane (Freon 113)	76-13-1	ug/l	20000		5.00 U	2.0 U	2.0 U	2.0 U	2.0 U
1,1-Dichloroethane	75-34-3	ug/l	50		0.54 J	0.63 J	0.55 J	0.66 J	0.54 J
1,1-Dichloroethene	75-35-4	ug/l	1	7	***5.0 U***	0.32 J	0.26 J	0.37 J	0.24 J
1,2,3-Trichlorobenzene	87-61-6	ug/l			5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2,4-Trichlorobenzene	120-82-1	ug/l	9	70	5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2-Dibromo-3-chloropropane	96-12-8	ug/l	0.02	0.2	***5.0 U***	***2.0 U***	***2.0 U***	***2.0 U***	***2.0 U***
1,2-Dibromoethane	106-93-4	ug/l	0.03	0.05	***5.0 U***	***1.0 U***	***1.0 U***	***1.0 U***	***1.0 U***
1,2-Dichlorobenzene	95-50-1	ug/l	600	600	5.0 U	1.0 U	1.0 U	0.19 J	1.0 U
1,2-Dichloroethane	107-06-2	ug/l	2	5	***5.0 U***	0.29 J	1.0 U	0.32 J	0.23 J
1,2-Dichloropropane	78-87-5	ug/l	1	5	***5.0 U***	0.23 J	1.0 U	0.26 J	1.0 U
1,3-Dichlorobenzene	541-73-1	ug/l	600		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	106-46-7	ug/l	75	75	5.0 U	0.25 J	0.37 J	0.38 J	0.28 J
1,4-Dioxane	123-91-1	ug/l	0.4		***100 U***			0.71	0.972
2-Hexanone	591-78-6	ug/l	300		10 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone	108-10-1	ug/l			10 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	67-64-1	ug/l	6000		25	5.0 U	4.3 J	5.0 U	5.0 U
Benzene	71-43-2	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Bromochloromethane	74-97-5	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	75-27-4	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	75-25-2	ug/l	4		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	74-83-9	ug/l	10		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon disulfide	75-15-0	ug/l	700		5.00 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	56-23-5	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	108-90-7	ug/l	50	100	5.0 U	0.41 J	0.56 J	0.53 J	0.46 J
Chloroethane	75-00-3	ug/l	5		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	67-66-3	ug/l	70		5.0 U	1.0 U	1.0 U	0.20 J	1.0 U
Chloromethane	74-87-3	ug/l			5.00 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	156-59-2	ug/l	70	70	2.3 J	1.8	2.0	1.5	1.9
cis-1,3-Dichloropropene	10061-01-5	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	110-82-7	ug/l			5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Cyclohexane, Methyl-	108-87-2	ug/l			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Dibromochloromethane	124-48-1	ug/l	1		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane	75-71-8	ug/l	1000		5.00 U	2.0 U	2.0 U	2.0 U	2.0 U
Ethylbenzene	100-41-4	ug/l	700	700	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Isopropylbenzene	98-82-8	ug/l	700		0.20 J	1.0 U	1.0 U	1.0 U	1.0 U
Methyl acetate	79-20-9	ug/l	7000		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl ethyl ketone (2-Butanone)	78-93-3	ug/l	300		10 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl tert butyl ether	1634-04-4	ug/l	70		2.4 J	3.9	3.1	3.3	3.3
Methylene chloride	75-09-2	ug/l	3	5	***5.00 U***	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	100-42-5	ug/l	100	100	1.9 J	2.0 U	2.0 U	2.0 U	2.0 U
Tetrachloroethene	127-18-4	ug/l	1	5	***5.0 U***	1.6	1.7	1.7	1.7
Toluene	108-88-3	ug/l	600	1000	0.11 J	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	156-60-5	ug/l	100	100	5.00 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	10061-02-6	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	79-01-6	ug/l	1	5	1.6 J	1.1	1.6	2.3	2.1
Trichlorofluoromethane	75-69-4	ug/l	2000		5.00 U	2.0 U	2.0 U	2.0 U	2.0 U
Vinyl Chloride	75-01-4	ug/l	1	2	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (m,p)	179601-23-1	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (o)	95-47-6	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (Total)	1330-20-7	ug/l	1000	10000		1.0 U	1.0 U	1.0 U	1.0 U

Notes:

-- Not analyzed

Concentrations which exceed the NJDEP GWQS are highlighted blue

Concentrations which exceed the NJDEP GWQS & USEPA GW Maximum Contaminant Level (MCLs) are highlighted blue and **bold**

Non-detectable concentrations which exceed any standard are *italicized and brown*

J - Estimated value

U - Non-detectable

Table 4: Shallow Aquifer Analytical Data
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

Well ID	CAS Number	Units	NJ Groundwater Quality Standard 2015	US EPA MCLs	MW-02				
Sample Date					October 2012	3/12/2015	6/10/2015	10/7/2015	12/3/2015
Field Sample ID					MW-2.20121008	MW-2.20150312	MW-2.20150610	MW-2.20151007	MW-2.20151203
Sample Matrix					Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Dissolved Gases									
Ethane	74-84-0	ug/l			4.0 U	0.0020 U	0.0020 U	0.0020 U	0.10 U
Ethene	74-85-1	ug/l			3.0 U	0.0030 U	0.0030 U	0.0040 U	0.10 U
Methane	74-82-8	ug/l			3.2	1.1	0.042 U	1.7	1.6
General Chemistry									
Alkalinity, Total	ALK	ug/l			15,700	23,000	24,200	25,700	19,100
Nitrate	14797-55-8	ug/l	10000	10000	100 U	110 U	26	150 J	110 U
Nitrate and Nitrite	OER-100-51	ug/l	10000			100 U	29	150 J	77
Nitrite	14797-65-0	ug/l	1000	1000		10 U	3	2 U	10 U
Sulfate	14808-79-8	ug/l	250000		11,700	19,300	18,500	31,000	34,200
Total Organic Carbon		ug/l			1,500	1,800	1,300	1,300	1,100
Total Suspended Solids	TSS	mg/l				5.0	4.0 U	4.0 U	4.0 U
Metals									
Iron Dissolved	7439-89-6	ug/l	300		1,160	18.6	27.6	631	162
Iron	7439-89-6	ug/l	300		3,050	1,800	984	582	128
Manganese Dissolved	7439-96-5	ug/l	50		553	747	675	759	697
Manganese	7439-96-5	ug/l	50		632	740	669	753	666
VOCs									
1,1,1-Trichloroethane	71-55-6	ug/l	30	200	0.74 J	0.98 J	0.56 J	0.43 J	0.36 J
1,1,2,2-Tetrachloroethane	79-34-5	ug/l	1		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	79-00-5	ug/l	3	5	0.53 J	0.76 J	0.69 J	0.82 J	0.80 J
1,1,2-Trichlorotrifluoroethane (Freon 113)	76-13-1	ug/l	20000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,1-Dichloroethane	75-34-3	ug/l	50		5.5	7.3	5.0	5.5	4.3
1,1-Dichloroethene	75-35-4	ug/l	1	7	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,2,3-Trichlorobenzene	87-61-6	ug/l			5.00 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2,4-Trichlorobenzene	120-82-1	ug/l	9	70	5.00 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2-Dibromo-3-chloropropane	96-12-8	ug/l	0.02	0.2	***5.0 U***	***2.0 U***	***2.0 U***	***2.0 U***	***2.0 U***
1,2-Dibromoethane	106-93-4	ug/l	0.03	0.05	***5.0 U***	***1.0 U***	***1.0 U***	***1.0 U***	***1.0 U***
1,2-Dichlorobenzene	95-50-1	ug/l	600	600	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	107-06-2	ug/l	2	5	**16**	**9.5**	**8.7**	**9**	**8.5**
1,2-Dichloropropane	78-87-5	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	541-73-1	ug/l	600		5.00 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	106-46-7	ug/l	75	75	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dioxane	123-91-1	ug/l	0.4		170			25.5	40
2-Hexanone	591-78-6	ug/l	300		10 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone	108-10-1	ug/l			10 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	67-64-1	ug/l	6000		130	4.1 J	5.0 U	5.0 U	5.0 U
Benzene	71-43-2	ug/l	1	5	***5.0 U***	0.26 J	1.0 U	1.0 U	1.0 U
Bromochloromethane	74-97-5	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	75-27-4	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	75-25-2	ug/l	4		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	74-83-9	ug/l	10		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon disulfide	75-15-0	ug/l	700		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	56-23-5	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	108-90-7	ug/l	50	100	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	75-00-3	ug/l	5		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	67-66-3	ug/l	70		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloromethane	74-87-3	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	156-59-2	ug/l	70	70	21	11.9	9.2	9.9	8.7
cis-1,3-Dichloropropene	10061-01-5	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	110-82-7	ug/l			5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Cyclohexane, Methyl-	108-87-2	ug/l			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Dibromochloromethane	124-48-1	ug/l	1		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane	75-71-8	ug/l	1000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Ethylbenzene	100-41-4	ug/l	700	700	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Isopropylbenzene	98-82-8	ug/l	700		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methyl acetate	79-20-9	ug/l	7000		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl ethyl ketone (2-Butanone)	78-93-3	ug/l	300		10 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl tert butyl ether	1634-04-4	ug/l	70		1.1 J	0.68 J	0.46 J	0.41 J	0.42 J
Methylene chloride	75-09-2	ug/l	3	5	***5.00 U***	0.29 J	1.0 U	1.0 U	1.0 U
Styrene	100-42-5	ug/l	100	100	5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Tetrachloroethene	127-18-4	ug/l	1	5	**8.5**	**5.5**	3.8	3.2	2.8
Toluene	108-88-3	ug/l	600	1000	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	156-60-5	ug/l	100	100	5.0 U	1.0 U	0.29 J	0.22 J	1.0 U
trans-1,3-Dichloropropene	10061-02-6	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	79-01-6	ug/l	1	5	**20**	**13**	**9.7**	**12.2**	**10.1**
Trichlorofluoromethane	75-69-4	ug/l	2000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Vinyl Chloride	75-01-4	ug/l	1	2	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (m,p)	179601-23-1	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (o)	95-47-6	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (Total)	1330-20-7	ug/l	1000	10000		1.0 U	1.0 U	1.0 U	1.0 U

Notes:

-- Not analyzed

Concentrations which exceed the NJDEP GWQS are highlighted blue

Concentrations which exceed the NJDEP GWQS & USEPA GW Maximum Contaminant Level (MCLs) are highlighted blue and **bold**

Non-detectable concentrations which exceed any standard are ***italicized and brown***

J - Estimated value

U - Non-detectable

Table 4: Shallow Aquifer Analytical Data
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

Well ID	CAS Number	Units	NJ Groundwater Quality Standard 2015	US EPA MCLs	MW-04				
Sample Date					October 2012	3/10/2015	6/10/2015	10/6/2015	12/2/2015
Field Sample ID					MW-4.20121002	MW-4.20150310	MW-4.20150610	MW-04.20151006	MW-04.20151202
Sample Matrix					Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Dissolved Gases									
Ethane	74-84-0	ug/l			4.0 U	0.0020 U	0.0020 U	0.0053 J	0.10 U
Ethene	74-85-1	ug/l			3.0 U	0.0030 U	0.0030 U	0.0040 U	0.013 J
Methane	74-82-8	ug/l			2.0 U	0.95	0.042 U	0.037 U	0.50 U
General Chemistry									
Alkalinity, Total	ALK	ug/l			13,300	21,100	4,700	8,600	1,500
Nitrate	14797-55-8	ug/l	10000	10000	1,200 H	2,500	2,800	2,700	110 U
Nitrate and Nitrite	OER-100-51	ug/l	10000			2,500	2,800	2,700	100 U
Nitrite	14797-65-0	ug/l	1000	1000		10 U	5	10 U	10 U
Sulfate	14808-79-8	ug/l	250000		18,300	13,600	13,900	12,400	12,800
Total Organic Carbon		ug/l			1000 U	960	1000	540	1000 U
Total Suspended Solids	TSS	mg/l				5.0	4.0 U	4.0 U	4.0 U
Metals									
Iron Dissolved	7439-89-6	ug/l	300		200 U	4.9	3.9	10.1	50.0 U
Iron	7439-89-6	ug/l	300		141 J	3,880	54.6	63.6	50.0 U
Manganese Dissolved	7439-96-5	ug/l	50		333	36.1	76.7	41.4	50.0
Manganese	7439-96-5	ug/l	50		370	1,840	81	48.2	50.1
VOCs									
1,1,1-Trichloroethane	71-55-6	ug/l	30	200	0.24 J	0.23 J	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	79-34-5	ug/l	1		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	79-00-5	ug/l	3	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichlorotrifluoroethane (Freon 113)	76-13-1	ug/l	20000		5.00 U	2.0 U	2.0 U	2.0 U	2.0 U
1,1-Dichloroethane	75-34-3	ug/l	50		0.33 J	0.24 J	0.17 J	1.0 U	1.0 U
1,1-Dichloroethene	75-35-4	ug/l	1	7	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,2,3-Trichlorobenzene	87-61-6	ug/l			5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2,4-Trichlorobenzene	120-82-1	ug/l	9	70	5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2-Dibromo-3-chloropropane	96-12-8	ug/l	0.02	0.2	***5.0 U***	***2.0 U***	***2.0 U***	***2.0 U***	***2.0 U***
1,2-Dibromoethane	106-93-4	ug/l	0.03	0.05	***5.0 U***	***1.0 U***	***1.0 U***	***1.0 U***	***1.0 U***
1,2-Dichlorobenzene	95-50-1	ug/l	600	600	5.00 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	107-06-2	ug/l	2	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	78-87-5	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	541-73-1	ug/l	600		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	106-46-7	ug/l	75	75	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dioxane	123-91-1	ug/l	0.4		***100 U***			0.32	0.36
2-Hexanone	591-78-6	ug/l	300		10 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone	108-10-1	ug/l			10 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	67-64-1	ug/l	6000		19	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	71-43-2	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Bromochloromethane	74-97-5	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	75-27-4	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	75-25-2	ug/l	4		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	74-83-9	ug/l	10		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon disulfide	75-15-0	ug/l	700		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	56-23-5	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	108-90-7	ug/l	50	100	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	75-00-3	ug/l	5		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	67-66-3	ug/l	70		5.0 U	1.0 U	0.15 J	0.18 J	0.22 J
Chloromethane	74-87-3	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	156-59-2	ug/l	70	70	8.0	8.5	7.4	8.5	10.2
cis-1,3-Dichloropropene	10061-01-5	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	110-82-7	ug/l			5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Cyclohexane, Methyl-	108-87-2	ug/l			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Dibromochloromethane	124-48-1	ug/l	1		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane	75-71-8	ug/l	1000		5.00 U	2.0 U	2.0 U	2.0 U	2.0 U
Ethylbenzene	100-41-4	ug/l	700	700	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Isopropylbenzene	98-82-8	ug/l	700		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methyl acetate	79-20-9	ug/l	7000		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl ethyl ketone (2-Butanone)	78-93-3	ug/l	300		10 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl tert butyl ether	1634-04-4	ug/l	70		0.25 J	1.0 U	1.0 U	1.0 U	1.0 U
Methylene chloride	75-09-2	ug/l	3	5	***5.00 U***	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	100-42-5	ug/l	100	100	1.4 J	2.0 U	2.0 U	2.0 U	2.0 U
Tetrachloroethene	127-18-4	ug/l	1	5	***5.0 U***	1.1	1.4	0.89 J	0.87 J
Toluene	108-88-3	ug/l	600	1000	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	156-60-5	ug/l	100	100	5.0 U	1.0 U	0.19 J	0.23 J	1.0 U
trans-1,3-Dichloropropene	10061-02-6	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	79-01-6	ug/l	1	5	**43**	**45.7**	**39.8**	**43.8**	**44.3**
Trichlorofluoromethane	75-69-4	ug/l	2000		5.000 U	2.0 U	2.0 U	2.0 U	2.0 U
Vinyl Chloride	75-01-4	ug/l	1	2	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (m,p)	179601-23-1	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (o)	95-47-6	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (Total)	1330-20-7	ug/l	1000	10000		1.0 U	1.0 U	1.0 U	1.0 U

Notes:

-- Not analyzed

Concentrations which exceed the NJDEP GWQS are highlighted blue

Concentrations which exceed the NJDEP GWQS & USEPA GW Maximum Contaminant Level (MCLs) are highlighted blue and **bold**

Non-detectable concentrations which exceed any standard are *italicized and brown*

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Table 4: Shallow Aquifer Analytical Data
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

Well ID	CAS Number	Units	NJ Groundwater Quality Standard 2015	US EPA MCLs	MW-07					
Sample Date					October 2012	3/11/2015	6/10/2015	10/6/2015	12/1/2015	12/1/2015
Field Sample ID					MW-7.20121004	MW-7.20150311	MW-7.20150610	MW-07.20151006	DUP-01.20151201	MW-07.20151201
Sample Matrix					Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Dissolved Gases										
Ethane	74-84-0	ug/l			4.0 U	0.0020 U	0.0020 U	0.0078 J	0.10 U	0.10 U
Ethene	74-85-1	ug/l			3.0 U	0.0030 U	0.0030 U	0.0040 U	0.10 U	0.10 U
Methane	74-82-8	ug/l			2.0 U	0.042 U	0.042 U	0.037 U	0.50 U	0.50 U
General Chemistry										
Alkalinity, Total	ALK	ug/l			5000 U	6,900	5000 U	2,100	13000 U	13000 U
Nitrate	14797-55-8	ug/l	10000	10000	2,500	94	1,800	1,700	2,300	2,200
Nitrate and Nitrite	OER-100-51	ug/l	10000			96	1,800	1,700	2,300	2,200
Nitrite	14797-65-0	ug/l	1000	1000		2	10 U	10 U	10 U	10 U
Sulfate	14808-79-8	ug/l	250000		2,700 J	1,700	4,800	2,700	2,700	2,800
Total Organic Carbon		ug/l			1,300	3,800	740	520	1000 U	1000 U
Total Suspended Solids	TSS	mg/l				12.0	4.0 U	3.2	1.8 J	4.0
Metals										
Iron Dissolved	7439-89-6	ug/l	300		200 U	29.6	2.4	1.8	50 U	50 U
Iron	7439-89-6	ug/l	300		550	469	35.8	86.0	25.7	29.4
Manganese Dissolved	7439-96-5	ug/l	50		50.9	2.9	47.8	48.5	43.1	41.5
Manganese	7439-96-5	ug/l	50		341	6.7	55.3	52.4	45.5	44.1
VOCs										
1,1,1-Trichloroethane	71-55-6	ug/l	30	200	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	79-34-5	ug/l	1		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	79-00-5	ug/l	3	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichlorotrifluoroethane (Freon 113)	76-13-1	ug/l	20000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,1-Dichloroethane	75-34-3	ug/l	50		0.35 J	1.0 U	0.31 J	0.38 J	0.30 J	0.33 J
1,1-Dichloroethene	75-35-4	ug/l	1	7	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2,3-Trichlorobenzene	87-61-6	ug/l			5.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2,4-Trichlorobenzene	120-82-1	ug/l	9	70	5.00 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2-Dibromo-3-chloropropane	96-12-8	ug/l	0.02	0.2	***5.0 U***	***2.0 U***	***2.0 U***	***2.0 U***	***2.0 U***	***2.0 U***
1,2-Dibromoethane	106-93-4	ug/l	0.03	0.05	***5.0 U***	***1.0 U***	***1.0 U***	***1.0 U***	***1.0 U***	***1.0 U***
1,2-Dichlorobenzene	95-50-1	ug/l	600	600	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	107-06-2	ug/l	2	5	***5.0 U***	1.0 U	1.0 U	0.22 J	0.31 J	0.30 J
1,2-Dichloropropane	78-87-5	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	541-73-1	ug/l	600		5.00 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	106-46-7	ug/l	75	75	5.00 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dioxane	123-91-1	ug/l	0.4		***100 U***			0.22 U	0.21 U	0.20 U
2-Hexanone	591-78-6	ug/l	300		10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone	108-10-1	ug/l			10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	67-64-1	ug/l	6000		2.7 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	71-43-2	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromochloromethane	74-97-5	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	75-27-4	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	75-25-2	ug/l	4		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	74-83-9	ug/l	10		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon disulfide	75-15-0	ug/l	700		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	56-23-5	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	108-90-7	ug/l	50	100	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	75-00-3	ug/l	5		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	67-66-3	ug/l	70		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloromethane	74-87-3	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	156-59-2	ug/l	70	70	4.0 J	1.0 U	3.3	3.2	2.9	3.0
cis-1,3-Dichloropropene	10061-01-5	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	110-82-7	ug/l			5.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Cyclohexane, Methyl-	108-87-2	ug/l			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Dibromochloromethane	124-48-1	ug/l	1		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane	75-71-8	ug/l	1000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Ethylbenzene	100-41-4	ug/l	700	700	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Isopropylbenzene	98-82-8	ug/l	700		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methyl acetate	79-20-9	ug/l	7000		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl ethyl ketone (2-Butanone)	78-93-3	ug/l	300		10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl tert butyl ether	1634-04-4	ug/l	70		0.54 J	1.0 U	0.24 J	0.20 J	1.0 U	1.0 U
Methylene chloride	75-09-2	ug/l	3	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	100-42-5	ug/l	100	100	0.27 J	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Tetrachloroethene	127-18-4	ug/l	1	5	***5.00 U***	1.0 U	0.70 J	0.57 J	0.64 J	0.61 J
Toluene	108-88-3	ug/l	600	1000	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	156-60-5	ug/l	100	100	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	10061-02-6	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	79-01-6	ug/l	1	5	**5.9**	0.20 J	**5.4**	4.5	4.5	4.5
Trichlorofluoromethane	75-69-4	ug/l	2000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Vinyl Chloride	75-01-4	ug/l	1	2	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (m,p)	179601-23-1	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (o)	95-47-6	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (Total)	1330-20-7	ug/l	1000	10000		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

Notes:

-- Not analyzed

Concentrations which exceed the NJDEP GWQS are highlighted blue

Concentrations which exceed the NJDEP GWQS & USEPA GW Maximum Contaminant Level (MCLs) are highlighted blue and **bold**

Non-detectable concentrations which exceed any standard are *italicized and brown*

J - Estimated value

U - Non-detectable

Table 4: Shallow Aquifer Analytical Data
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

Well ID	CAS Number	Units	NJ Groundwater Quality Standard 2015	US EPA MCLs	MW-09S				
Sample Date					October 2012	3/10/2015	6/9/2015	10/5/2015	12/2/2015
Field Sample ID					MW-9S.20121008	MW-9S.20150310	MW-9S.20150609	MW-09S.20151005	MW-09S.20151202
Sample Matrix					Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Dissolved Gases									
Ethane	74-84-0	ug/l			4.0 U	0.0020 U	0.0020 U	0.0020 U	0.10 U
Ethene	74-85-1	ug/l			3.0 U	0.48	0.38	0.0040 U	0.17
Methane	74-82-8	ug/l			38	94	64	38	32
General Chemistry									
Alkalinity, Total	ALK	ug/l			50,900	43,600	95,800	53,800	51,000
Nitrate	14797-55-8	ug/l	10000	10000	100 U	110 U	87	140	110 U
Nitrate and Nitrite	OER-100-51	ug/l	10000			100 U	87	140	100 U
Nitrite	14797-65-0	ug/l	1000	1000		10 U	10 U	10 U	10 U
Sulfate	14808-79-8	ug/l	250000		28,500	30,800	30,200	34,400	19,300
Total Organic Carbon		ug/l			9,900	1,800	1,800	1,100	1,200
Total Suspended Solids	TSS	mg/l				28.0	33.0	4.8	4.8
Metals									
Iron Dissolved	7439-89-6	ug/l	300		25,600	48,700	31,800	25,800	17,500
Iron	7439-89-6	ug/l	300		27,600	46,900	29,800	25,100	15,300
Manganese Dissolved	7439-96-5	ug/l	50		267	366	425	515	305
Manganese	7439-96-5	ug/l	50		295	361	392	497	275
VOCs									
1,1,1-Trichloroethane	71-55-6	ug/l	30	200	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	79-34-5	ug/l	1		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	79-00-5	ug/l	3	5	***5.0 U***	1.0 U	1.0 U	0.42 J	1.0 U
1,1,2-Trichlorotrifluoroethane (Freon 113)	76-13-1	ug/l	20000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,1-Dichloroethane	75-34-3	ug/l	50		5.9	4.6	2.2	2.8	1.3
1,1-Dichloroethene	75-35-4	ug/l	1	7	***5.0 U***	1.0 U	1.0 U	1.0 U	0.24 J
1,2,3-Trichlorobenzene	87-61-6	ug/l			5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2,4-Trichlorobenzene	120-82-1	ug/l	9	70	5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2-Dibromo-3-chloropropane	96-12-8	ug/l	0.02	0.2	***5.0 U***	***2.0 U***	***2.0 U***	***2.0 U***	***2.0 U***
1,2-Dibromoethane	106-93-4	ug/l	0.03	0.05	***5.0 U***	***1.0 U***	***1.0 U***	***1.0 U***	***1.0 U***
1,2-Dichlorobenzene	95-50-1	ug/l	600	600	5.0 U	1.0 U	1.0 U	1.0 U	0.20 J
1,2-Dichloroethane	107-06-2	ug/l	2	5	**11**	**10.7**	5	**5.7**	1.8
1,2-Dichloropropane	78-87-5	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	541-73-1	ug/l	600		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	106-46-7	ug/l	75	75	5.0 U	1.0 U	1.0 U	1.0 U	0.37 J
1,4-Dioxane	123-91-1	ug/l	0.4		***100 U***			17.1	4.3
2-Hexanone	591-78-6	ug/l	300		10 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone	108-10-1	ug/l			10 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	67-64-1	ug/l	6000		7.3 J	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	71-43-2	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Bromochloromethane	74-97-5	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	75-27-4	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	75-25-2	ug/l	4		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	74-83-9	ug/l	10		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon disulfide	75-15-0	ug/l	700		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	56-23-5	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	108-90-7	ug/l	50	100	5.0 U	1.0 U	1.0 U	1.0 U	0.69 J
Chloroethane	75-00-3	ug/l	5		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	67-66-3	ug/l	70		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloromethane	74-87-3	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	156-59-2	ug/l	70	70	11	11.6	5.7	8.2	4.7
cis-1,3-Dichloropropene	10061-01-5	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	110-82-7	ug/l			5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Cyclohexane, Methyl-	108-87-2	ug/l			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Dibromochloromethane	124-48-1	ug/l	1		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane	75-71-8	ug/l	1000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Ethylbenzene	100-41-4	ug/l	700	700	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Isopropylbenzene	98-82-8	ug/l	700		0.15 J	1.0 U	1.0 U	1.0 U	1.0 U
Methyl acetate	79-20-9	ug/l	7000		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl ethyl ketone (2-Butanone)	78-93-3	ug/l	300		3.7 J	5.0 U	5.0 U	5.0 U	5.0 U
Methyl tert butyl ether	1634-04-4	ug/l	70		0.76 J	1.1	0.45 J	0.73 J	4.1
Methylene chloride	75-09-2	ug/l	3	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	100-42-5	ug/l	100	100	5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Tetrachloroethene	127-18-4	ug/l	1	5	0.49 J	3.4	1.1	3.6	1.4
Toluene	108-88-3	ug/l	600	1000	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	156-60-5	ug/l	100	100	5.0 U	0.23 J	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	10061-02-6	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	79-01-6	ug/l	1	5	**7.8**	**10.4**	2.8	**6**	4.4
Trichlorofluoromethane	75-69-4	ug/l	2000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Vinyl Chloride	75-01-4	ug/l	1	2	***5.0 U***	**2.8**	1.3	1.6	0.58 J
Xylene (m,p)	179601-23-1	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (o)	95-47-6	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (Total)	1330-20-7	ug/l	1000	10000		1.0 U	1.0 U	1.0 U	1.0 U

Notes:

-- Not analyzed

Concentrations which exceed the NJDEP GWQS are highlighted blue

Concentrations which exceed the NJDEP GWQS & USEPA GW Maximum Contaminant Level (MCLs) are highlighted blue and **bold**

Non-detectable concentrations which exceed any standard are *italicized and brown*

J - Estimated value

U - Non-detectable

Table 4: Shallow Aquifer Analytical Data
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

Well ID	CAS Number	Units	NJ Groundwater Quality Standard 2015	US EPA MCLs	MW-10S				
Sample Date					October 2012	3/11/2015	6/9/2015	10/7/2015	12/2/2015
Field Sample ID					MW-10S.20121002	MW-10S.20150311	MW-10S.20150609	MW-10S.20151007	MW-10S.20151202
Sample Matrix					Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Dissolved Gases									
Ethane	74-84-0	ug/l			4.0 U	0.0020 U	0.0020 U	0.0020 U	0.10 U
Ethene	74-85-1	ug/l			3.0 U	0.047	0.0030 U	0.0040 U	0.087 J
Methane	74-82-8	ug/l			2.0 U	0.23	0.042 U	1.6	0.50 U
General Chemistry									
Alkalinity, Total	ALK	ug/l			5,600	5000 U	5000 U	5000 U	5000 U
Nitrate	14797-55-8	ug/l	10000	10000	1,700 H	1,800	1,500	1,100 J	110 U
Nitrate and Nitrite	OER-100-51	ug/l	10000			1,800	1,500	1,100 J	100 U
Nitrite	14797-65-0	ug/l	1000	1000		10 U	10 U	2 U	10 U
Sulfate	14808-79-8	ug/l	250000		18,500	24,800	18,300	18,900	21,900
Total Organic Carbon		ug/l			1000 U	1000	900	1,100	1,100
Total Suspended Solids	TSS	mg/l				4.0 U	4.0 U	1.2	4.0 U
Metals									
Iron Dissolved	7439-89-6	ug/l	300		200 U	50 U	7.2	50.0 U	50.0 U
Iron	7439-89-6	ug/l	300		74.4 J	50 U	2.8	50.0 U	50.0 U
Manganese Dissolved	7439-96-5	ug/l	50		193	443	322	540	234
Manganese	7439-96-5	ug/l	50		192	436	313	566	242
VOCs									
1,1,1-Trichloroethane	71-55-6	ug/l	30	200	0.80 J	0.31 J	0.39 J	0.29 J	0.50 J
1,1,2,2-Tetrachloroethane	79-34-5	ug/l	1		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	79-00-5	ug/l	3	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichlorotrifluoroethane (Freon 113)	76-13-1	ug/l	20000		5.00 U	2.0 U	2.0 U	2.0 U	2.0 U
1,1-Dichloroethane	75-34-3	ug/l	50		2.2 J	0.86 J	0.63 J	0.82 J	0.83 J
1,1-Dichloroethene	75-35-4	ug/l	1	7	***5.0 U***	0.44 J	0.59 J	0.53 J	0.84 J
1,2,3-Trichlorobenzene	87-61-6	ug/l			5.00 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2,4-Trichlorobenzene	120-82-1	ug/l	9	70	5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2-Dibromo-3-chloropropane	96-12-8	ug/l	0.02	0.2	***5.0 U***	***2.0 U***	***2.0 U***	***2.0 U***	***2.0 U***
1,2-Dibromoethane	106-93-4	ug/l	0.03	0.05	***5.0 U***	***1.0 U***	***1.0 U***	***1.0 U***	***1.0 U***
1,2-Dichlorobenzene	95-50-1	ug/l	600	600	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	107-06-2	ug/l	2	5	***5.0 U***	1.2	1.1	1.1	0.77 J
1,2-Dichloropropane	78-87-5	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	541-73-1	ug/l	600		5.00 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	106-46-7	ug/l	75	75	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dioxane	123-91-1	ug/l	0.4		***100 U***			3.2	4
2-Hexanone	591-78-6	ug/l	300		10 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone	108-10-1	ug/l			10 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	67-64-1	ug/l	6000		44	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	71-43-2	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Bromochloromethane	74-97-5	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	75-27-4	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	75-25-2	ug/l	4		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	74-83-9	ug/l	10		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon disulfide	75-15-0	ug/l	700		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	56-23-5	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	108-90-7	ug/l	50	100	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	75-00-3	ug/l	5		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	67-66-3	ug/l	70		5.0 U	0.43 J	0.31 J	0.28 J	0.49 J
Chloromethane	74-87-3	ug/l			5.0 U	1.0 U	1.0 U	0.26 J	1.0 U
cis-1,2-Dichloroethene	156-59-2	ug/l	70	70	67	29.2	23.4	20.0	34.4
cis-1,3-Dichloropropene	10061-01-5	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	110-82-7	ug/l			5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Cyclohexane, Methyl-	108-87-2	ug/l			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Dibromochloromethane	124-48-1	ug/l	1		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane	75-71-8	ug/l	1000		5.00 U	2.0 U	2.0 U	2.0 U	2.0 U
Ethylbenzene	100-41-4	ug/l	700	700	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Isopropylbenzene	98-82-8	ug/l	700		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methyl acetate	79-20-9	ug/l	7000		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl ethyl ketone (2-Butanone)	78-93-3	ug/l	300		10 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl tert butyl ether	1634-04-4	ug/l	70		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methylene chloride	75-09-2	ug/l	3	5	***5.00 U***	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	100-42-5	ug/l	100	100	0.91 J	2.0 U	2.0 U	2.0 U	2.0 U
Tetrachloroethene	127-18-4	ug/l	1	5	***5.0 U***	1.7	2.5	1.4	2.2
Toluene	108-88-3	ug/l	600	1000	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	156-60-5	ug/l	100	100	5.00 U	0.41 J	0.22 J	0.29 J	0.40 J
trans-1,3-Dichloropropene	10061-02-6	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	79-01-6	ug/l	1	5	**220 E**	**115**	**90.8**	**73.4**	**112**
Trichlorofluoromethane	75-69-4	ug/l	2000		5.00 U	2.0 U	2.0 U	2.0 U	2.0 U
Vinyl Chloride	75-01-4	ug/l	1	2	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (m,p)	179601-23-1	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (o)	95-47-6	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (Total)	1330-20-7	ug/l	1000	10000		1.0 U	1.0 U	1.0 U	1.0 U

Notes:

-- Not analyzed

Concentrations which exceed the NJDEP GWQS are highlighted blue

Concentrations which exceed the NJDEP GWQS & USEPA GW Maximum Contaminant Level (MCLs) are highlighted blue and **bold**

Non-detectable concentrations which exceed any standard are *italicized and brown*

J - Estimated value

U - Non-detectable

Table 4: Shallow Aquifer Analytical Data
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

Well ID	CAS Number	Units	NJ Groundwater Quality Standard 2015	US EPA MCLs	MW-11S					
Sample Date					October 2012	October 2012	6/9/2015	6/9/2015	10/8/2015	12/2/2015
Field Sample ID					MW-11S.20121008	MW-11S.20150311	DUP-1.20150609	MW-11S.20150609	MW-11S.20151008	MW-11S.20151202
Sample Matrix					Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Dissolved Gases										
Ethane	74-84-0	ug/l			4.0 U	0.0020 U	0.0020 U	0.0020 U	0.0020 U	0.10 U
Ethene	74-85-1	ug/l			3.0 U	0.038	0.0030 U	0.0030 U	0.0040 U	0.044 J
Methane	74-82-8	ug/l			2.0 U	0.042 U	0.042 U	0.042 U	6.1	0.50 U
General Chemistry										
Alkalinity, Total	ALK	ug/l			10,300	3,400	3,200	2,100	5000 U	5000 U
Nitrate	14797-55-8	ug/l	10000	10000	1,900	1,300	2,000	2,000	1,500	800 U
Nitrate and Nitrite	OER-100-51	ug/l	10000			1,300	2,000	2,000	1,500	800 U
Nitrite	14797-65-0	ug/l	1000	1000		10 U	10 U	10 U	10 U	10 U
Sulfate	14808-79-8	ug/l	250000		3,400 J	5,700	4,100	4,100	10000 U	4,300
Total Organic Carbon		ug/l			1000 U	890	620	610	1000 U	1000 U
Total Suspended Solids	TSS	mg/l				4.0 U	4.0 U	4.0 U	1.4	3.1
Metals										
Iron Dissolved	7439-89-6	ug/l	300		200 U	3.9	1.5	1.7	50.0 U	50.0 U
Iron	7439-89-6	ug/l	300		200 U	102	4.4	5.5	50.0 U	82.7
Manganese Dissolved	7439-96-5	ug/l	50		12.8 J	16.3	26.8	27.1	21.2	17.9
Manganese	7439-96-5	ug/l	50		16.3	25.0	26.8	27.3	34.1	35.9
VOCs										
1,1,1-Trichloroethane	71-55-6	ug/l	30	200	0.23 J	1.0 U	1.0 U	0.20 J	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	79-34-5	ug/l	1		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	79-00-5	ug/l	3	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichlorotrifluoroethane (Freon 113)	76-13-1	ug/l	20000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,1-Dichloroethane	75-34-3	ug/l	50		3.1 J	2.4	1.9	1.7	1.7	2.6
1,1-Dichloroethene	75-35-4	ug/l	1	7	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2,3-Trichlorobenzene	87-61-6	ug/l			5.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2,4-Trichlorobenzene	120-82-1	ug/l	9	70	5.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2-Dibromo-3-chloropropane	96-12-8	ug/l	0.02	0.2	***5.0 U***	***2.0 U***	***2.0 U***	***2.0 U***	***2.0 U***	***2.0 U***
1,2-Dibromoethane	106-93-4	ug/l	0.03	0.05	***5.0 U***	***1.0 U***	***1.0 U***	***1.0 U***	***1.0 U***	***1.0 U***
1,2-Dichlorobenzene	95-50-1	ug/l	600	600	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	107-06-2	ug/l	2	5	***5.0 U***	0.67 J	1.2	1.2	0.92 J	0.75 J
1,2-Dichloropropane	78-87-5	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	541-73-1	ug/l	600		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	106-46-7	ug/l	75	75	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dioxane	123-91-1	ug/l	0.4		***100 U***				0.21 U	0.21 U
2-Hexanone	591-78-6	ug/l	300		10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone	108-10-1	ug/l			10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	67-64-1	ug/l	6000		10 U	5.0 U	9.0	6.6	5.0 U	5.0 U
Benzene	71-43-2	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromochloromethane	74-97-5	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	75-27-4	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	75-25-2	ug/l	4		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	74-83-9	ug/l	10		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon disulfide	75-15-0	ug/l	700		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	56-23-5	ug/l	1	5	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	108-90-7	ug/l	50	100	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	75-00-3	ug/l	5		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	67-66-3	ug/l	70		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloromethane	74-87-3	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	156-59-2	ug/l	70	70	9.4	5.0	6.9	6.6	4.9	6.5
cis-1,3-Dichloropropene	10061-01-5	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	110-82-7	ug/l			5.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Cyclohexane, Methyl-	108-87-2	ug/l			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Dibromochloromethane	124-48-1	ug/l	1		***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane	75-71-8	ug/l	1000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Ethylbenzene	100-41-4	ug/l	700	700	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Isopropylbenzene	98-82-8	ug/l	700		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methyl acetate	79-20-9	ug/l	7000		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl ethyl ketone (2-Butanone)	78-93-3	ug/l	300		10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl tert butyl ether	1634-04-4	ug/l	70		0.33 J	1.0 U	0.48 J	0.42 J	0.46 J	1.0 U
Methylene chloride	75-09-2	ug/l	3	5	***5.00 U***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	100-42-5	ug/l	100	100	5.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Tetrachloroethene	127-18-4	ug/l	1	5	2.5 J	2	1.8	1.8	1.5	2.2
Toluene	108-88-3	ug/l	600	1000	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	156-60-5	ug/l	100	100	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	10061-02-6	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	79-01-6	ug/l	1	5	**10**	**8.9**	**10.6**	**10.2**	**8.6**	**10.2**
Trichlorofluoromethane	75-69-4	ug/l	2000		5.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Vinyl Chloride	75-01-4	ug/l	1	2	***5.0 U***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (m,p)	179601-23-1	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (o)	95-47-6	ug/l			5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (Total)	1330-20-7	ug/l	1000	10000		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

Notes:

-- Not analyzed

Concentrations which exceed the NJDEP GWQS are highlighted blue

Concentrations which exceed the NJDEP GWQS & USEPA GW Maximum Contaminant Level (MCLs) are highlighted blue and **bold**

Non-detectable concentrations which exceed any standard are *italicized and brown*

J - Estimated value

U - Non-detectable

Table 5: Deep Aquifer Analytical Data
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

Well ID	CAS Number	Units	NJ Groundwater Quality Standard 2015	US EPA MCLs	GM-01D		
Sample Date					October 2012	October 2012	10/26/2015
Field Sample ID					DUP-01.20121022	GM-01D.20121022	GM-1D.20151026
Sample Matrix					Groundwater	Groundwater	Groundwater
VOCs							
1,1,1-Trichloroethane	71-55-6	ug/l	30	200	6.0 U	6.0 U	1.0 U
1,1,2,2-Tetrachloroethane	79-34-5	ug/l	1		***6.0 U***	***6.0 U***	1.0 U
1,1,2-Trichloroethane	79-00-5	ug/l	3	5	***6.0 U***	***6.0 U***	1.0 U
1,1,2-Trichlorotrifluoroethane (Freon 113)	76-13-1	ug/l	20000		6.0 U	6.0 U	2.0 U
1,1-Dichloroethane	75-34-3	ug/l	50		1.7 J	1.8 J	1.1
1,1-Dichloroethene	75-35-4	ug/l	1	7	***6.0 U***	***6.0 U***	0.23 J
1,2,4-Trichlorobenzene	120-82-1	ug/l	9	70	6.0 U	6.0 U	2.0 U
1,2-Dibromo-3-chloropropane	96-12-8	ug/l	0.02	0.2	***6.0 U***	***6.0 U***	***2.0 U***
1,2-Dibromoethane	106-93-4	ug/l	0.03	0.05	***6.0 U***	***6.0 U***	***1.0 U***
1,2-Dichlorobenzene	95-50-1	ug/l	600	600	0.60 J	6.0 U	0.39 J
1,2-Dichloroethane	107-06-2	ug/l	2	5	***6.0 U***	***6.0 U***	0.90 J
1,2-Dichloropropane	78-87-5	ug/l	1	5	***6.0 U***	***6.0 U***	0.32 J
1,3-Dichlorobenzene	541-73-1	ug/l	600		6.0 U	6.0 U	1.0 U
1,4-Dichlorobenzene	106-46-7	ug/l	75	75	6.0 U	6.0 U	0.89 J
2-Hexanone	591-78-6	ug/l	300		12 U	12 U	5.0 U
Acetone	67-64-1	ug/l	6000		6.7 J	7.2 J	5.0 U
Benzene	71-43-2	ug/l	1	5	***6.0 U***	***6.0 U***	1.9
Bromoform	75-25-2	ug/l	4		***6.0 U***	***6.0 U***	1.0 U
Bromomethane	74-83-9	ug/l	10		6.0 U	6.0 U	1.0 U
Carbon disulfide	75-15-0	ug/l	700		6.0 U	6.0 U	1.0 U
Carbon tetrachloride	56-23-5	ug/l	1	5	***6.0 U***	***6.0 U***	1.0 U
Chlorobenzene	108-90-7	ug/l	50	100	2.2 J	2.3 J	0.94 J
Chloroethane	75-00-3	ug/l	5		***6.0 U***	***6.0 U***	1.0 U
Chloroform	67-66-3	ug/l	70		23	20	0.30 J
cis-1,2-Dichloroethene	156-59-2	ug/l	70	70	8.0	8.4	2.9
Dibromochloromethane	124-48-1	ug/l	1		***6.0 U***	***6.0 U***	1.0 U
Dichlorodifluoromethane	75-71-8	ug/l	1000		6.0 U	6.0 U	2.0 U
Ethylbenzene	100-41-4	ug/l	700	700	0.99 J	0.93 J	1.0 U
Isopropylbenzene	98-82-8	ug/l	700		6.0 U	6.0 U	1.0 U
Methyl acetate	79-20-9	ug/l	7000		6.0 U	6.0 U	5.0 U
Methyl ethyl ketone (2-Butanone)	78-93-3	ug/l	300		12 U	12 U	5.0 U
Methyl tert butyl ether	1634-04-4	ug/l	70		11	11	12.8
Methylene chloride	75-09-2	ug/l	3	5	***6.00 U***	***6.00 U***	1.0 U
Styrene	100-42-5	ug/l	100	100	6.0 U	6.0 U	2.0 U
Tetrachloroethene	127-18-4	ug/l	1	5	2.9 J	3.0 J	0.79 J
Toluene	108-88-3	ug/l	600	1000	0.55 J	0.53 J	1.0 U
trans-1,2-Dichloroethene	156-60-5	ug/l	100	100	6.0 U	6.0 U	1.0 U
Trichloroethene	79-01-6	ug/l	1	5	4.3 J	3.8 J	0.79 J
Trichlorofluoromethane	75-69-4	ug/l	2000		6.0 U	6.0 U	2.0 U
Vinyl Chloride	75-01-4	ug/l	1	2	***6.0 U***	***6.0 U***	1.0 U
Xylene (Total)	1330-20-7	ug/l	1000	10000			1.0 U

Notes:

-- Not analyzed

Concentrations which exceed the NJ GWQS are highlighted blue

Concentrations which exceed the NJ GWQS and US EPA GW MCLs are highlighted blue and **bolded**

Non-detectable concentrations which exceed any NJDEP GWQS are ***italicized and brown***

J - Estimated value

U - Non-detectable

Table 5: Deep Aquifer Analytical Data
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

Well ID	CAS Number	Units	NJ Groundwater Quality Standard 2015	US EPA MCLs	GM-02D		GM-03D	
Sample Date					October 2012	10/8/2015	10/22/2012	10/7/2015
Field Sample ID					GM-2D.20121022	GM-2D.20151008	GM-3D.20121022	GM-3D.20151007
Sample Matrix					Groundwater	Groundwater	Groundwater	Groundwater
VOCs								
1,1,1-Trichloroethane	71-55-6	ug/l	30	200	6.0 U	1.0 U	0.25 J	1.0 U
1,1,2,2-Tetrachloroethane	79-34-5	ug/l	1		***6.0 U***	1.0 U	***6.0 U***	1.0 U
1,1,2-Trichloroethane	79-00-5	ug/l	3	5	***6.0 U***	1.0 U	***6.0 U***	1.0 U
1,1,2-Trichlorotrifluoroethane (Freon 113)	76-13-1	ug/l	20000		6.0 U	2.0 U	6.0 U	2.0 U
1,1-Dichloroethane	75-34-3	ug/l	50		6.0 U	1.1	2.3 J	2.0
1,1-Dichloroethene	75-35-4	ug/l	1	7	***6.0 U***	0.30 J	***6.0 U***	0.75 J
1,2,4-Trichlorobenzene	120-82-1	ug/l	9	70	6.0 U	2.0 U	6.0 U	0.21 J
1,2-Dibromo-3-chloropropane	96-12-8	ug/l	0.02	0.2	***6.0 U***	***2.0 U***	***6.0 U***	***2.0 U***
1,2-Dibromoethane	106-93-4	ug/l	0.03	0.05	***6.0 U***	***1.0 U***	***6.0 U***	***1.0 U***
1,2-Dichlorobenzene	95-50-1	ug/l	600	600	6.0 U	1.0 U	6.0 U	0.23 J
1,2-Dichloroethane	107-06-2	ug/l	2	5	***6.0 U***	0.28 J	***6.0 U***	1.3
1,2-Dichloropropane	78-87-5	ug/l	1	5	***6.0 U***	0.60 J	***6.0 U***	1.3
1,3-Dichlorobenzene	541-73-1	ug/l	600		6.0 U	1.0 U	6.0 U	1.0 U
1,4-Dichlorobenzene	106-46-7	ug/l	75	75	6.0 U	1.0 U	6.0 U	0.43 J
2-Hexanone	591-78-6	ug/l	300		12 U	5.0 U	12 U	5.0 U
Acetone	67-64-1	ug/l	6000		3.4 J	4.4 J	12 U	5.0 U
Benzene	71-43-2	ug/l	1	5	***6.0 U***	1.0 U	***6.0 U***	0.26 J
Bromoform	75-25-2	ug/l	4		***6.0 U***	1.0 U	***6.0 U***	1.0 U
Bromomethane	74-83-9	ug/l	10		6.0 U	1.0 U	6.0 U	1.0 U
Carbon disulfide	75-15-0	ug/l	700		6.0 U	1.0 U	6.0 U	1.0 U
Carbon tetrachloride	56-23-5	ug/l	1	5	***6.0 U***	1.0 U	0.87 J	0.52 J
Chlorobenzene	108-90-7	ug/l	50	100	6.0 U	0.24 J	6.0 U	1.4
Chloroethane	75-00-3	ug/l	5		***6.0 U***	1.0 U	***6.0 U***	1.0 U
Chloroform	67-66-3	ug/l	70		6.0 U	0.26 J	6.0 U	1.1
cis-1,2-Dichloroethene	156-59-2	ug/l	70	70	6.0 U	3.2	8.3	6.7
Dibromochloromethane	124-48-1	ug/l	1		***6.0 U***	1.0 U	***6.0 U***	1.0 U
Dichlorodifluoromethane	75-71-8	ug/l	1000		6.0 U	2.0 U	6.0 U	2.0 U
Ethylbenzene	100-41-4	ug/l	700	700	0.15 J	1.0 U	0.30 J	1.0 U
Isopropylbenzene	98-82-8	ug/l	700		6.0 U	1.0 U	6.0 U	1.0 U
Methyl acetate	79-20-9	ug/l	7000		6.0 U	5.0 U	6.0 U	5.0 U
Methyl ethyl ketone (2-Butanone)	78-93-3	ug/l	300		12 U	5.0 U	12 U	5.0 U
Methyl tert butyl ether	1634-04-4	ug/l	70		6.0 U	6.9	5.6 J	14.5
Methylene chloride	75-09-2	ug/l	3	5	***6.00 U***	1.0 U	***6.00 U***	0.25 J
Styrene	100-42-5	ug/l	100	100	6.0 U	2.0 U	6.0 U	2.0 U
Tetrachloroethene	127-18-4	ug/l	1	5	***6.0 U***	0.61 J	4.2 J	3.5
Toluene	108-88-3	ug/l	600	1000	0.12 J	1.0 U	0.18 J	1.0 U
trans-1,2-Dichloroethene	156-60-5	ug/l	100	100	6.0 U	1.0 U	6.0 U	1.0 U
Trichloroethene	79-01-6	ug/l	1	5	***6.0 U***	1.4	4.9 J	4.2
Trichlorofluoromethane	75-69-4	ug/l	2000		6.0 U	2.0 U	6.0 U	2.0 U
Vinyl Chloride	75-01-4	ug/l	1	2	***6.0 U***	1.0 U	***6.0 U***	1.0 U
Xylene (Total)	1330-20-7	ug/l	1000	10000		1.0 U		1.0 U

Notes:

-- Not analyzed

Concentrations which exceed the NJ GWQS are highlighted blue

Concentrations which exceed the NJ GWQS and US EPA GW MCLs are highlighted blue and **bolded**

Non-detectable concentrations which exceed any NJDEP GWQS are ***italicized and brown***

J - Estimated value

U - Non-detectable

Table 5: Deep Aquifer Analytical Data
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

Well ID	CAS Number	Units	NJ Groundwater Quality Standard 2015	US EPA MCLs	GM-04D		GM-05D	
Sample Date					October 2012	10/26/2015	October 2012	10/8/2015
Field Sample ID					GM-4D.20121022	GM-4D.20151026	GM-5D.20121022	GM-5D.20151008
Sample Matrix					Groundwater	Groundwater	Groundwater	Groundwater
VOCs								
1,1,1-Trichloroethane	71-55-6	ug/l	30	200	6.0 U	1.0 U	0.25 J	1.0 U
1,1,2,2-Tetrachloroethane	79-34-5	ug/l	1		***6.0 U***	1.0 U	***6.0 U***	1.0 U
1,1,2-Trichloroethane	79-00-5	ug/l	3	5	***6.0 U***	1.0 U	***6.0 U***	1.0 U
1,1,2-Trichlorotrifluoroethane (Freon 113)	76-13-1	ug/l	20000		6.0 U	2.0 U	6.0 U	2.0 U
1,1-Dichloroethane	75-34-3	ug/l	50		2.0 J	4.1	2.0 J	3.0
1,1-Dichloroethene	75-35-4	ug/l	1	7	***6.0 U***	0.56 J	***6.0 U***	0.63 J
1,2,4-Trichlorobenzene	120-82-1	ug/l	9	70	6.00 U	0.51 J	6.0 U	2.0 U
1,2-Dibromo-3-chloropropane	96-12-8	ug/l	0.02	0.2	***6.0 U***	***2.0 U***	***6.0 U***	***2.0 U***
1,2-Dibromoethane	106-93-4	ug/l	0.03	0.05	***6.0 U***	***1.0 U***	***6.0 U***	***1.0 U***
1,2-Dichlorobenzene	95-50-1	ug/l	600	600	6.0 U	0.36 J	6.0 U	1.0 U
1,2-Dichloroethane	107-06-2	ug/l	2	5	***6.0 U***	0.68 J	***6.0 U***	0.61 J
1,2-Dichloropropane	78-87-5	ug/l	1	5	***6.0 U***	2	***6.0 U***	2.2
1,3-Dichlorobenzene	541-73-1	ug/l	600		6.0 U	1.0 U	6.0 U	1.0 U
1,4-Dichlorobenzene	106-46-7	ug/l	75	75	6.0 U	0.47 J	6.0 U	1.0 U
2-Hexanone	591-78-6	ug/l	300		12 U	5.0 U	12 U	5.0 U
Acetone	67-64-1	ug/l	6000		12 U	5.0 U	12 U	5.0 U
Benzene	71-43-2	ug/l	1	5	***6.0 U***	0.23 J	***6.0 U***	1.0 U
Bromoform	75-25-2	ug/l	4		***6.0 U***	1.0 U	***6.0 U***	1.0 U
Bromomethane	74-83-9	ug/l	10		6.0 U	1.0 U	6.0 U	1.0 U
Carbon disulfide	75-15-0	ug/l	700		6.0 U	0.31 J	6.0 U	1.0 U
Carbon tetrachloride	56-23-5	ug/l	1	5	0.20 J	1.0 U	0.21 J	1.0 U
Chlorobenzene	108-90-7	ug/l	50	100	2.7 J	1.4	6.0 U	0.35 J
Chloroethane	75-00-3	ug/l	5		***6.0 U***	1.0 U	***6.0 U***	1.0 U
Chloroform	67-66-3	ug/l	70		6.0 U	0.45 J	6.0 U	1.0 U
cis-1,2-Dichloroethene	156-59-2	ug/l	70	70	6.6	12.9	9.0	9.6
Dibromochloromethane	124-48-1	ug/l	1		***6.0 U***	1.0 U	***6.0 U***	1.0 U
Dichlorodifluoromethane	75-71-8	ug/l	1000		6.0 U	2.0 U	6.0 U	2.0 U
Ethylbenzene	100-41-4	ug/l	700	700	0.30 J	1.0 U	6.0 U	1.0 U
Isopropylbenzene	98-82-8	ug/l	700		6.0 U	1.0 U	6.0 U	1.0 U
Methyl acetate	79-20-9	ug/l	7000		6.0 U	5.0 U	6.0 U	5.0 U
Methyl ethyl ketone (2-Butanone)	78-93-3	ug/l	300		12 U	5.0 U	12 U	5.0 U
Methyl tert butyl ether	1634-04-4	ug/l	70		25	64.4	1.1 J	43.1
Methylene chloride	75-09-2	ug/l	3	5	***6.00 U***	1.0 U	***6.00 U***	1.0 U
Styrene	100-42-5	ug/l	100	100	6.0 U	2.0 U	6.0 U	2.0 U
Tetrachloroethene	127-18-4	ug/l	1	5	1.0 J	1.8	4.5 J	0.79 J
Toluene	108-88-3	ug/l	600	1000	0.24 J	1.0 U	0.13 J	1.0 U
trans-1,2-Dichloroethene	156-60-5	ug/l	100	100	6.0 U	1.0 U	6.0 U	0.78 J
Trichloroethene	79-01-6	ug/l	1	5	2.4 J	4.1	**5.9 J**	4.7
Trichlorofluoromethane	75-69-4	ug/l	2000		6.0 U	2.0 U	6.0 U	2.0 U
Vinyl Chloride	75-01-4	ug/l	1	2	***6.0 U***	0.60 J	***6.0 U***	0.57 J
Xylene (Total)	1330-20-7	ug/l	1000	10000		1.0 U		1.0 U

Notes:

-- Not analyzed

Concentrations which exceed the NJ GWQS are highlighted blue

Concentrations which exceed the NJ GWQS and US EPA GW MCLs are highlighted blue and **bolded**

Non-detectable concentrations which exceed any NJDEP GWQS are ***italicized and brown***

J - Estimated value

U - Non-detectable

Table 5: Deep Aquifer Analytical Data
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

Well ID	CAS Number	Units	NJ Groundwater Quality Standard 2015	US EPA MCLs	GM-06D		GM-07D	
Sample Date					October 2012	10/8/2015	October 2012	10/7/2015
Field Sample ID					GM-6D.20121022	GM-6D.20151008	GM-7D.20121022	GM-7D.20151007
Sample Matrix					Groundwater	Groundwater	Groundwater	Groundwater
VOCs								
1,1,1-Trichloroethane	71-55-6	ug/l	30	200	0.22 J	0.92 J	0.27 J	0.23 J
1,1,2,2-Tetrachloroethane	79-34-5	ug/l	1		***6.0 U***	1.0 U	***6.0 U***	1.0 U
1,1,2-Trichloroethane	79-00-5	ug/l	3	5	***6.0 U***	1.0 U	***6.0 U***	1.0 U
1,1,2-Trichlorotrifluoroethane (Freon 113)	76-13-1	ug/l	20000		6.0 U	2.0 U	6.0 U	2.0 U
1,1-Dichloroethane	75-34-3	ug/l	50		1.3 J	4.0	1.7 J	2.3
1,1-Dichloroethene	75-35-4	ug/l	1	7	***6.0 U***	1.3	***6.0 U***	0.65 J
1,2,4-Trichlorobenzene	120-82-1	ug/l	9	70	6.0 U	2.0 U	6.00 U	0.27 J
1,2-Dibromo-3-chloropropane	96-12-8	ug/l	0.02	0.2	***6.0 U***	***2.0 U***	***6.0 U***	***2.0 U***
1,2-Dibromoethane	106-93-4	ug/l	0.03	0.05	***6.0 U***	***1.0 U***	***6.0 U***	***1.0 U***
1,2-Dichlorobenzene	95-50-1	ug/l	600	600	6.0 U	1.0 U	6.0 U	0.54 J
1,2-Dichloroethane	107-06-2	ug/l	2	5	***6.0 U***	0.66 J	***6.0 U***	1.4
1,2-Dichloropropane	78-87-5	ug/l	1	5	***6.0 U***	2.9	***6.0 U***	1.2
1,3-Dichlorobenzene	541-73-1	ug/l	600		6.0 U	1.0 U	0.40 J	1.0 U
1,4-Dichlorobenzene	106-46-7	ug/l	75	75	6.0 U	1.0 U	6.0 U	0.89 J
2-Hexanone	591-78-6	ug/l	300		12 U	5.0 U	12 U	5.0 U
Acetone	67-64-1	ug/l	6000		12 U	5.0 U	12 U	5.0 U
Benzene	71-43-2	ug/l	1	5	***6.0 U***	1.0 U	***6.0 U***	0.33 J
Bromoform	75-25-2	ug/l	4		***6.0 U***	1.0 U	***6.0 U***	1.0 U
Bromomethane	74-83-9	ug/l	10		6.0 U	1.0 U	6.0 U	1.0 U
Carbon disulfide	75-15-0	ug/l	700		6.0 U	1.0 U	6.0 U	1.0 U
Carbon tetrachloride	56-23-5	ug/l	1	5	0.38 J	1.0 U	0.51 J	1.0 U
Chlorobenzene	108-90-7	ug/l	50	100	6.0 U	1.0 U	2.9 J	2.1
Chloroethane	75-00-3	ug/l	5		***6.0 U***	1.0 U	***6.0 U***	1.0 U
Chloroform	67-66-3	ug/l	70		6.0 U	1.5	6.0 U	0.95 J
cis-1,2-Dichloroethene	156-59-2	ug/l	70	70	5.4 J	14.0	7.7	9.0
Dibromochloromethane	124-48-1	ug/l	1		***6.0 U***	1.0 U	***6.0 U***	1.0 U
Dichlorodifluoromethane	75-71-8	ug/l	1000		6.0 U	2.0 U	6.0 U	2.0 U
Ethylbenzene	100-41-4	ug/l	700	700	6.0 U	1.0 U	0.14 J	1.0 U
Isopropylbenzene	98-82-8	ug/l	700		6.0 U	1.0 U	6.0 U	1.0 U
Methyl acetate	79-20-9	ug/l	7000		6.0 U	5.0 U	6.0 U	5.0 U
Methyl ethyl ketone (2-Butanone)	78-93-3	ug/l	300		12 U	5.0 U	12 U	5.0 U
Methyl tert butyl ether	1634-04-4	ug/l	70		3.9 J	35.1	11	11.6
Methylene chloride	75-09-2	ug/l	3	5	***6.00 U***	1.0 U	***6.00 U***	0.33 J
Styrene	100-42-5	ug/l	100	100	6.0 U	2.0 U	0.15 J	2.0 U
Tetrachloroethene	127-18-4	ug/l	1	5	**11**	**7.5**	**9.5**	2.1
Toluene	108-88-3	ug/l	600	1000	6.0 U	1.0 U	0.20 J	1.0 U
trans-1,2-Dichloroethene	156-60-5	ug/l	100	100	6.0 U	1.0 U	0.57 J	1.0 U
Trichloroethene	79-01-6	ug/l	1	5	**9.5**	**9.9**	**8.4**	**12**
Trichlorofluoromethane	75-69-4	ug/l	2000		6.0 U	2.0 U	0.19 J	2.0 U
Vinyl Chloride	75-01-4	ug/l	1	2	***6.0 U***	1.0 U	***6.0 U***	0.23 J
Xylene (Total)	1330-20-7	ug/l	1000	10000		1.0 U		1.0 U

Notes:

-- Not analyzed

Concentrations which exceed the NJ GWQS are highlighted blue

Concentrations which exceed the NJ GWQS and US EPA GW MCLs are highlighted blue and **bolded**

Non-detectable concentrations which exceed any NJDEP GWQS are ***italicized and brown***

J - Estimated value

U - Non-detectable

Table 5: Deep Aquifer Analytical Data
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

Well ID	CAS Number	Units	NJ Groundwater Quality Standard 2015	US EPA MCLs	GM-08D	
Sample Date					October 2012	10/8/2015
Field Sample ID					GM-8D.20121022	GM-8D.20151008
Sample Matrix					Groundwater	Groundwater
VOCs						
1,1,1-Trichloroethane	71-55-6	ug/l	30	200	0.25 J	0.22 J
1,1,2,2-Tetrachloroethane	79-34-5	ug/l	1		***6.0 U***	1.0 U
1,1,2-Trichloroethane	79-00-5	ug/l	3	5	***6.0 U***	1.0 U
1,1,2-Trichlorotrifluoroethane (Freon 113)	76-13-1	ug/l	20000		6.0 U	2.0 U
1,1-Dichloroethane	75-34-3	ug/l	50		5.6 J	6.4
1,1-Dichloroethene	75-35-4	ug/l	1	7	***6.0 U***	0.57 J
1,2,4-Trichlorobenzene	120-82-1	ug/l	9	70	6.0 U	2.0 U
1,2-Dibromo-3-chloropropane	96-12-8	ug/l	0.02	0.2	***6.0 U***	***2.0 U***
1,2-Dibromoethane	106-93-4	ug/l	0.03	0.05	***6.0 U***	***1.0 U***
1,2-Dichlorobenzene	95-50-1	ug/l	600	600	6.0 U	0.46 J
1,2-Dichloroethane	107-06-2	ug/l	2	5	***6.0 U***	4.2
1,2-Dichloropropane	78-87-5	ug/l	1	5	***6.0 U***	0.77 J
1,3-Dichlorobenzene	541-73-1	ug/l	600		6.0 U	1.0 U
1,4-Dichlorobenzene	106-46-7	ug/l	75	75	6.0 U	1.1
2-Hexanone	591-78-6	ug/l	300		12 U	5.0 U
Acetone	67-64-1	ug/l	6000		12 U	4.2 J
Benzene	71-43-2	ug/l	1	5	***6.0 U***	0.41 J
Bromoform	75-25-2	ug/l	4		***6.0 U***	1.0 U
Bromomethane	74-83-9	ug/l	10		6.0 U	1.0 U
Carbon disulfide	75-15-0	ug/l	700		6.0 U	1.0 U
Carbon tetrachloride	56-23-5	ug/l	1	5	***6.0 U***	1.0 U
Chlorobenzene	108-90-7	ug/l	50	100	3.9 J	1.8
Chloroethane	75-00-3	ug/l	5		***6.0 U***	1.0 U
Chloroform	67-66-3	ug/l	70		6.0 U	0.43 J
cis-1,2-Dichloroethene	156-59-2	ug/l	70	70	16	17.5
Dibromochloromethane	124-48-1	ug/l	1		***6.0 U***	1.0 U
Dichlorodifluoromethane	75-71-8	ug/l	1000		6.0 U	2.0 U
Ethylbenzene	100-41-4	ug/l	700	700	6.0 U	1.0 U
Isopropylbenzene	98-82-8	ug/l	700		6.0 U	1.0 U
Methyl acetate	79-20-9	ug/l	7000		6.0 U	5.0 U
Methyl ethyl ketone (2-Butanone)	78-93-3	ug/l	300		12 U	5.0 U
Methyl tert butyl ether	1634-04-4	ug/l	70		4.9 J	3.5
Methylene chloride	75-09-2	ug/l	3	5	***6.00 U***	0.63 J
Styrene	100-42-5	ug/l	100	100	6.0 U	2.0 U
Tetrachloroethene	127-18-4	ug/l	1	5	**5.5 J**	4.3
Toluene	108-88-3	ug/l	600	1000	0.14 J	1.0 U
trans-1,2-Dichloroethene	156-60-5	ug/l	100	100	6.0 U	1.0 U
Trichloroethene	79-01-6	ug/l	1	5	**10**	**9.8**
Trichlorofluoromethane	75-69-4	ug/l	2000		0.68 J	2.0 U
Vinyl Chloride	75-01-4	ug/l	1	2	***6.0 U***	1.3
Xylene (Total)	1330-20-7	ug/l	1000	10000		1.0 U

Notes:

-- Not analyzed

Concentrations which exceed the NJ GWQS are highlighted blue

Concentrations which exceed the NJ GWQS and US EPA GW MCLs are highlighted blue and **bolded**

Non-detectable concentrations which exceed any NJDEP GWQS are ***italicized and brown***

J - Estimated value

U - Non-detectable

Table 6: Mann-Kendall Analysis Results
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

Geosyntec Consultants

Location	Location Relative to the Site	PCE	TCE	cDCE	VC	Ethene
GM-01S	on-Site	No Trend	Stable	Stable	NA	NA
GM-02S	off-Site upgradient	No Trend	No Trend	No Trend	No Trend	NA
GM-03RS	on-Site	Stable	No Trend	Decreasing	Decreasing	NA
GM-05S	off-Site upgradient	Stable	No Trend	Increasing	NA	NA
GM-06S	off-Site sidegradient	No Trend	Increasing	Increasing	NA	NA
GM-07S	off-Site sidegradient	No Trend	Decreasing	Stable	NA	NA
GM-08S	off-Site downgradient/sidegradient	NA	Stable	No Trend	NA	NA
MW-01	on-Site	No Trend	No Trend	Stable	NA	NA
MW-02	on-Site	Decreasing	Stable	Stable	NA	NA
MW-04	on-Site	Stable	Stable	No Trend	NA	NA
MW-07	off-Site downgradient/sidegradient	Stable	No Trend	Stable	NA	NA
MW-09S	off-Site downgradient/sidegradient	Stable	Stable	Stable	Stable	Stable
MW-10S	off-Site upgradient	Stable	Stable	Stable	NA	No Trend
MW-11S	off-Site downgradient/sidegradient	Stable	Stable	Stable	NA	No Trend

Notes:

NA = Not analyzed due to < 50% detection frequency.

"No Trend" does not imply the absence of a trend. It simply means that the Mann-Kendall test could not discern either an upward or downward trend for the given data set.

PCE- Tetrachloroethene
TCE- Trichloroethene
cDCE- cis-1,2-Dichloroethene
VC- Vinyl chloride

Table 7: First-Order Natural Attenuation Rates
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

Geosyntec Consultants

Well Grouping	Well ID	TCE Attenuation Rate (µg/L per year)		cDCE Attenuation Rate (µg/L per year)	
		Historic	Recent	Historic	Recent
On-Site	GM-03RS	-0.05	-0.14	0.02	0.62
	MW-02	-0.11	0.18	0.08	0.33
	MW-04	-0.03	0.00	-	-
Off-Site Upgradient	GM-02S	-	-	-0.15	-0.76
	MW-10S	-0.56	0.19	-0.68	-0.05
Off-Site Downgradient/Sidegradient	MW-11S	0.14	-0.09	-	-
	MW-09S	0.10	0.67	0.15	0.86
Off-Site Sidegradient	GM-07S	0.07	0.22	-0.19	0.00

Notes:

TCE- Trichloroethene

cDCE- cis-1,2-Dichloroethene

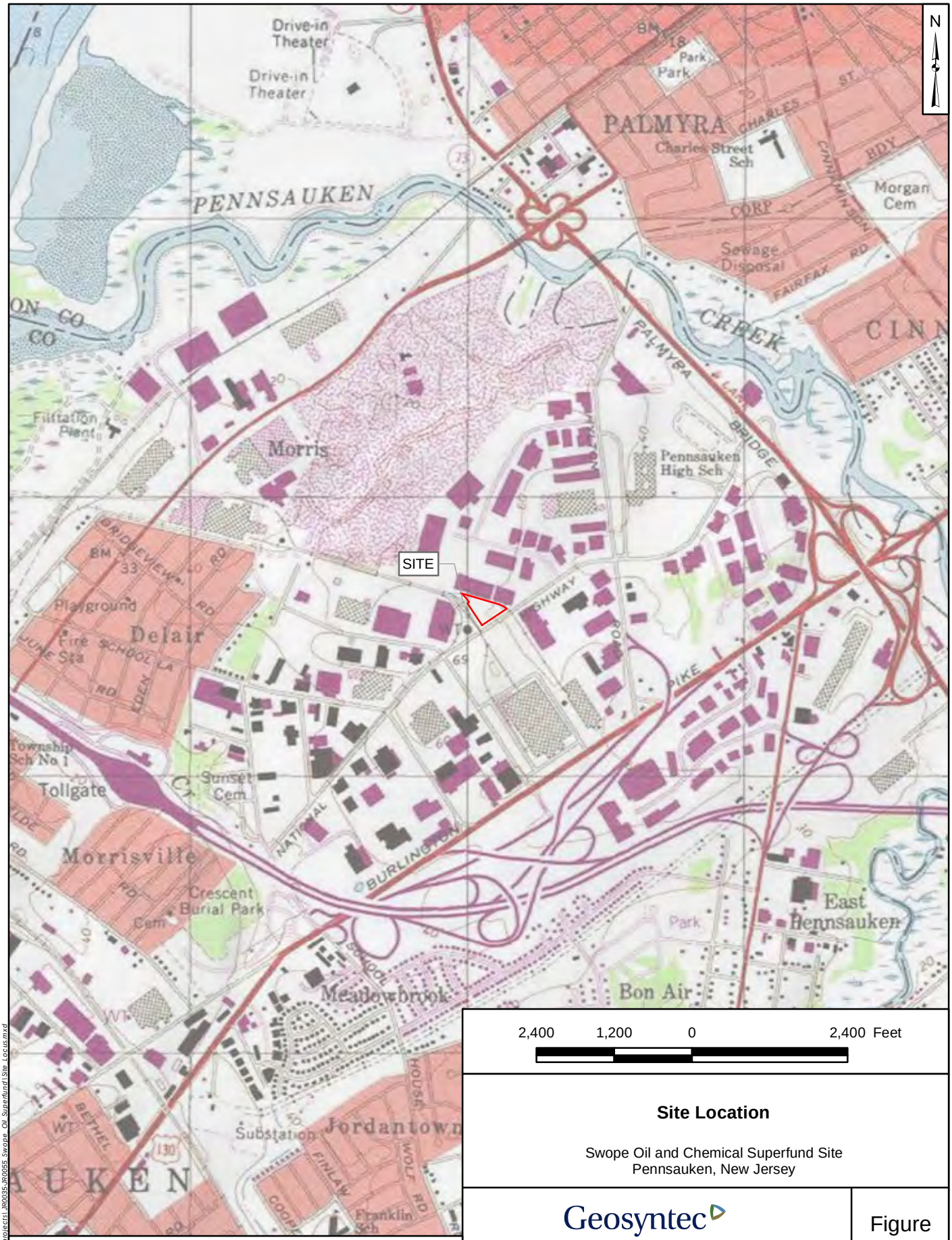
First-order natural attenuation rates with respect to concentration versus time were derived for all wells where the concentration of individual COCs was greater than 10 µg/L, in order to evaluate the natural attenuation process in groundwater. Among the Site COCs, only TCE and cDCE were detected at concentrations greater than 10 µg/L in 2015.

Historic- Pre-Cap analytical data

Recent- Post-Cap analytical data

A negative attenuation rate may indicate attenuation is not occuring, or there are too few data points to draw a conclusion.

FIGURES



Base Map: USGS Camden (1999) 7.5 x 7.5 Minute Quadrangle.

Site Location

Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

Geosyntec consultants

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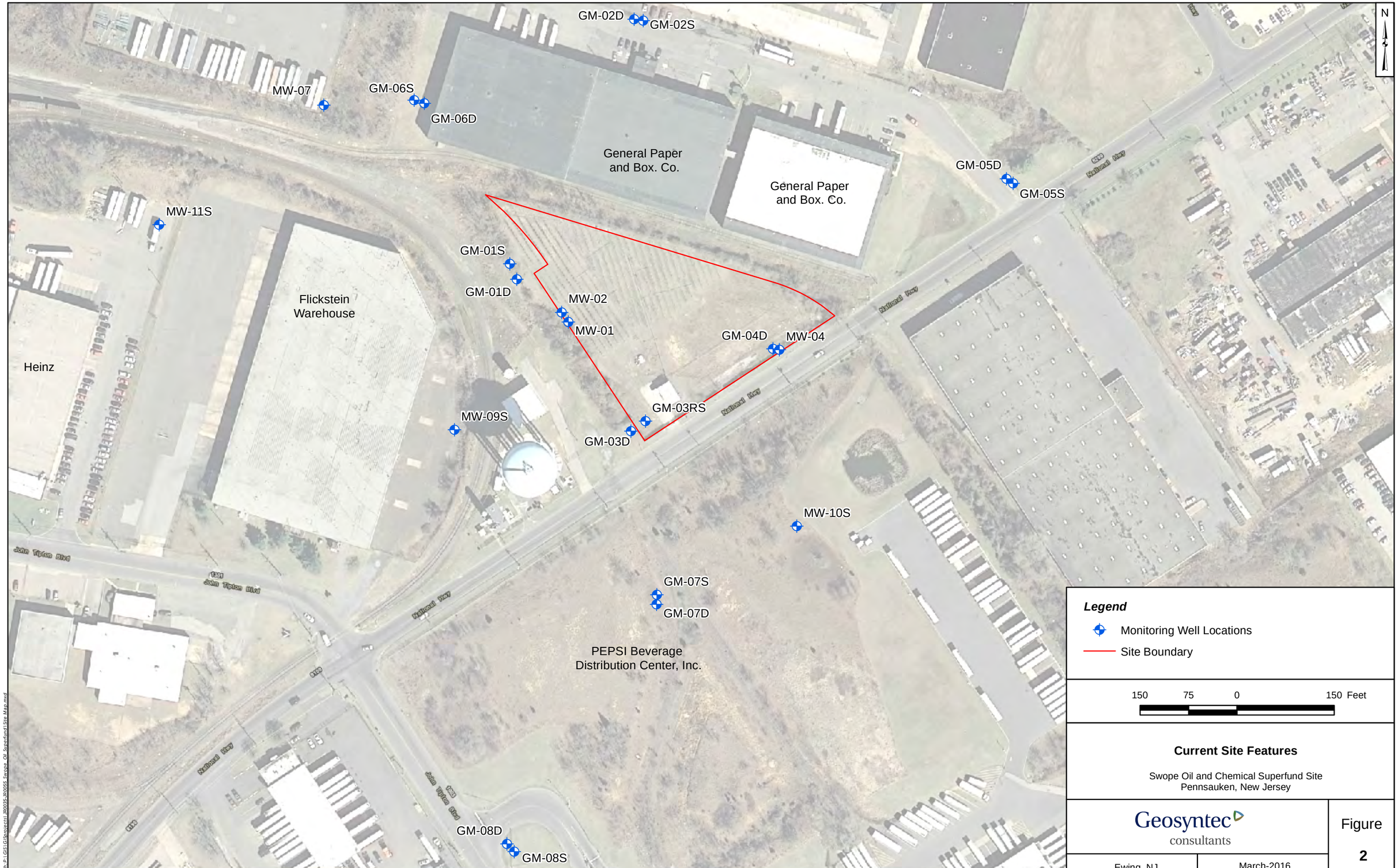
Figure 1

Path:P:\GIS\GIS\projects\JR0035-JR0055_Swope_Oil_Superfund\Site_Locus.mxd



Current Site Features

Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

Geosyntec consultants

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Figure 2

Path: P:\GIS\GIS\projects\JR0035-JR0055_Swope_Oil_Superfund\Site Map.mxd

Figure 3a
Swope Oil and Chemical Company Superfund Site
Continuous Groundwater Elevation Monitoring, Q1 2015

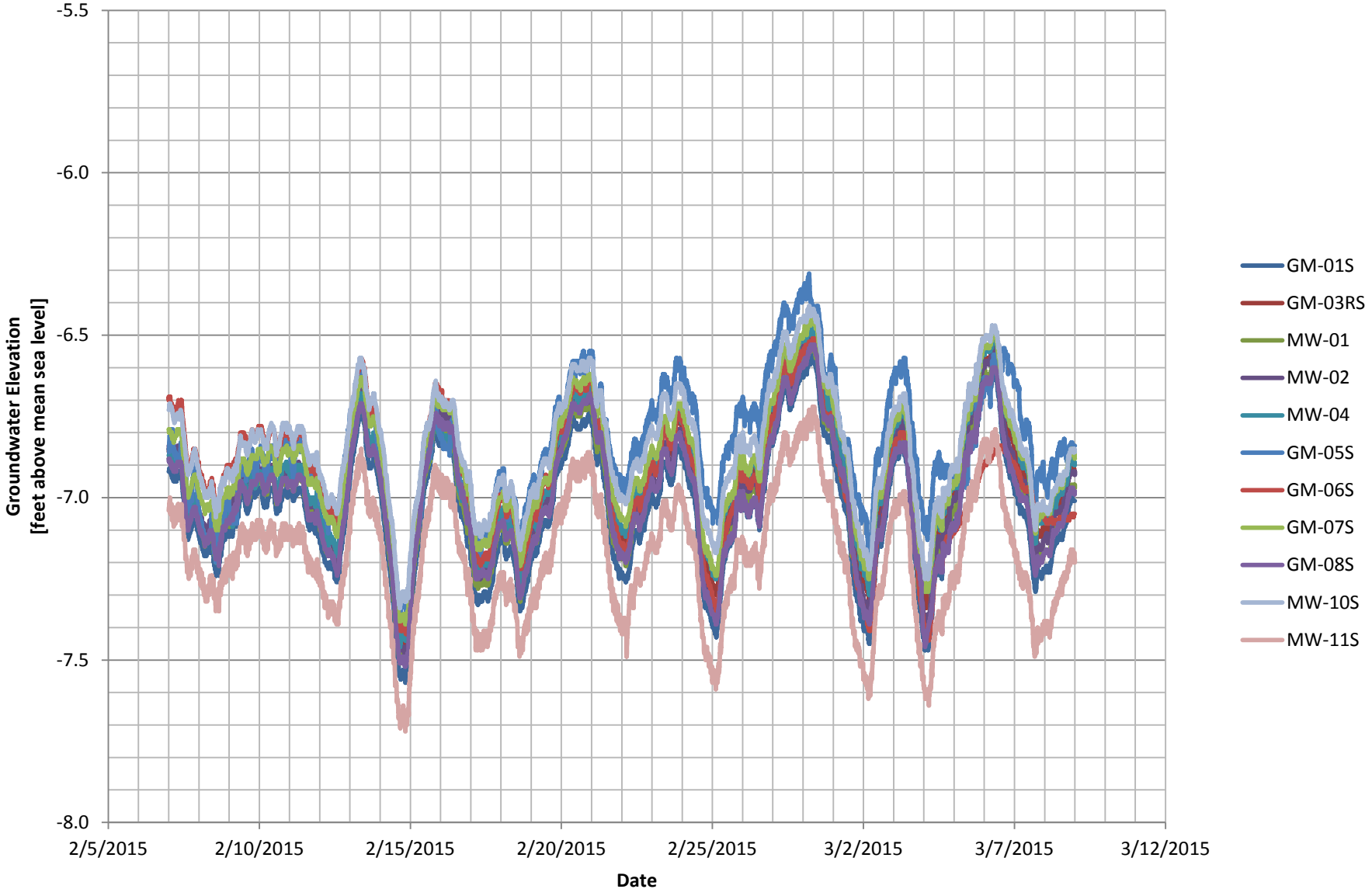
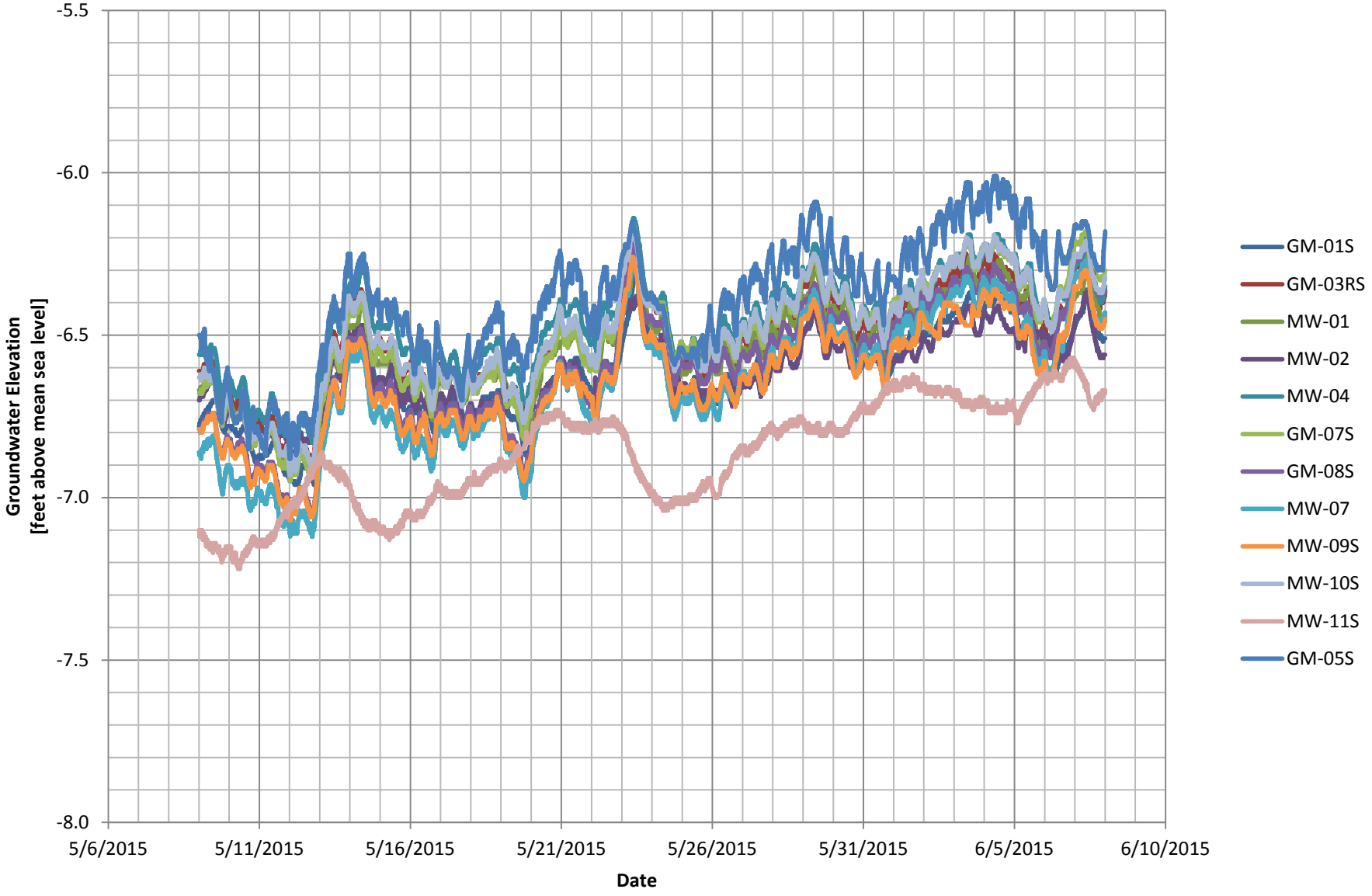


Figure 3b
Swope Oil and Chemical Company Superfund Site
Continuous Groundwater Elevation Monitoring, Q2 2015



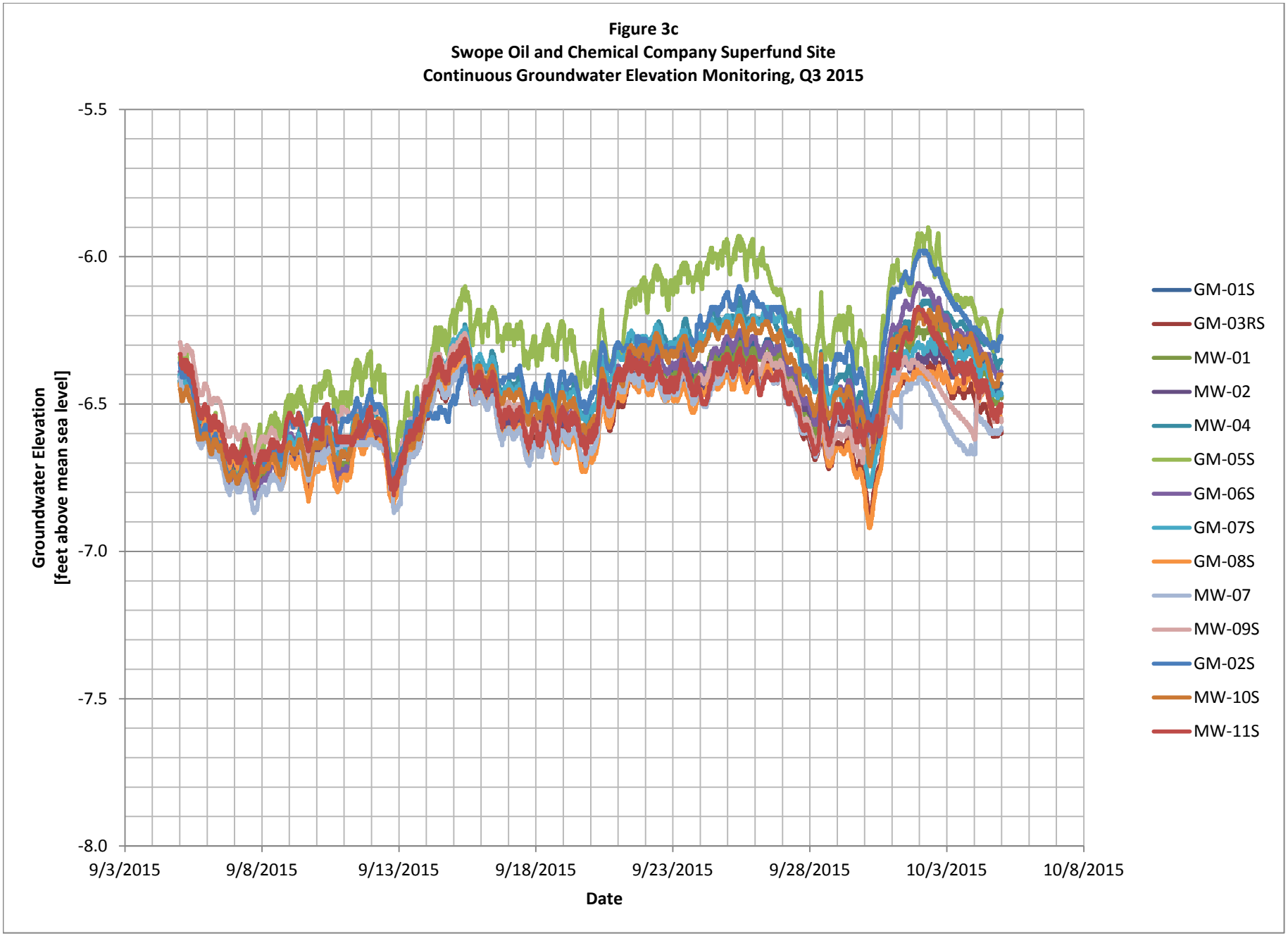


Figure 3c
Swope Oil and Chemical Company Superfund Site
Continuous Groundwater Elevation Monitoring, Q3 2015
Groundwater Elevation
[feet above mean sea level]
-5.5
-6.0
-6.5
-7.0
-7.5
-8.0
9/3/2015
9/8/2015
9/13/2015
9/18/2015
9/23/2015
9/28/2015
10/3/2015
10/8/2015
Date
GM-01S
GM-03RS
MW-01
MW-02
MW-04
GM-05S
GM-06S
GM-07S
GM-08S
MW-07
MW-09S
GM-02S
MW-10S
MW-11S

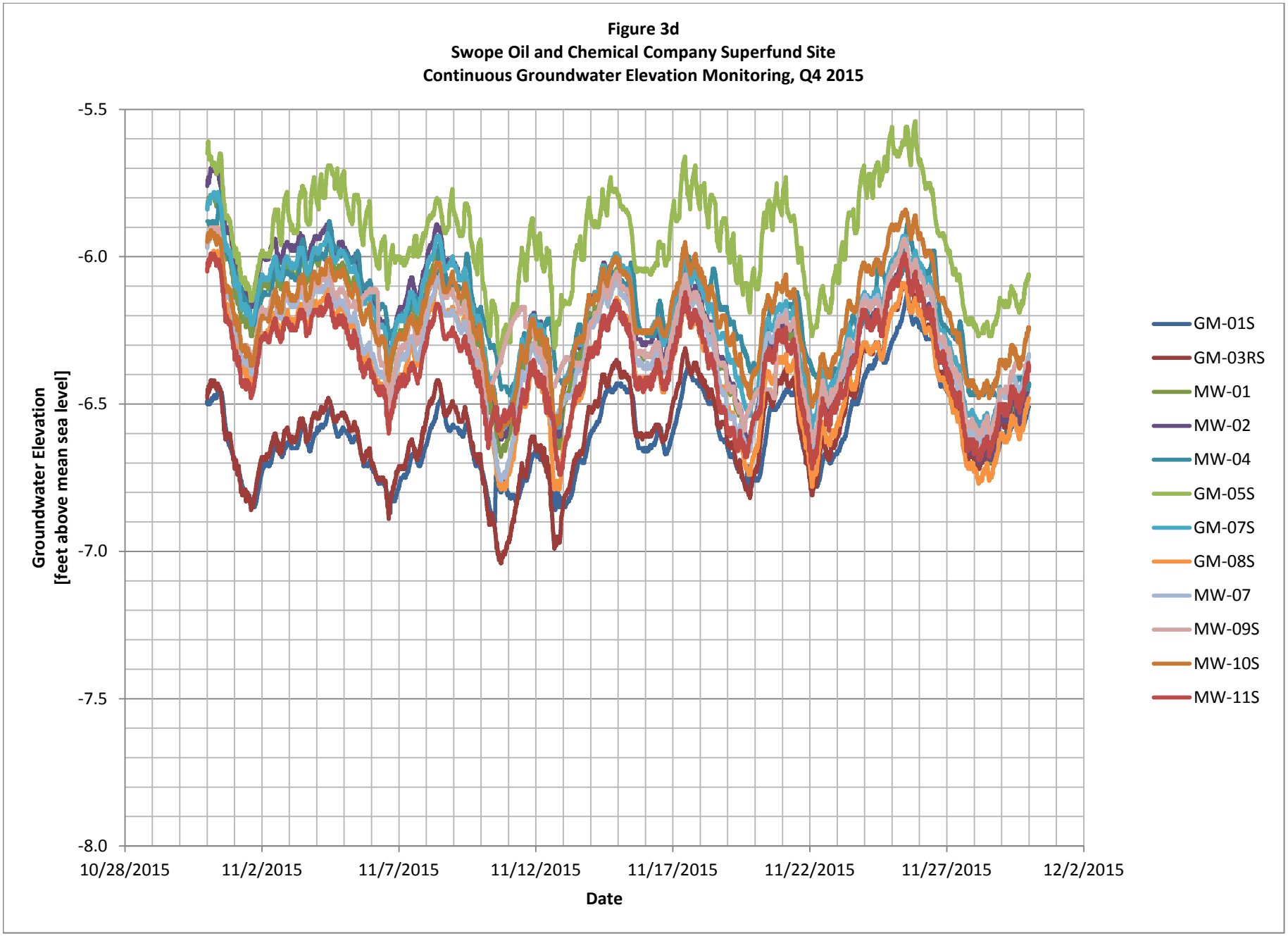
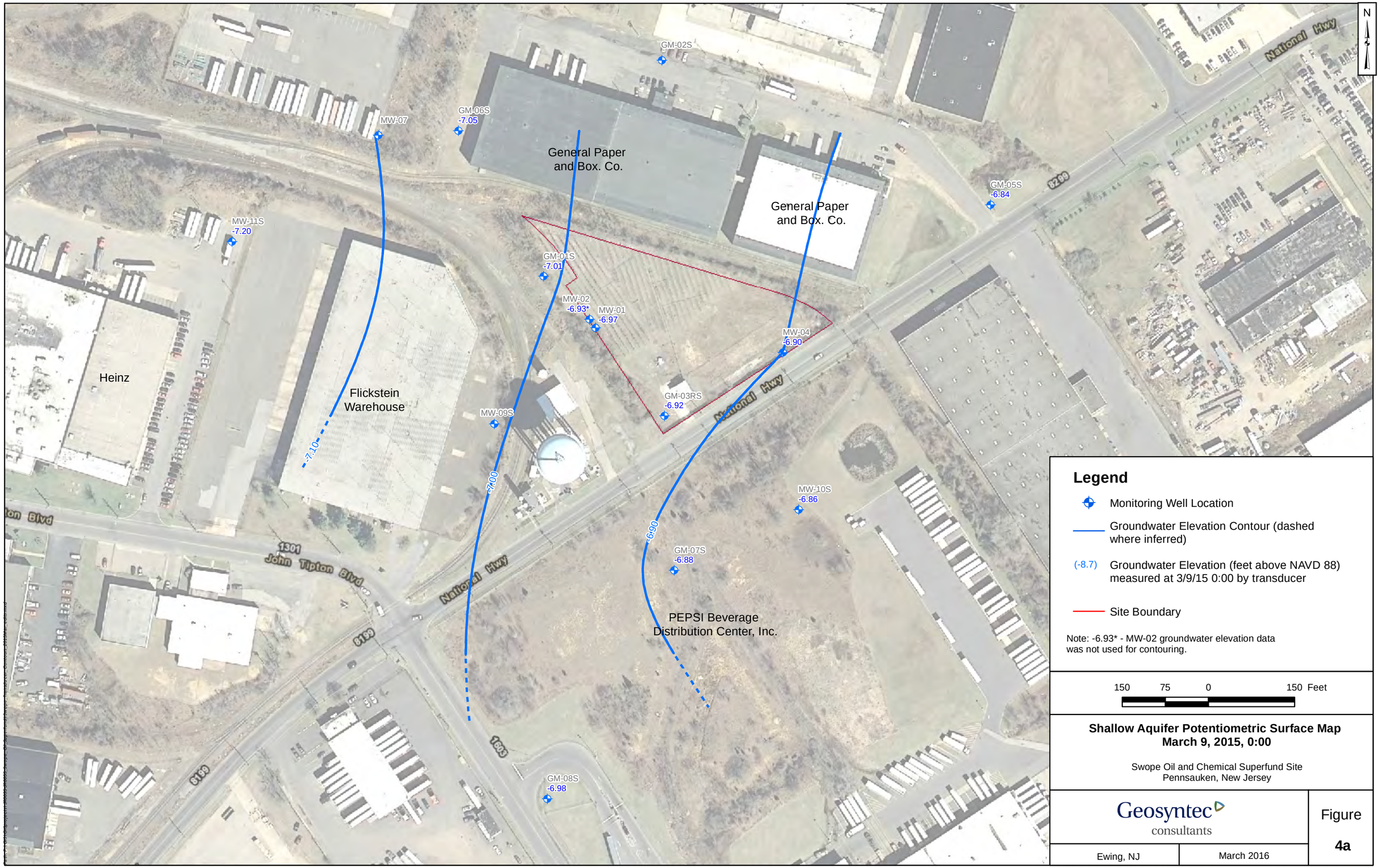
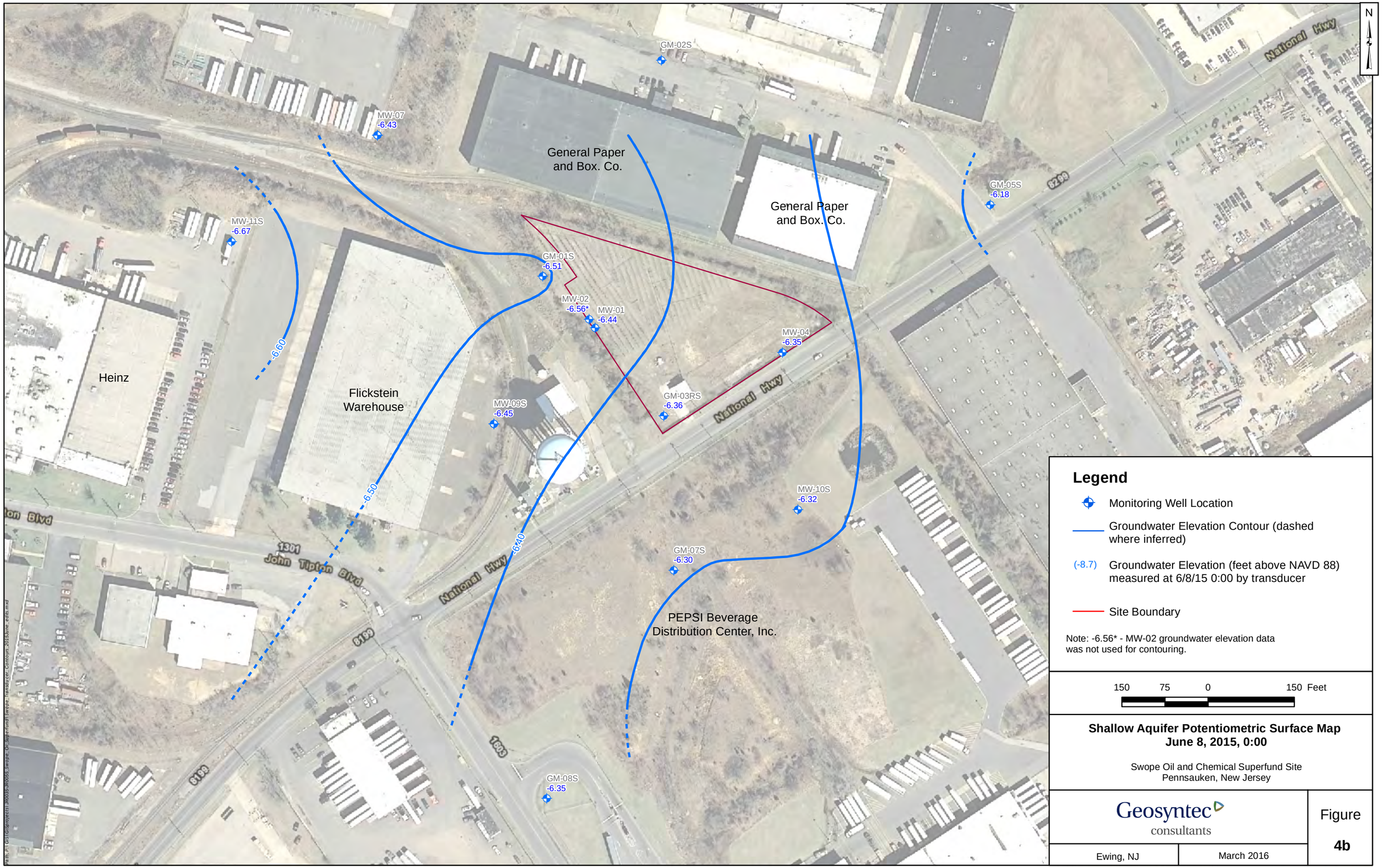


Figure 3d
Swope Oil and Chemical Company Superfund Site
Continuous Groundwater Elevation Monitoring, Q4 2015
Groundwater Elevation
[feet above mean sea level]
-5.5
-6.0
-6.5
-7.0
-7.5
-8.0
10/28/2015
11/2/2015
11/7/2015
11/12/2015
11/17/2015
11/22/2015
11/27/2015
12/2/2015
Date
GM-01S
GM-03RS
MW-01
MW-02
MW-04
GM-05S
GM-07S
GM-08S
MW-07
MW-09S
MW-10S
MW-11S


N
GM-02S
GM-06S
-7.05
MW-07
General Paper
and Box. Co.
General Paper
and Box. Co.
GM-05S
-6.84
MW-11S
-7.20
GM-01S
-7.01
MW-02
-6.93*
MW-01
-6.97
MW-04
-6.90
Heinz
Flickstein
Warehouse
GM-03RS
-6.92
MW-09S
-7.10
-7.00
-6.90
MW-10S
-6.86
GM-07S
-6.88
PEPSI Beverage
Distribution Center, Inc.
GM-08S
-6.98
National Hwy
John Tipton Blvd
1301
6199
1603
Legend
Monitoring Well Location
Groundwater Elevation Contour (dashed where inferred)
(-8.7) Groundwater Elevation (feet above NAVD 88) measured at 3/9/15 0:00 by transducer
Site Boundary
Note: -6.93* - MW-02 groundwater elevation data was not used for contouring.
150 75 0 150 Feet
Shallow Aquifer Potentiometric Surface Map
March 9, 2015, 0:00
Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey
Geosyntec consultants
Ewing, NJ
March 2016
Figure
4a



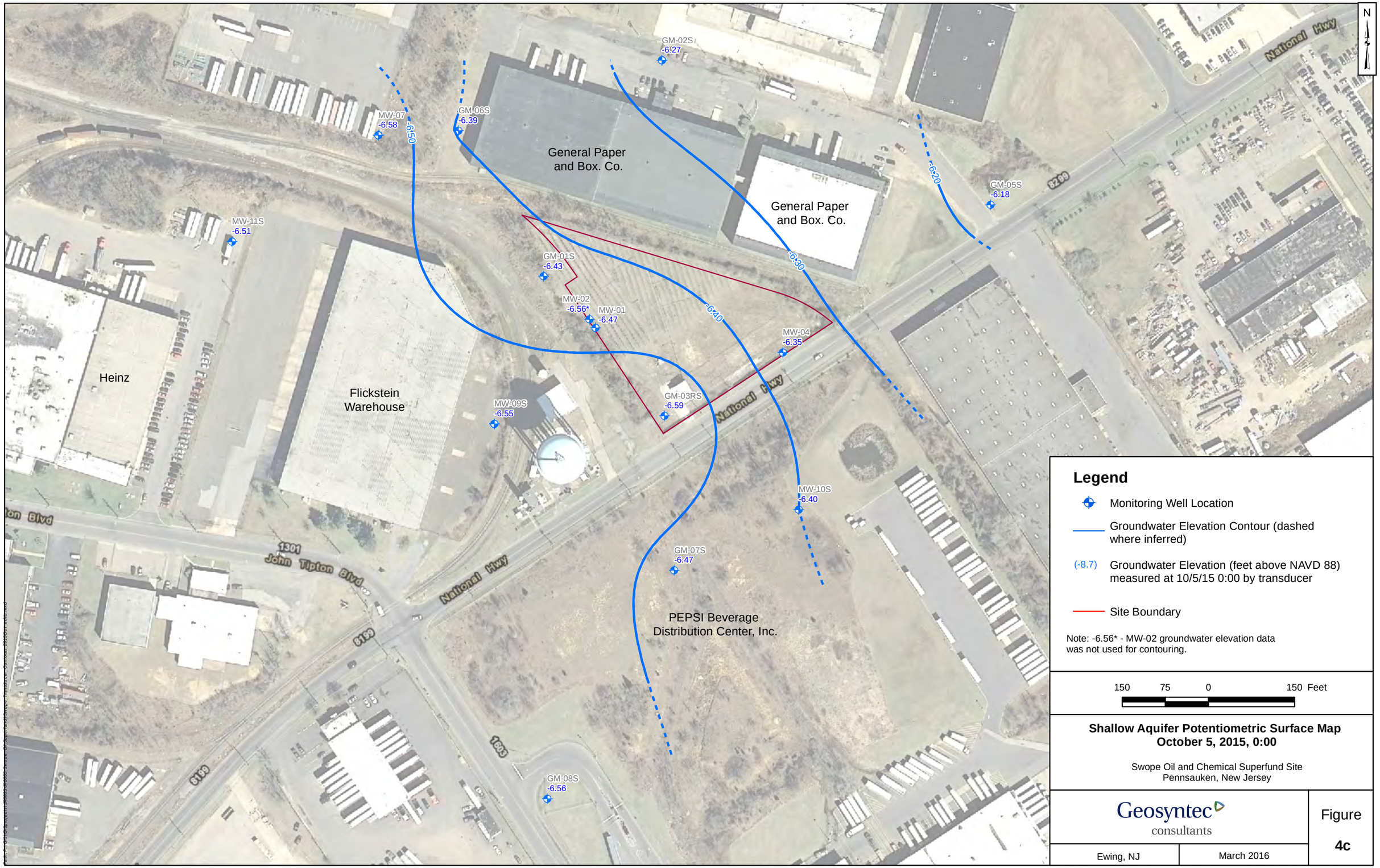
Shallow Aquifer Potentiometric Surface Map
June 8, 2015, 0:00

Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

Geosyntec consultants

Ewing, NJ | March 2016

Figure **4b**



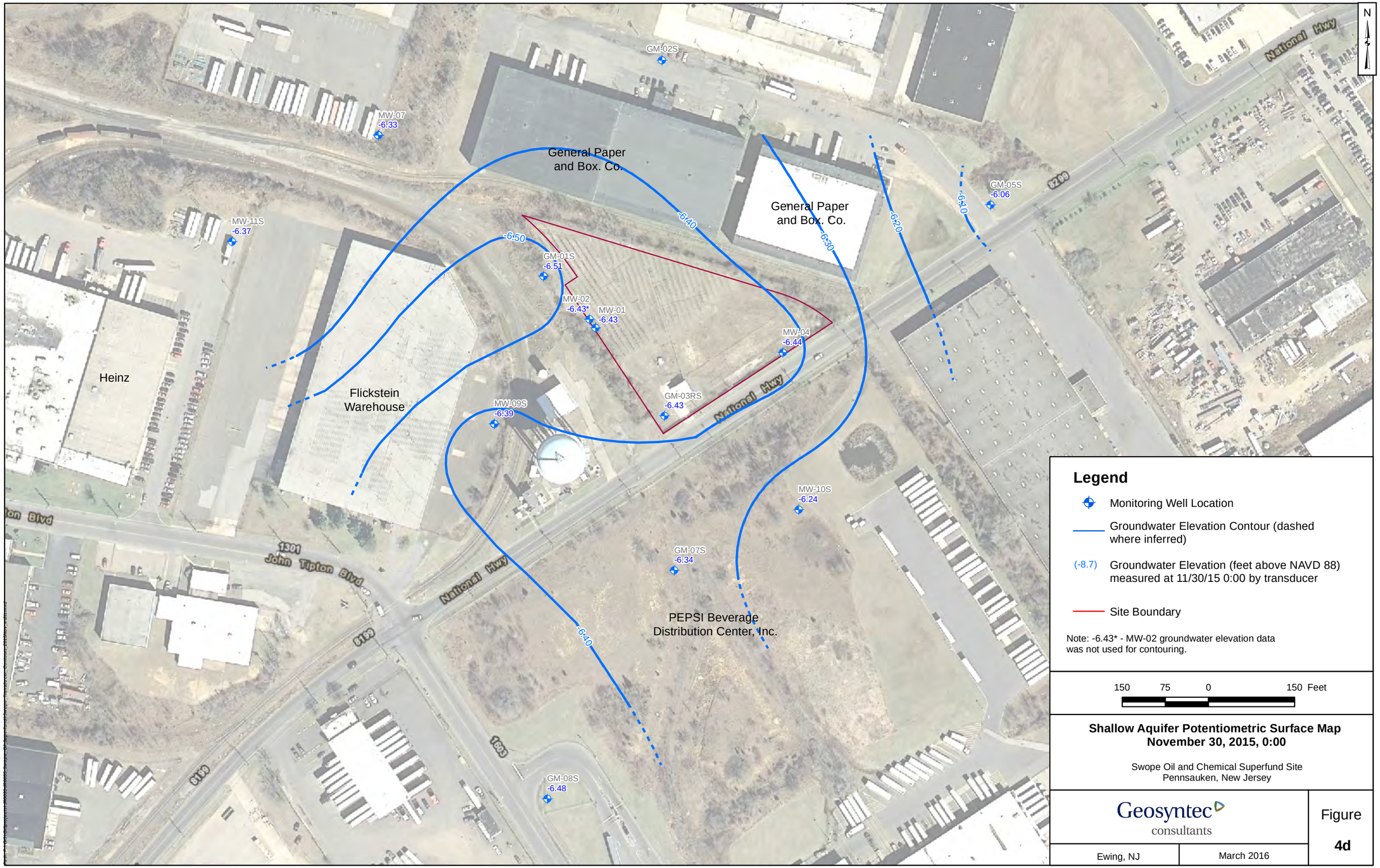
Shallow Aquifer Potentiometric Surface Map
October 5, 2015, 0:00

Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

Geosyntec consultants

Ewing, NJ | March 2016

Figure **4c**



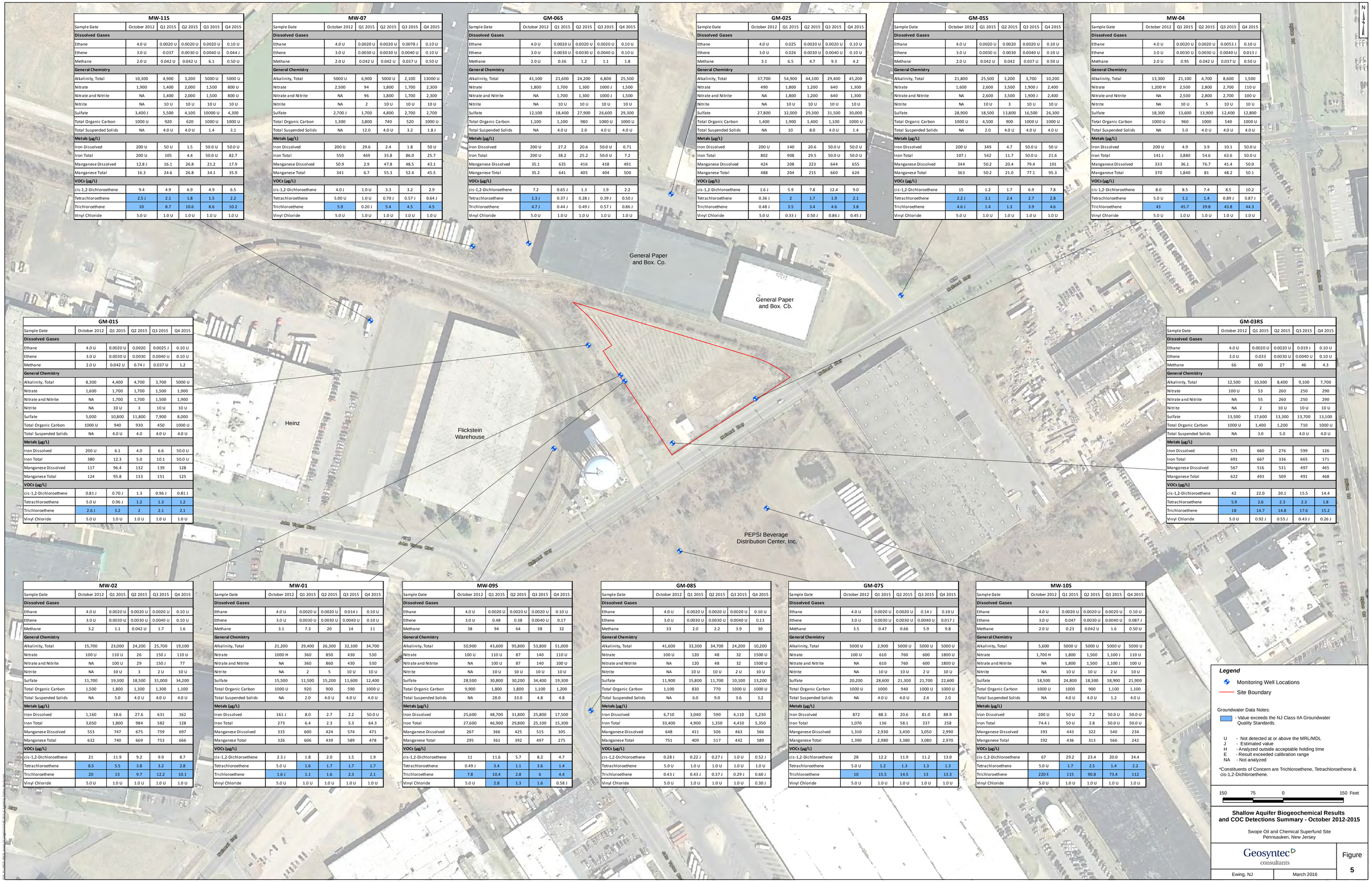
Shallow Aquifer Potentiometric Surface Map
November 30, 2015, 0:00

Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

Geosyntec consultants

Ewing, NJ | March 2016

Figure **4d**



MW-11S					
Sample Date	October 2012	Q1 2015	Q2 2015	Q3 2015	Q4 2015
Dissolved Gases					
Ethane	4.0 U	0.0020 U	0.0020 U	0.0020 U	0.10 U
Ethene	3.0 U	0.037	0.0030 U	0.0040 U	0.044 J
Methane	2.0 U	0.042 U	0.042 U	6.1	0.50 U
General Chemistry					
Alkalinity, Total	10,300	4,900	3,200	5000 U	5000 U
Nitrate	1,900	1,400	2,000	1,500	800 U
Nitrate and Nitrite	NA	1,400	2,000	1,500	800 U
Nitrite	NA	10 U	10 U	10 U	10 U
Sulfate	3,400 J	5,500	4,100	10000 U	4,300
Total Organic Carbon	1000 U	920	620	1000 U	1000 U
Total Suspended Solids	NA	4.0 U	4.0 U	1.4	3.1
Metals (µg/L)					
Iron Dissolved	200 U	50 U	1.5	50.0 U	50.0 U
Iron Total	200 U	105	4.4	50.0 U	82.7
Manganese Dissolved	12.8 J	16.1	26.8	21.2	17.9
Manganese Total	16.3	24.6	26.8	34.1	35.9
VOCs (µg/L)					
cis-1,2-Dichloroethene	9.4	4.9	6.9	4.9	6.5
Tetrachloroethene	2.5 J	2.1	1.8	1.5	2.2
Trichloroethene	10	8.7	10.6	8.6	10.2
Vinyl Chloride	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U

MW-07					
Sample Date	October 2012	Q1 2015	Q2 2015	Q3 2015	Q4 2015
Dissolved Gases					
Ethane	4.0 U	0.0020 U	0.0020 U	0.0078 J	0.10 U
Ethene	3.0 U	0.0030 U	0.0030 U	0.0040 U	0.10 U
Methane	2.0 U	0.042 U	0.042 U	0.037 U	0.50 U
General Chemistry					
Alkalinity, Total	5000 U	6,900	5000 U	2,100	13000 U
Nitrate	2,500	94	1,800	1,700	2,300
Nitrate and Nitrite	NA	96	1,800	1,700	2,300
Nitrite	NA	2	10 U	10 U	10 U
Sulfate	2,700 J	1,700	4,800	2,700	2,700
Total Organic Carbon	1,300	3,800	740	520	1000 U
Total Suspended Solids	NA	12.0	4.0 U	3.2	1.8 J
Metals (µg/L)					
Iron Dissolved	200 U	29.6	2.4	1.8	50 U
Iron Total	550	469	35.8	86.0	25.7
Manganese Dissolved	50.9	2.9	47.8	48.5	43.1
Manganese Total	341	6.7	55.3	52.4	45.5
VOCs (µg/L)					
cis-1,2-Dichloroethene	4.0 J	1.0 U	3.3	3.2	2.9
Tetrachloroethene	5.00 U	1.0 U	0.70 J	0.57 J	0.64 J
Trichloroethene	5.9	0.20 J	5.4	4.5	4.5
Vinyl Chloride	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U

GM-06S					
Sample Date	October 2012	Q1 2015	Q2 2015	Q3 2015	Q4 2015
Dissolved Gases					
Ethane	4.0 U	0.0020 U	0.0020 U	0.0020 U	0.10 U
Ethene	3.0 U	0.0030 U	0.0030 U	0.0040 U	0.10 U
Methane	2.0 U	0.36	1.2	1.1	1.8
General Chemistry					
Alkalinity, Total	41,100	21,600	24,200	6,800	25,500
Nitrate	1,800	1,700	1,300	1000 J	1,500
Nitrate and Nitrite	NA	1,700	1,300	1000 J	1,500
Nitrite	NA	10 U	10 U	10 U	10 U
Sulfate	12,100	18,400	27,900	26,600	29,300
Total Organic Carbon	1,100	1,100	980	1000 U	1000 U
Total Suspended Solids	NA	4.0 U	2.0	4.0 U	4.0 U
Metals (µg/L)					
Iron Dissolved	200 U	27.2	20.6	50.0 U	0.71
Iron Total	200 U	38.2	25.2	50.0 U	7.2
Manganese Dissolved	35.1	635	416	418	491
Manganese Total	35.2	641	405	404	500
VOCs (µg/L)					
cis-1,2-Dichloroethene	7.2	0.65 J	1.3	1.9	2.2
Tetrachloroethene	1.3 J	0.37 J	0.28 J	0.39 J	0.50 J
Trichloroethene	4.7 J	0.44 J	0.49 J	0.57 J	0.86 J
Vinyl Chloride	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U

GM-02S					
Sample Date	October 2012	Q1 2015	Q2 2015	Q3 2015	Q4 2015
Dissolved Gases					
Ethane	4.0 U	0.025	0.0020 U	0.0020 U	0.10 U
Ethene	3.0 U	0.026	0.0030 U	0.0040 U	0.10 U
Methane	3.1	6.5	4.7	9.3	4.2
General Chemistry					
Alkalinity, Total	37,700	54,900	44,100	29,400	45,200
Nitrate	490	1,800	1,200	640	1,300
Nitrate and Nitrite	NA	1,800	1,200	640	1,300
Nitrite	NA	10 U	10 U	10 U	10 U
Sulfate	27,800	32,000	29,300	31,500	30,000
Total Organic Carbon	1,400	1,900	1,400	1,100	1000 U
Total Suspended Solids	NA	10	8.0	4.0 U	1.4
Metals (µg/L)					
Iron Dissolved	200 U	140	20.6	50.0 U	50.0 U
Iron Total	802	908	29.5	50.0 U	50.0 U
Manganese Dissolved	424	208	223	644	655
Manganese Total	488	204	215	660	624
VOCs (µg/L)					
cis-1,2-Dichloroethene	1.6 J	5.9	7.8	12.4	9.0
Tetrachloroethene	0.36 J	2	1.7	1.9	2.1
Trichloroethene	0.48 J	3.5	3.4	4.6	3.8
Vinyl Chloride	5.0 U	0.33 J	0.50 J	0.86 J	0.45 J

GM-05S					
Sample Date	October 2012	Q1 2015	Q2 2015	Q3 2015	Q4 2015
Dissolved Gases					
Ethane	4.0 U	0.0020 U	0.0020	0.0020 U	0.10 U
Ethene	3.0 U	0.0030 U	0.0030	0.0040 U	0.10 U
Methane	2.0 U	0.042 U	0.042	0.037 U	0.50 U
General Chemistry					
Alkalinity, Total	21,800	25,500	3,200	3,700	10,200
Nitrate	1,600	2,600	3,500	1,900 J	2,400
Nitrate and Nitrite	NA	2,600	3,500	1,900 J	2,400
Nitrite	NA	10 U	3	10 U	10 U
Sulfate	28,900	18,500	13,800	16,500	26,300
Total Organic Carbon	1000 U	4,500	900	1000 U	1000 U
Total Suspended Solids	NA	2.0	4.0 U	4.0 U	4.0 U
Metals (µg/L)					
Iron Dissolved	200 U	349	4.7	50.0 U	50 U
Iron Total	107 J	542	11.7	50.0 U	21.6
Manganese Dissolved	344	50.2	20.4	79.4	101
Manganese Total	363	50.2	21.0	77.1	95.3
VOCs (µg/L)					
cis-1,2-Dichloroethene	15	1.2	1.7	6.9	7.8
Tetrachloroethene	2.2 J	3.1	2.4	2.7	2.8
Trichloroethene	4.6 J	1.4	1.3	3.9	4.6
Vinyl Chloride	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U

MW-04					
Sample Date	October 2012	Q1 2015	Q2 2015	Q3 2015	Q4 2015
Dissolved Gases					
Ethane	4.0 U	0.0020 U	0.0020 U	0.0053 J	0.10 U
Ethene	3.0 U	0.0030 U	0.0030 U	0.0040 U	0.013 J
Methane	2.0 U	0.95	0.042 U	0.037 U	0.50 U
General Chemistry					
Alkalinity, Total	13,300	21,100	4,700	8,600	1,500
Nitrate	1,200 H	2,500	2,800	2,700	110 U
Nitrate and Nitrite	NA	2,500	2,800	2,700	100 U
Nitrite	NA	10 U	5	10 U	10 U
Sulfate	18,300	13,600	13,900	12,400	12,800
Total Organic Carbon	1000 U	960	1000	540	1000 U
Total Suspended Solids	NA	5.0	4.0 U	4.0 U	4.0 U
Metals (µg/L)					
Iron Dissolved	200 U	4.9	3.9	10.1	50.0 U
Iron Total	141 J	3,880	54.6	63.6	50.0 U
Manganese Dissolved	333	36.1	76.7	41.4	50.0
Manganese Total	370	1,840	81	48.2	50.1
VOCs (µg/L)					
cis-1,2-Dichloroethene	8.0	8.5	7.4	8.5	10.2
Tetrachloroethene	5.0 U	1.1	1.4	0.89 J	0.87 J
Trichloroethene	43	45.7	39.8	43.8	44.3
Vinyl Chloride	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U

GM-01S					
Sample Date	October 2012	Q1 2015	Q2 2015	Q3 2015	Q4 2015
Dissolved Gases					
Ethane	4.0 U	0.0020 U	0.0020	0.0025 J	0.10 U
Ethene	3.0 U	0.0030 U	0.0030	0.0040 U	0.10 U
Methane	2.0 U	0.042 U	0.74 J	0.037 U	1.2
General Chemistry					
Alkalinity, Total	8,300	4,400	4,700	3,700	5000 U
Nitrate	1,600	1,700	1,700	1,500	1,900
Nitrate and Nitrite	NA	1,700	1,700	1,500	1,900
Nitrite	NA	10 U	3	10 U	10 U
Sulfate	5,000	10,800	11,800	7,900	8,000
Total Organic Carbon	1000 U	940	930	450	1000 U
Total Suspended Solids	NA	4.0 U	4.0	4.0 U	4.0 U
Metals (µg/L)					
Iron Dissolved	200 U	6.1	4.0	6.6	50.0 U
Iron Total	380	12.3	5.0	10.1	50.0 U
Manganese Dissolved	117	96.4	132	139	128
Manganese Total	124	95.8	133	151	125
VOCs (µg/L)					
cis-1,2-Dichloroethene	0.81 J	0.70 J	1.3	0.96 J	0.81 J
Tetrachloroethene	5.0 U	0.96 J	1.2	1.3	1.2
Trichloroethene	2.6 J	3.2	2	2.1	2.1
Vinyl Chloride	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U

GM-03RS					
Sample Date	October 2012	Q1 2015	Q2 2015	Q3 2015	Q4 2015
Dissolved Gases					
Ethane	4.0 U	0.0020 U	0.0020 U	0.019 J	0.10 U
Ethene	3.0 U	0.033	0.0030 U	0.0040 U	0.10 U
Methane	66	60	27	46	4.3
General Chemistry					
Alkalinity, Total	12,500	10,300	8,400	9,100	7,700
Nitrate	100 U	53	260	250	290
Nitrate and Nitrite	NA	55	260	250	290
Nitrite	NA	2	10 U	10 U	10 U
Sulfate	13,500	17,600	13,300	13,700	13,100
Total Organic Carbon	1000 U	1,400	1,200	710	1000 U
Total Suspended Solids	NA	3.0	5.0	4.0 U	4.0 U
Metals (µg/L)					
Iron Dissolved	571	660	276	599	126
Iron Total	691	667	336	665	171
Manganese Dissolved	567	516	531	497	465
Manganese Total	622	493	509	491	468
VOCs (µg/L)					
cis-1,2-Dichloroethene	42	22.0	20.1	15.5	14.4
Tetrachloroethene	5.9	2.6	2.3	2.3	1.8
Trichloroethene	18	14.7	14.8	17.6	15.2
Vinyl Chloride	5.0 U	0.92 J	0.55 J	0.43 J	0.26 J

MW-02					
Sample Date	October 2012	Q1 2015	Q2 2015	Q3 2015	Q4 2015
Dissolved Gases					
Ethane	4.0 U	0.0020 U	0.0020 U	0.0020 U	0.10 U
Ethene	3.0 U	0.0030 U	0.0030 U	0.0040 U	0.10 U
Methane	3.2	1.1	0.042 U	1.7	1.6
General Chemistry					
Alkalinity, Total	15,700	23,000	24,200	25,700	19,100
Nitrate	100 U	110 U	26	150 J	110 U
Nitrate and Nitrite	NA	100 U	29	150 J	77
Nitrite	NA	10 U	3	2 U	10 U
Sulfate	11,700	19,300	18,500	31,000	34,200
Total Organic Carbon	1,500	1,800	1,300	1,300	1,100
Total Suspended Solids	NA	5.0	4.0 U	4.0 U	4.0 U
Metals (µg/L)					
Iron Dissolved	1,160	18.6	27.6	631	162
Iron Total	3,050	1,800	984	582	128
Manganese Dissolved	553	747	675	759	697
Manganese Total	632	740	669	753	666
VOCs (µg/L)					
cis-1,2-Dichloroethene	21	11.9	9.2	9.9	8.7
Tetrachloroethene	8.5	5.5	3.8	3.2	2.8
Trichloroethene	20	13	9.7	12.2	10.1
Vinyl Chloride	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U

MW-01					
Sample Date	October 2012	Q1 2015	Q2 2015	Q3 2015	Q4 2015
Dissolved Gases					
Ethane	4.0 U	0.0020 U	0.0020 U	0.014 J	0.10 U
Ethene	3.0 U	0.0030 U	0.0030 U	0.0040 U	0.10 U
Methane	3.1	7.3	20	14	11
General Chemistry					
Alkalinity, Total	21,200	29,400	26,300	32,100	34,700
Nitrate	1000 H	360	850	430	530
Nitrate and Nitrite	NA	360	860	430	530
Nitrite	NA	2	5	10 U	10 U
Sulfate	15,500	11,500	15,200	11,600	12,400
Total Organic Carbon	1000 U	920	900	590	1000 U
Total Suspended Solids	NA	2.0	4.0 U	4.0 U	4.0 U
Metals (µg/L)					
Iron Dissolved	161 J	8.0	2.7	2.2	50.0 U
Iron Total	273	6.4	2.3	5.3	64.3
Manganese Dissolved	315	600	424	574	471
Manganese Total	326	606	439	589	478
VOCs (µg/L)					
cis-1,2-Dichloroethene	2.3 J	1.8	2.0	1.5	1.9
Tetrachloroethene	5.0 U	1.6	1.7	1.7	1.7
Trichloroethene	1.6 J	1.1	1.6	2.3	2.1
Vinyl Chloride	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U

MW-09S					
Sample Date	October 2012	Q1 2015	Q2 2015	Q3 2015	Q4 2015
Dissolved Gases					
Ethane	4.0 U	0.0020 U	0.0020 U	0.0020 U	0.10 U
Ethene	3.0 U	0.48	0.38	0.0040 U	0.17
Methane	38	94	64	38	32
General Chemistry					
Alkalinity, Total	50,900	43,600	95,800	53,800	51,000
Nitrate	100 U	110 U	87	140	110 U
Nitrate and Nitrite	NA	100 U	87	140	100 U
Nitrite	NA	10 U	10 U	10 U	10 U
Sulfate	28,500	30,800	30,200	34,400	19,300
Total Organic Carbon	9,900	1,800	1,800	1,100	1,200
Total Suspended Solids	NA	28.0	33.0	4.8	4.8
Metals (µg/L)					
Iron Dissolved	25,600	48,700	31,800	25,800	17,500
Iron Total	27,600	46,900	29,800	25,100	15,300
Manganese Dissolved	267	366	425	515	305
Manganese Total	295	361	392	497	275
VOCs (µg/L)					
cis-1,2-Dichloroethene	11	11.6	5.7	8.2	4.7
Tetrachloroethene	0.49 J	3.4	1.1	3.6	1.4
Trichloroethene	7.8	10.4	2.8	6	4.4
Vinyl Chloride	5.0 U	2.8	1.3	1.6	0.58 J

GM-08S					
Sample Date	October 2012	Q1 2015	Q2 2015	Q3 2015	Q4 2015
Dissolved Gases					
Ethane	4.0 U	0.0020 U	0.0020 U	0.0020 U	0.10 U
Ethene	3.0 U	0.0030 U	0.0030 U	0.0040 U	0.13
Methane	33	2.0	2.2	3.9	30
General Chemistry					
Alkalinity, Total	41,600	33,300	34,700	24,200	10,200
Nitrate	100 U	120	48	32	1500 U
Nitrate and Nitrite	NA	120	48	32	1500 U
Nitrite	NA	10 U	10 U	2 U	10 U
Sulfate	11,900	15,800	11,700	10,100	13,200
Total Organic Carbon	1,100	830	770	1000 U	1000 U
Total Suspended Solids	NA	6.0	9.0	3.6	3.2
Metals (µg/L)					
Iron Dissolved	6,710	3,040	590	4,110	5,230
Iron Total	33,400	4,900	1,350	4,410	5,350
Manganese Dissolved	648	411	506	463	566
Manganese Total	751	409	517	442	589
VOCs (µg/L)					
cis-1,2-Dichloroethene	0.28 J	0.22 J	0.27 J	1.0 U	0.52 J
Tetrachloroethene	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	0.43 J	0.43 J	0.37 J	0.29 J	0.60 J
Vinyl Chloride	5.0 U	1.0 U	1.0 U	1.0 U	0.30 J

GM-07S					
Sample Date	October 2012	Q1 2015	Q2 2015	Q3 2015	Q4 2015
Dissolved Gases					
Ethane	4.0 U	0.0020 U	0.0020 U	0.14 J	0.10 U
Ethene	3.0 U	0.0030 U	0.0030 U	0.0040 U	0.017 J
Methane	3.5	0.47	0.66	5.9	9.8
General Chemistry					
Alkalinity, Total	5000 U	2,900	5000 U	5000 U	5000 U
Nitrate	100 U	610	760	600	1800 U
Nitrate and Nitrite	NA	610	760	600	1800 U
Nitrite	NA	10 U	10 U	2 U	10 U
Sulfate	20,200	28,600	21,300	21,700	22,600
Total Organic Carbon	1000 U	1000	940	1000 U	1000 U
Total Suspended Solids	NA	4.0 U	4.0 U	2.4	2.0
Metals (µg/L)					
Iron Dissolved	872	88.3	20.6	81.0	88.9
Iron Total	1,070	136	58.1	237	258
Manganese Dissolved	1,310	2,930	3,450	3,050	2,990
Manganese Total	1,390	2,980	3,380	3,080	2,970
VOCs (µg/L)					
cis-1,2-Dichloroethene	28	12.2	11.9	11.2	13.0
Tetrachloroethene	5.0 U	1.2	1.3	1.3	1.3
Trichloroethene	10	15.5	14.5	13	13.3
Vinyl Chloride	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U

MW-10S					
Sample Date	October 2012	Q1 2015	Q2 2015	Q3 2015	Q4 2015
Dissolved Gases					
Ethane	4.0 U	0.0020 U	0.0020 U	0.0020 U	0.10 U
Ethene	3.0 U	0.047	0.0030 U	0.0040 U	0.087 J
Methane	2.0 U	0.23	0.042 U	1.6	0.50 U
General Chemistry					
Alkalinity, Total	5,600	5000 U	5000 U	5000 U	5000 U
Nitrate	1,700 H	1,800	1,500	1,100 J	110 U
Nitrate and Nitrite	NA	1,800	1,500	1,100 J	100 U
Nitrite	NA	10 U	10 U	2 U	10 U
Sulfate	18,500	24,800	18,300	18,900	21,900
Total Organic Carbon	1000 U	1000	900	1,100	1,100
Total Suspended Solids	NA	4.0 U	4.0 U	1.2	4.0 U
Metals (µg/L)					
Iron Dissolved	200 U	50 U	7.2	50.0 U	50.0 U
Iron Total	74.4 J	50 U	2.8	50.0 U	50.0 U
Manganese Dissolved	193	443	322	540	234
Manganese Total	192	436	313	566	242
VOCs (µg/L)					
cis-1,2-Dichloroethene	67	29.2	23.4	20.0	34.4
Tetrachloroethene	5.0 U	1.7	2.5	1.4	2.2
Trichloroethene	220 E	115	90.8	73.4	112
Vinyl Chloride	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U

Legend

Monitoring Well Locations

Site Boundary

Groundwater Data Notes:

- Value exceeds the NJ Class IIA Groundwater Quality Standards.

U - Not detected at or above the MRL/MDL
J - Estimated value
H - Analyzed outside acceptable holding time
E - Result exceeded calibration range
NA - Not analyzed

*Constituents of Concern are Trichloroethene, Tetrachloroethene & cis-1,2-Dichloroethene.

150 75 0 150 Feet

Shallow Aquifer Biogeochemical Results and COC Detections Summary - October 2012-2015

Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

Geosyntec consultants

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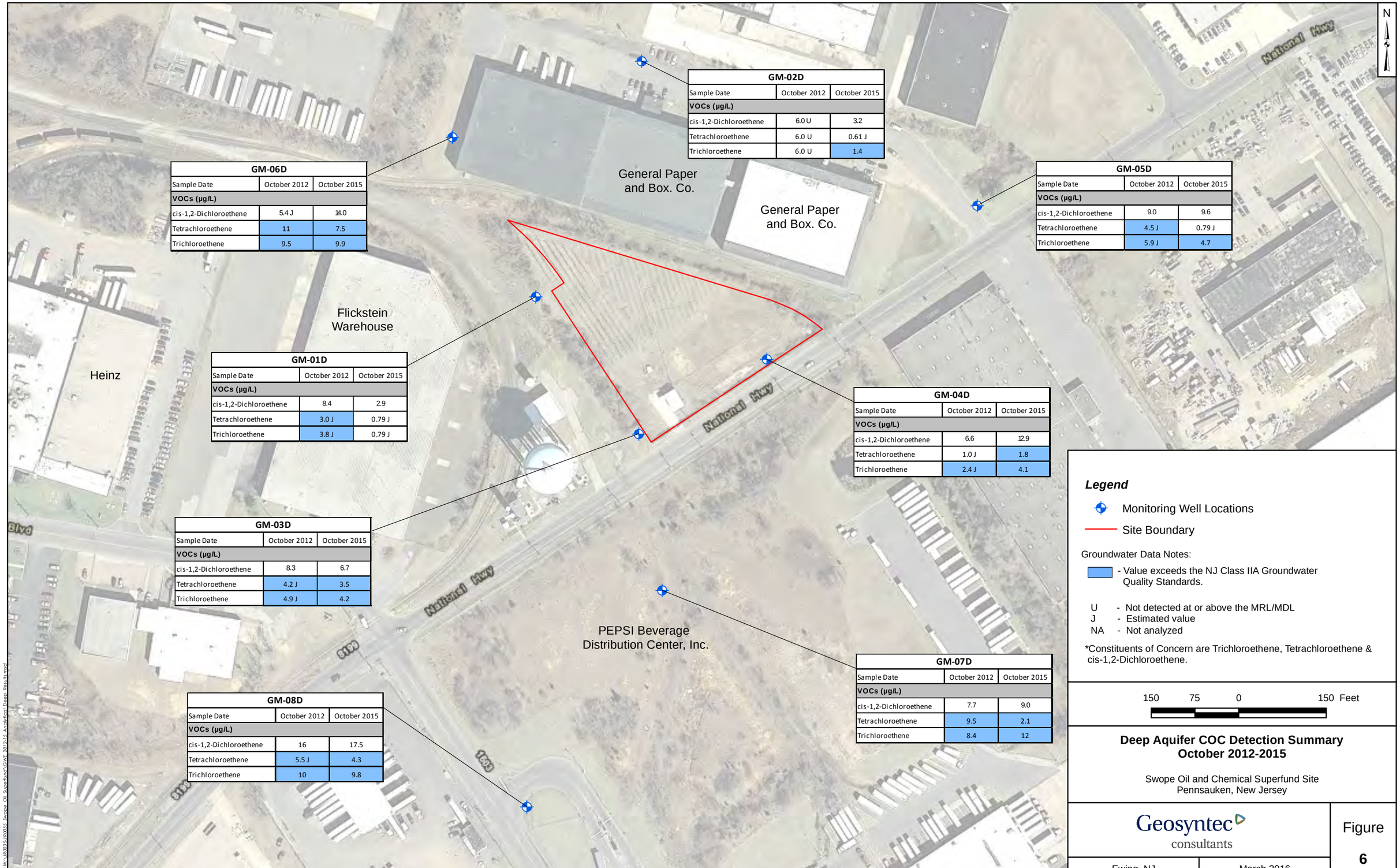
Figure 5



GM-02D

Sample Date	October 2012	October 2015
VOCs (µg/L)		
cis-1,2-Dichloroethene	6.0 U	3.2
Tetrachloroethene	6.0 U	0.61 J
Trichloroethene	6.0 U	1.4

GM-06D

Sample Date	October 2012	October 2015
VOCs (µg/L)		
cis-1,2-Dichloroethene	5.4 J	14.0
Tetrachloroethene	11	7.5
Trichloroethene	9.5	9.9

GM-05D

Sample Date	October 2012	October 2015
VOCs (µg/L)		
cis-1,2-Dichloroethene	9.0	9.6
Tetrachloroethene	4.5 J	0.79 J
Trichloroethene	5.9 J	4.7

GM-01D

Sample Date	October 2012	October 2015
VOCs (µg/L)		
cis-1,2-Dichloroethene	8.4	2.9
Tetrachloroethene	3.0 J	0.79 J
Trichloroethene	3.8 J	0.79 J

GM-04D

Sample Date	October 2012	October 2015
VOCs (µg/L)		
cis-1,2-Dichloroethene	6.6	12.9
Tetrachloroethene	1.0 J	1.8
Trichloroethene	2.4 J	4.1

GM-03D

Sample Date	October 2012	October 2015
VOCs (µg/L)		
cis-1,2-Dichloroethene	8.3	6.7
Tetrachloroethene	4.2 J	3.5
Trichloroethene	4.9 J	4.2

GM-07D

Sample Date	October 2012	October 2015
VOCs (µg/L)		
cis-1,2-Dichloroethene	7.7	9.0
Tetrachloroethene	9.5	2.1
Trichloroethene	8.4	12

GM-08D

Sample Date	October 2012	October 2015
VOCs (µg/L)		
cis-1,2-Dichloroethene	16	17.5
Tetrachloroethene	5.5 J	4.3
Trichloroethene	10	9.8

Deep Aquifer COC Detection Summary
October 2012-2015

Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

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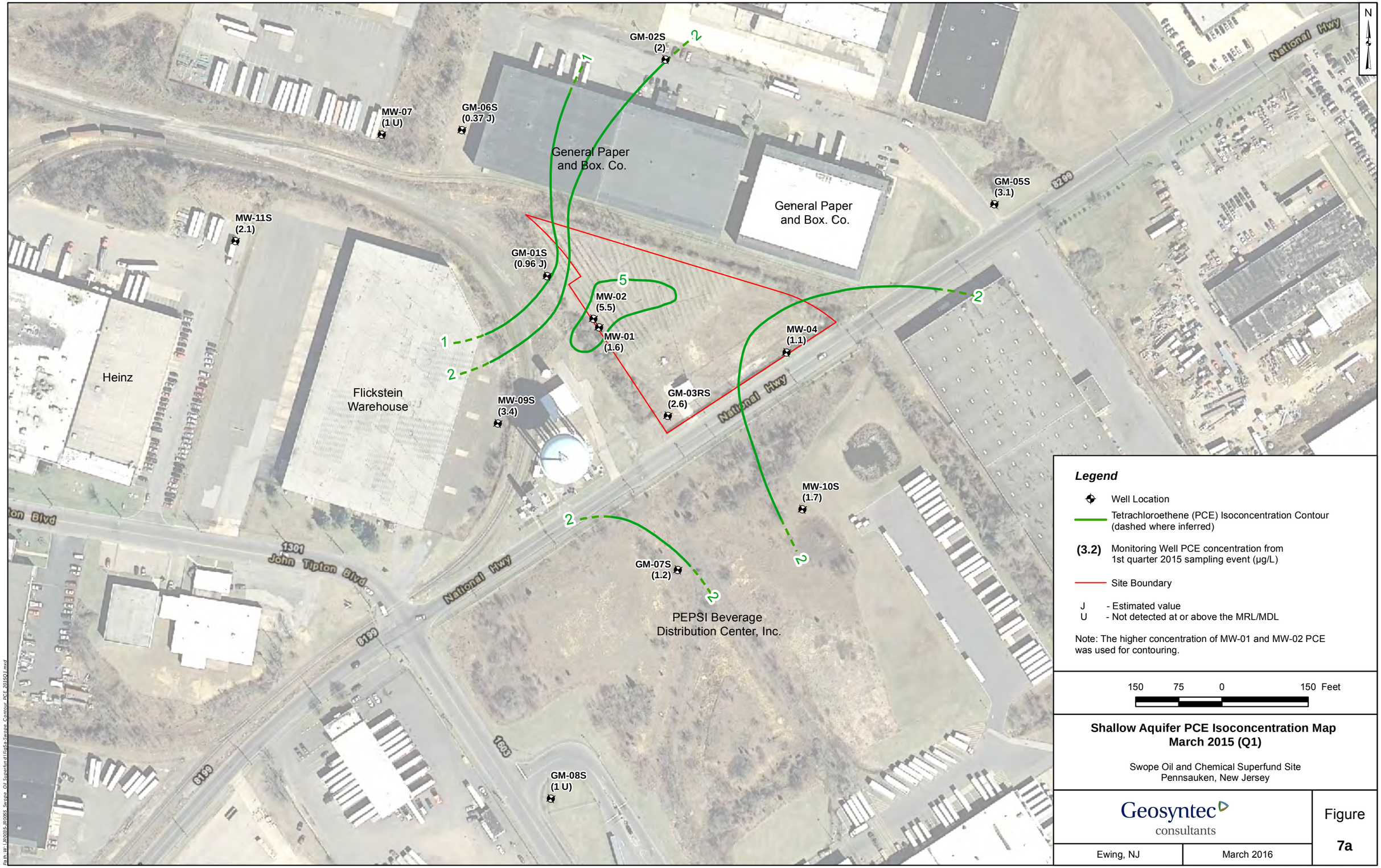

Shallow Aquifer PCE Isoconcentration Map
March 2015 (Q1)

Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

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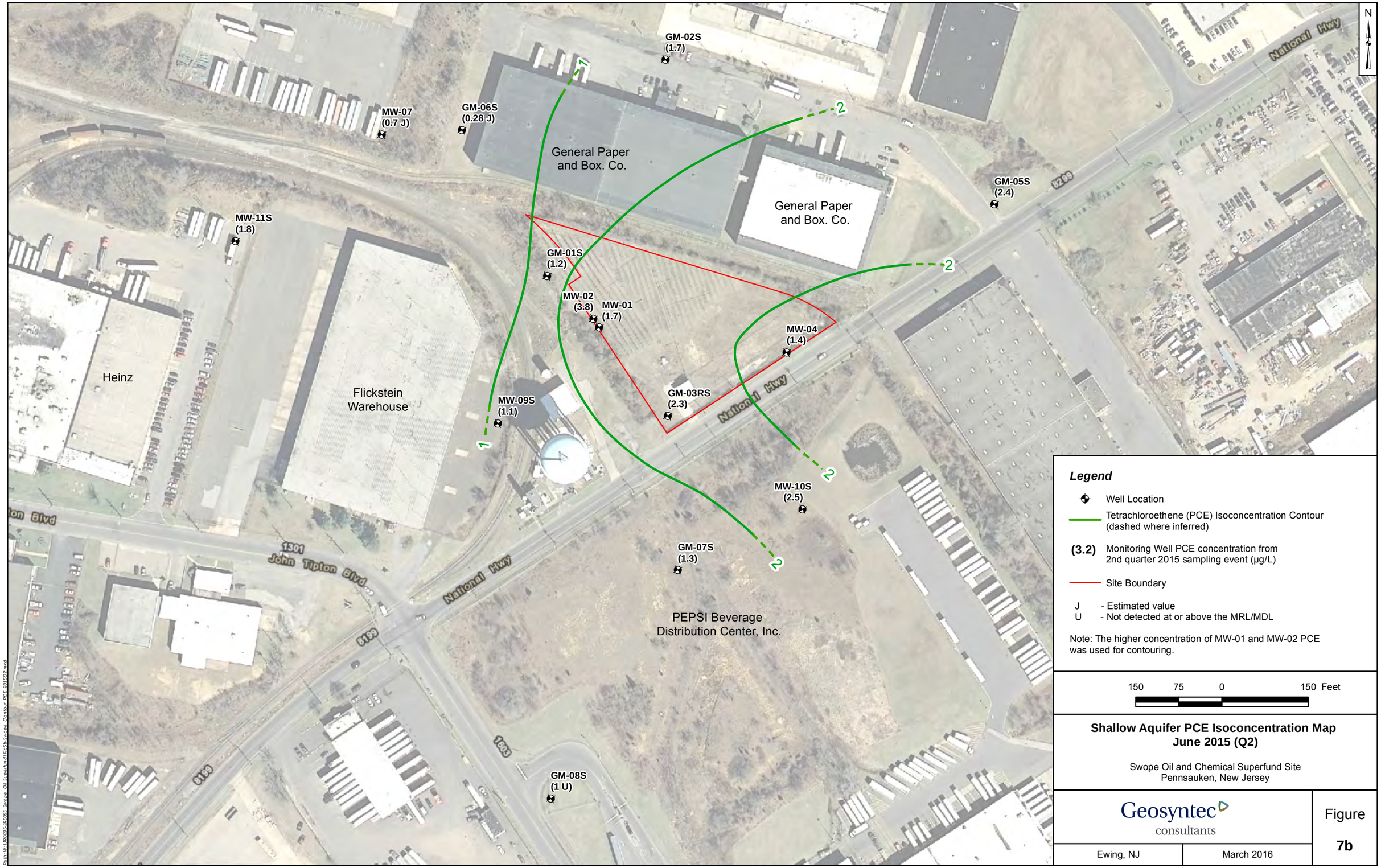
Figure 7a

Path: W:\JR0035\JR0065_Swope_Oil_Superfund\Fig5a-Swope_Contour_PCE_2015Q1.mxd



Shallow Aquifer PCE Isoconcentration Map
June 2015 (Q2)

Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

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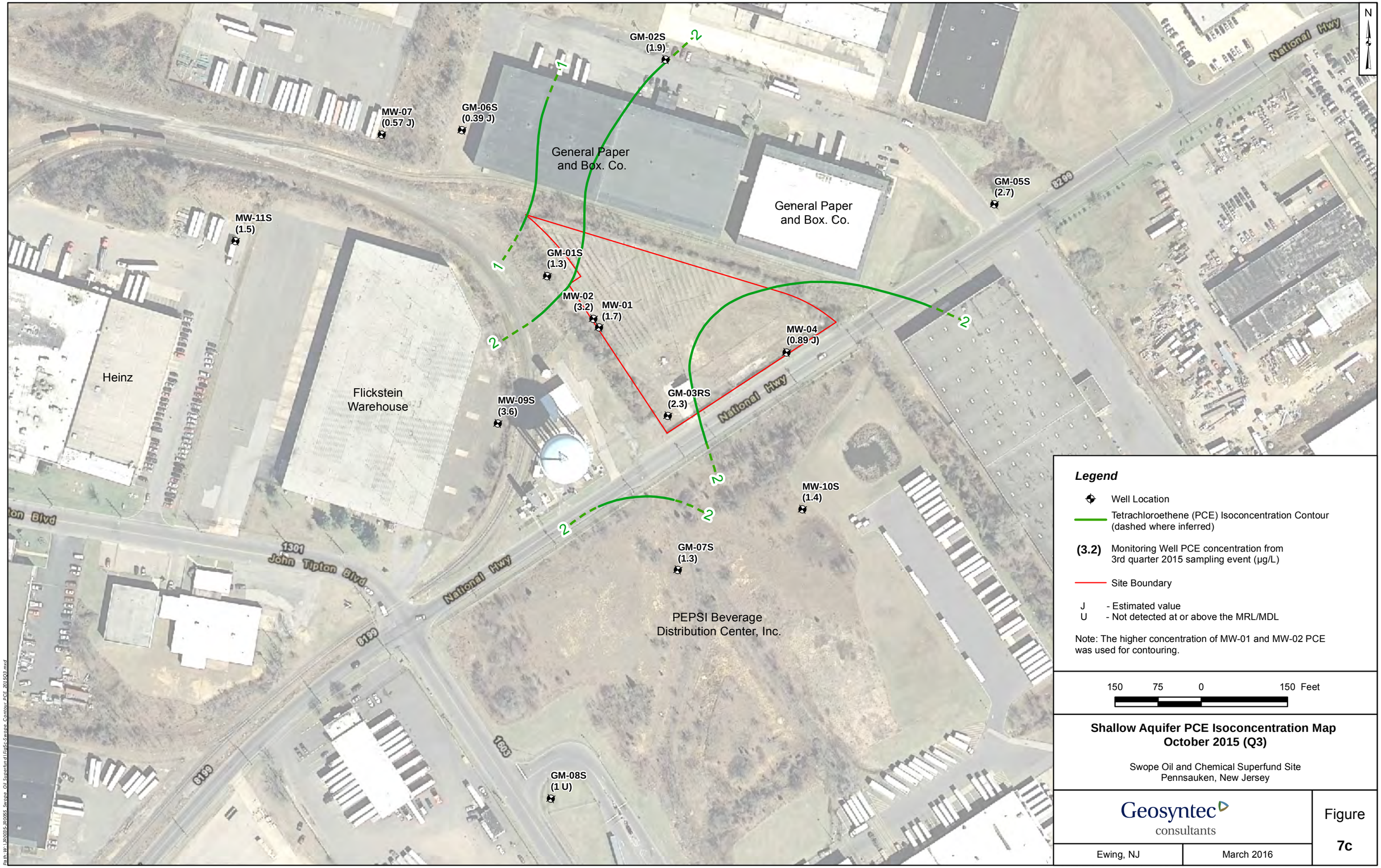
Figure **7b**

Path: W:\JR0035\JR0065_Swope_Oil_Superfund\Fig5b-Swope_Contour_PCE_2015Q2.mxd



Shallow Aquifer PCE Isoconcentration Map
October 2015 (Q3)

Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

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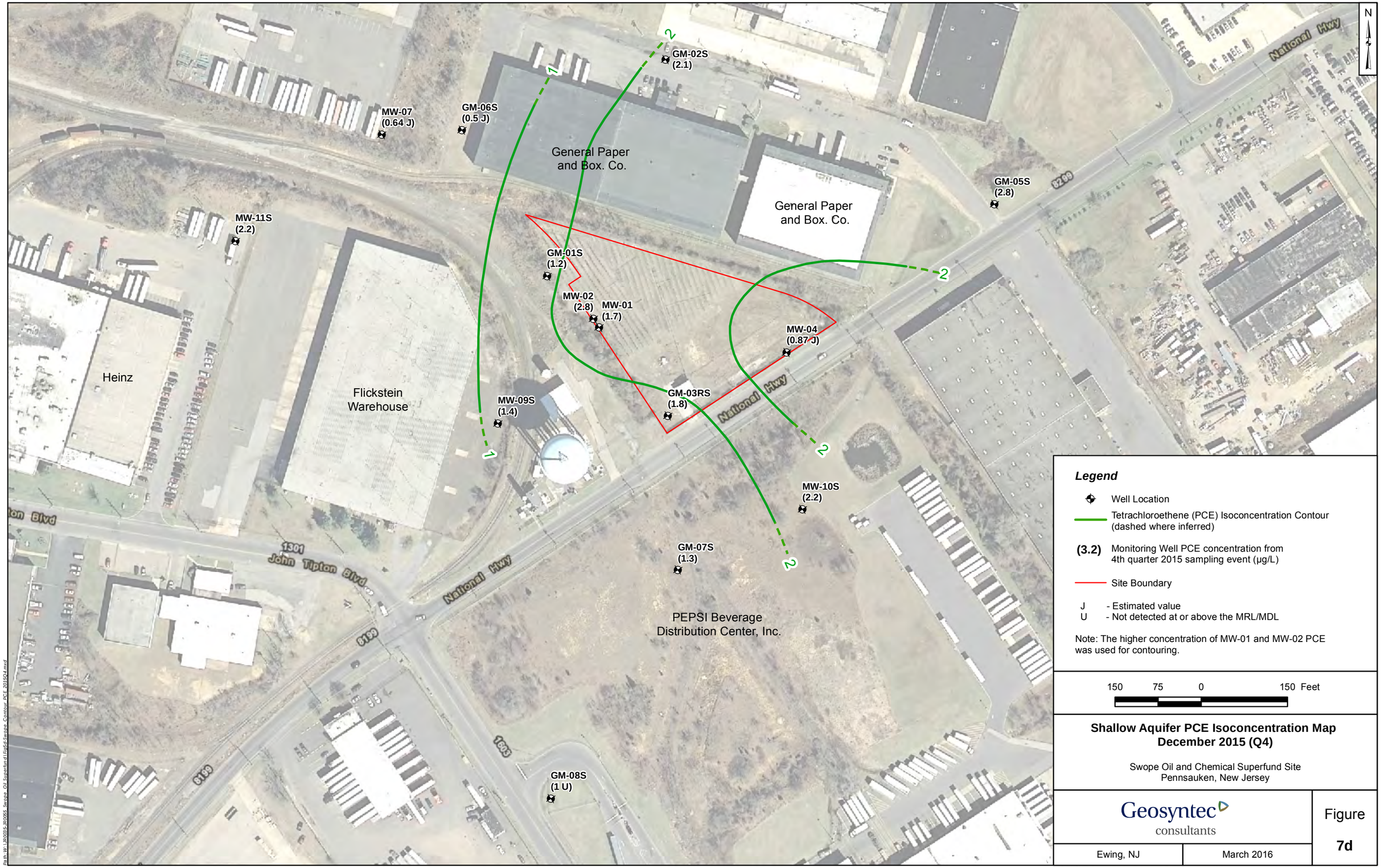
Figure 7c

Path: W:\JR0035\JR0065_Swope_Oil_Superfund\Fig5c-Swope_Contour_PCE_201503.mxd



Shallow Aquifer PCE Isoconcentration Map
December 2015 (Q4)

Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

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Figure **7d**

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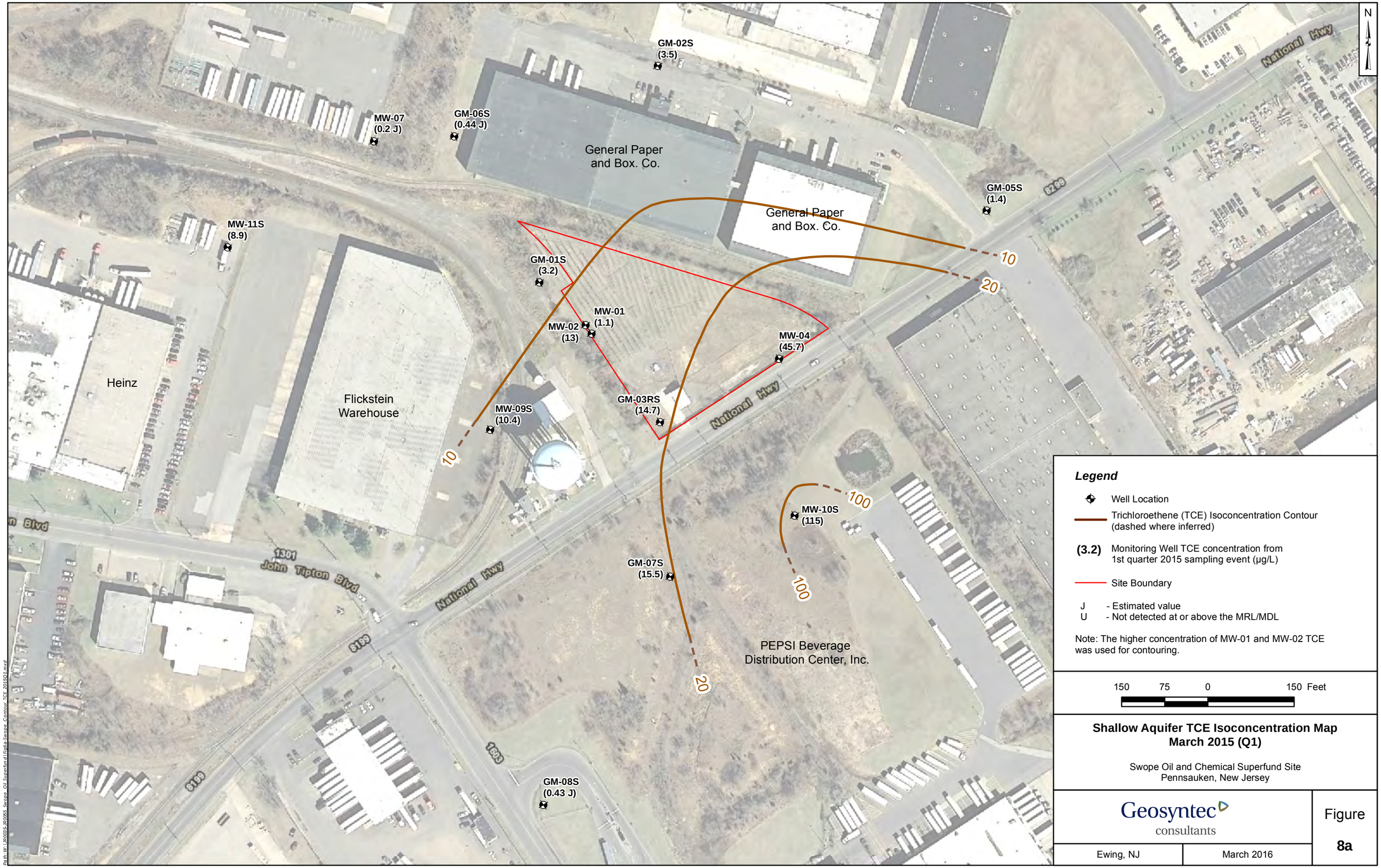

Shallow Aquifer TCE Isoconcentration Map
March 2015 (Q1)

Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

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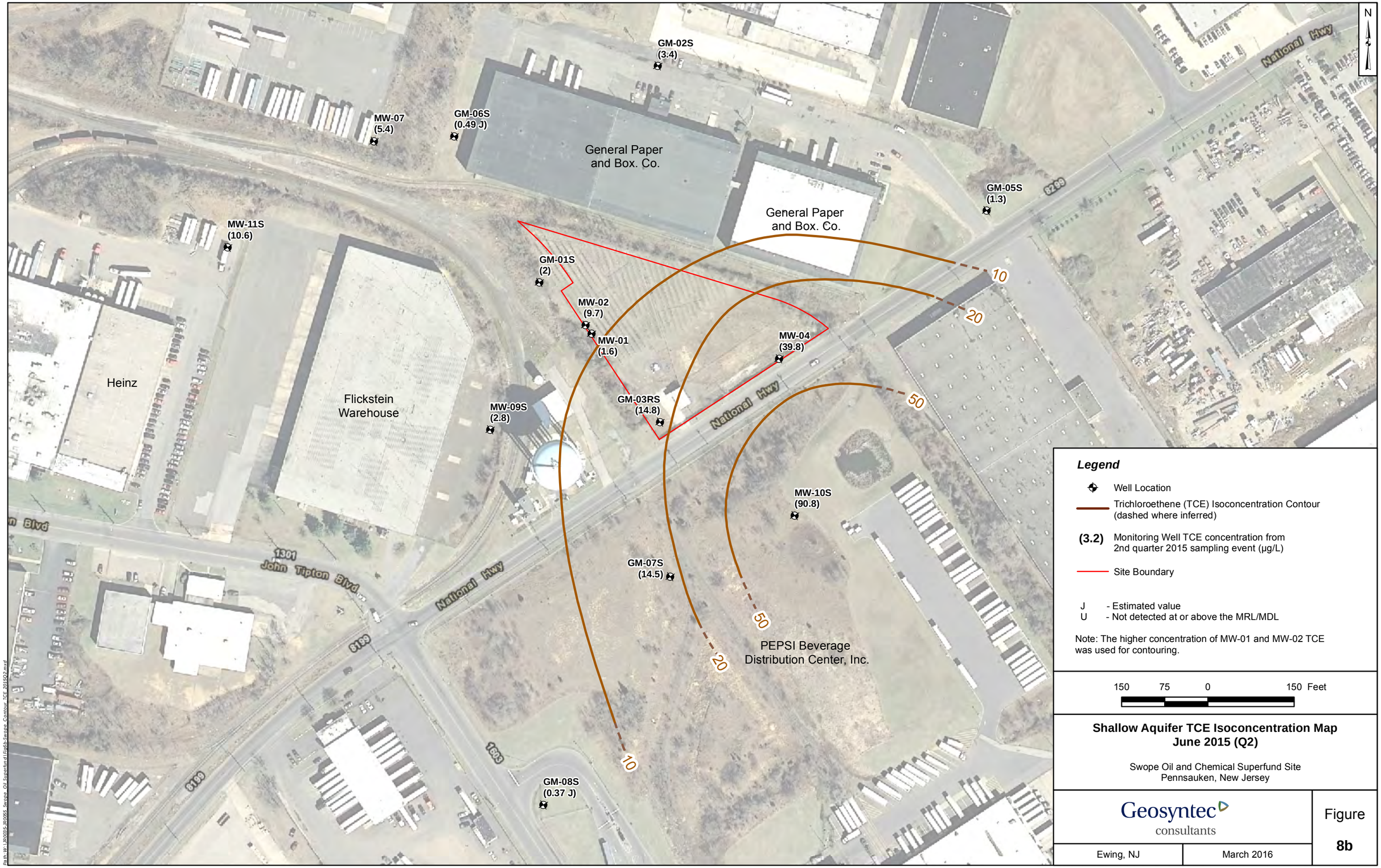
Figure 8a



Shallow Aquifer TCE Isoconcentration Map
June 2015 (Q2)

Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

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Figure 8b

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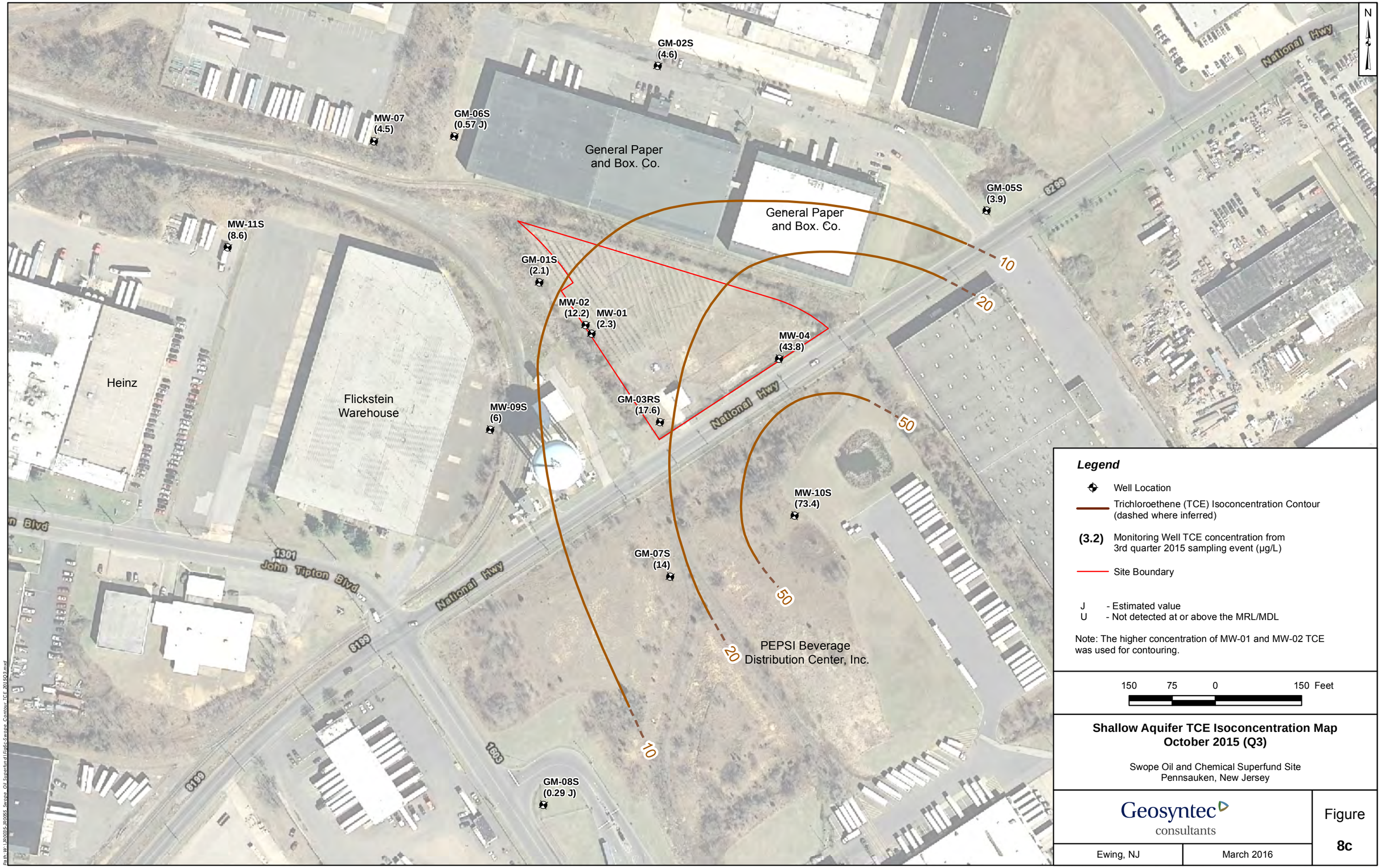

Shallow Aquifer TCE Isoconcentration Map
October 2015 (Q3)

Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

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Figure **8c**

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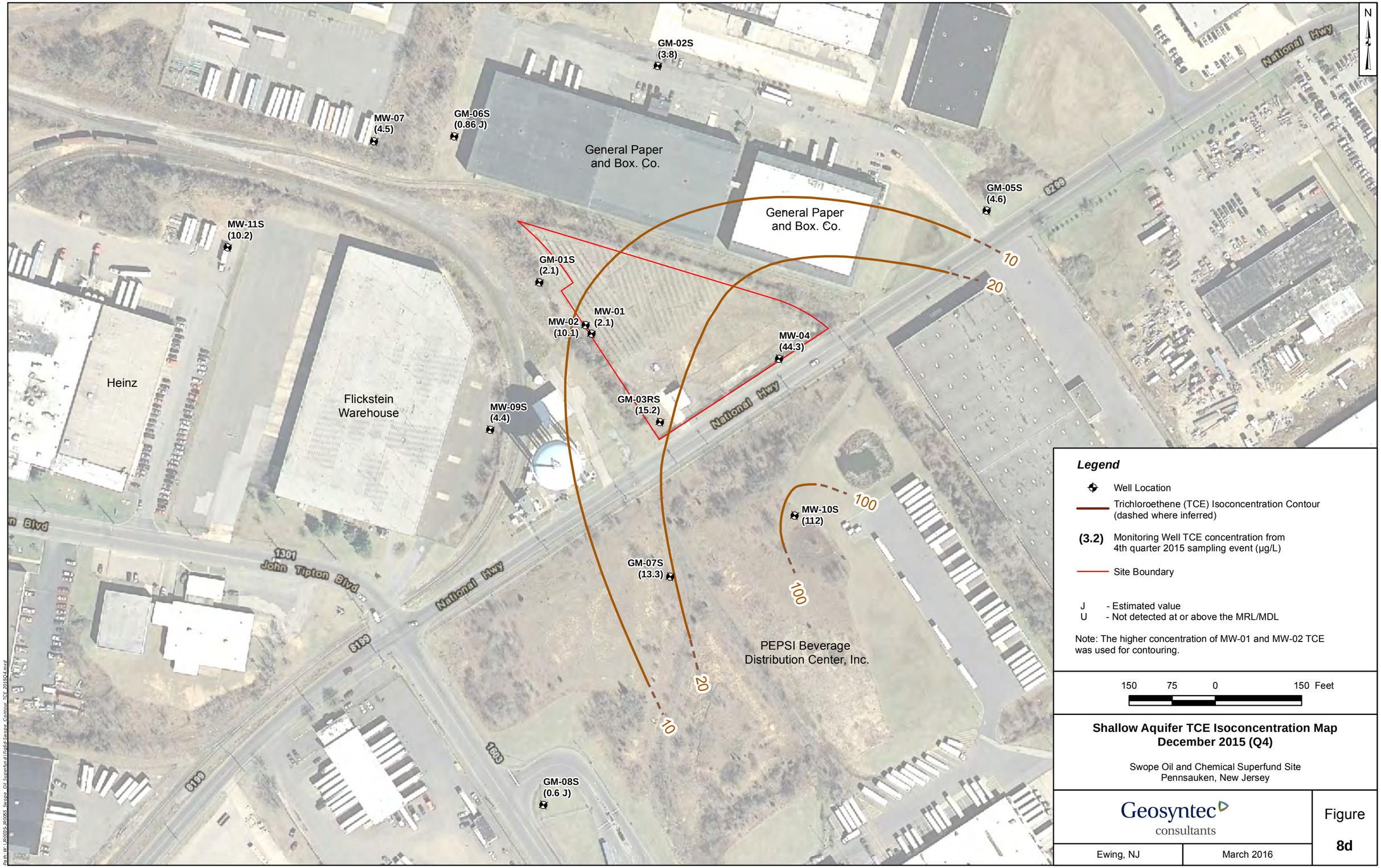

Shallow Aquifer TCE Isoconcentration Map
December 2015 (Q4)

Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

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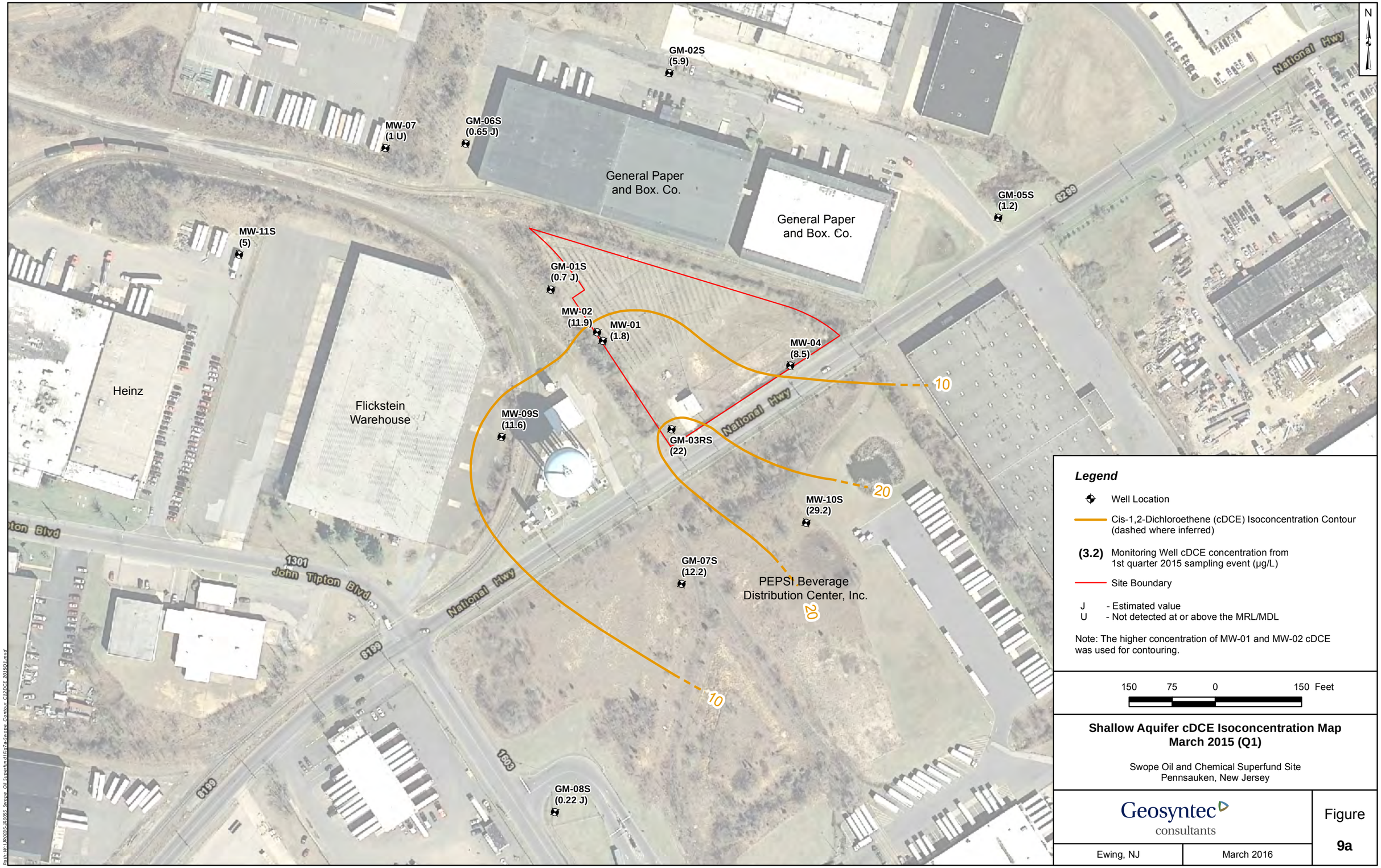
Figure **8d**

Path: W:\JR0035\JR0065_Swope_Oil_Superfund\Field\Swope_Contour_TCE_201504.mxd



Legend

- Well Location
- Cis-1,2-Dichloroethene (cDCE) Isoconcentration Contour (dashed where inferred)
- **(3.2)** Monitoring Well cDCE concentration from 1st quarter 2015 sampling event (µg/L)
- Site Boundary

J - Estimated value
U - Not detected at or above the MRL/MDL

Note: The higher concentration of MW-01 and MW-02 cDCE was used for contouring.

150 75 0 150 Feet

Shallow Aquifer cDCE Isoconcentration Map
March 2015 (Q1)

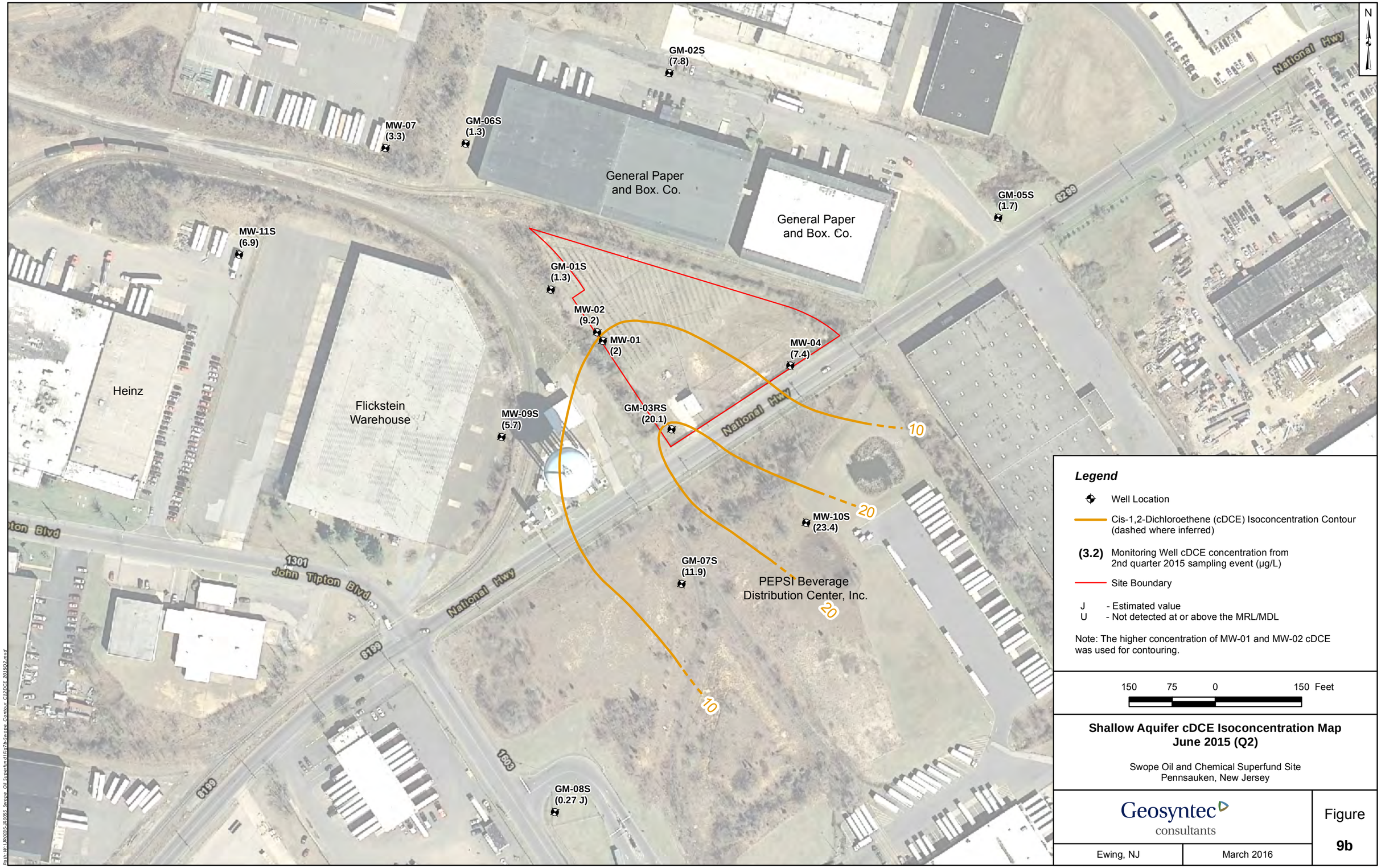
Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

Geosyntec consultants

Ewing, NJ | March 2016

Figure **9a**

Path: W:\JR0035\JR0065_Swope_Oil_Superfund\Fig7a-Swope_Contour_C12DCE_2015Q1.mxd



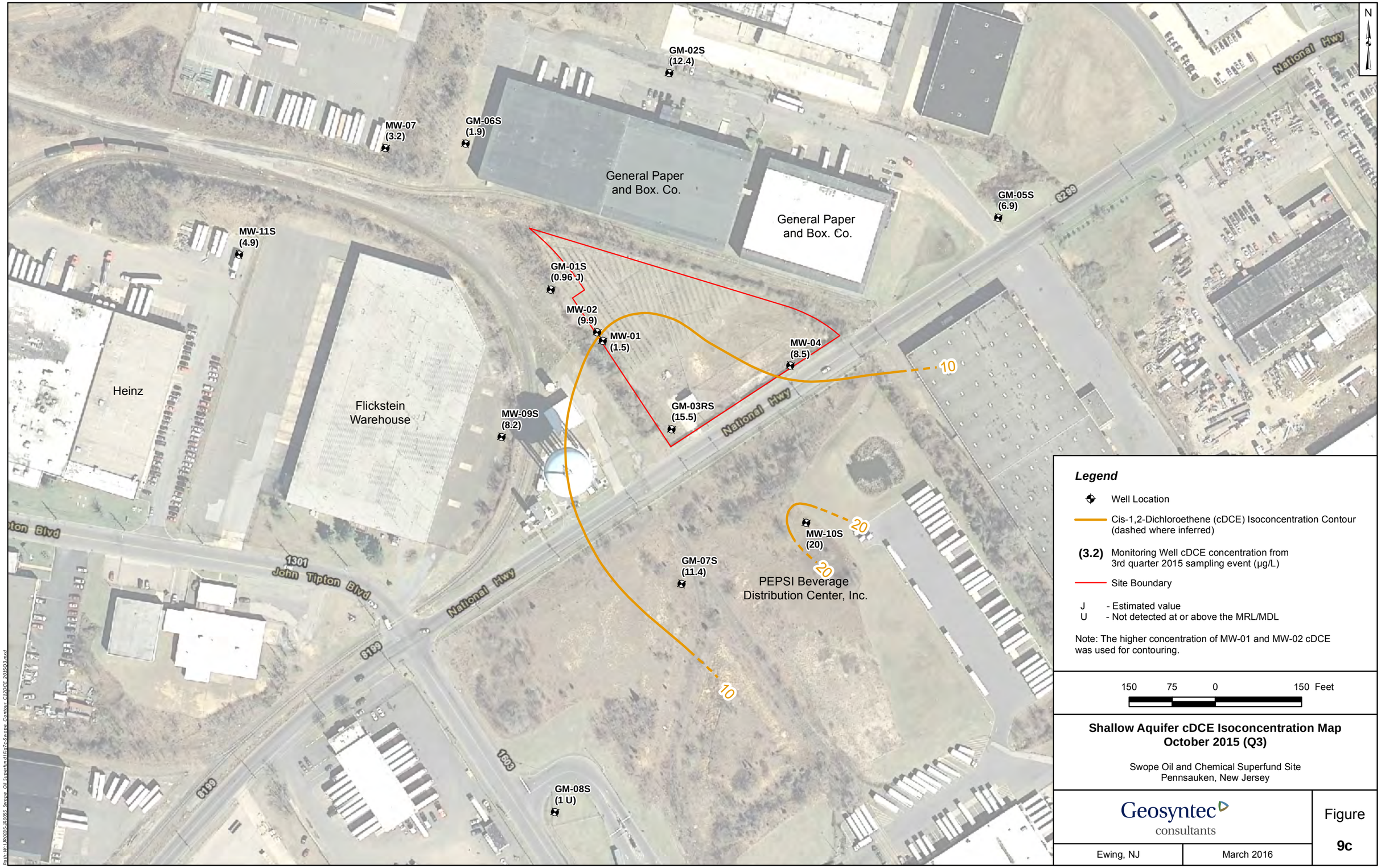
Shallow Aquifer cDCE Isoconcentration Map
June 2015 (Q2)

Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

Geosyntec consultants

Ewing, NJ | March 2016

Figure 9b



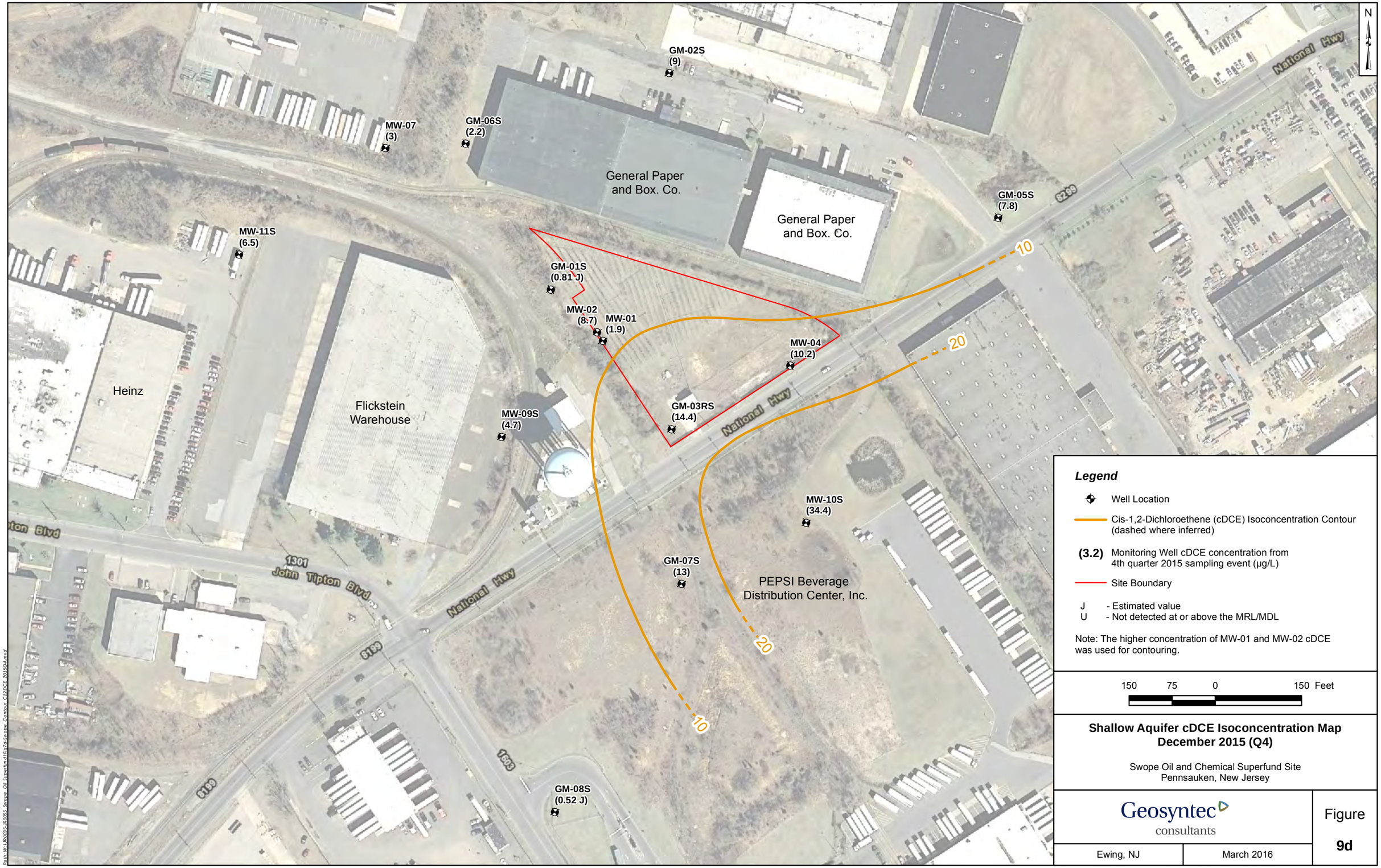
Shallow Aquifer cDCE Isoconcentration Map
October 2015 (Q3)

Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

Geosyntec consultants

Ewing, NJ | March 2016

Figure 9c



Shallow Aquifer cDCE Isoconcentration Map
December 2015 (Q4)

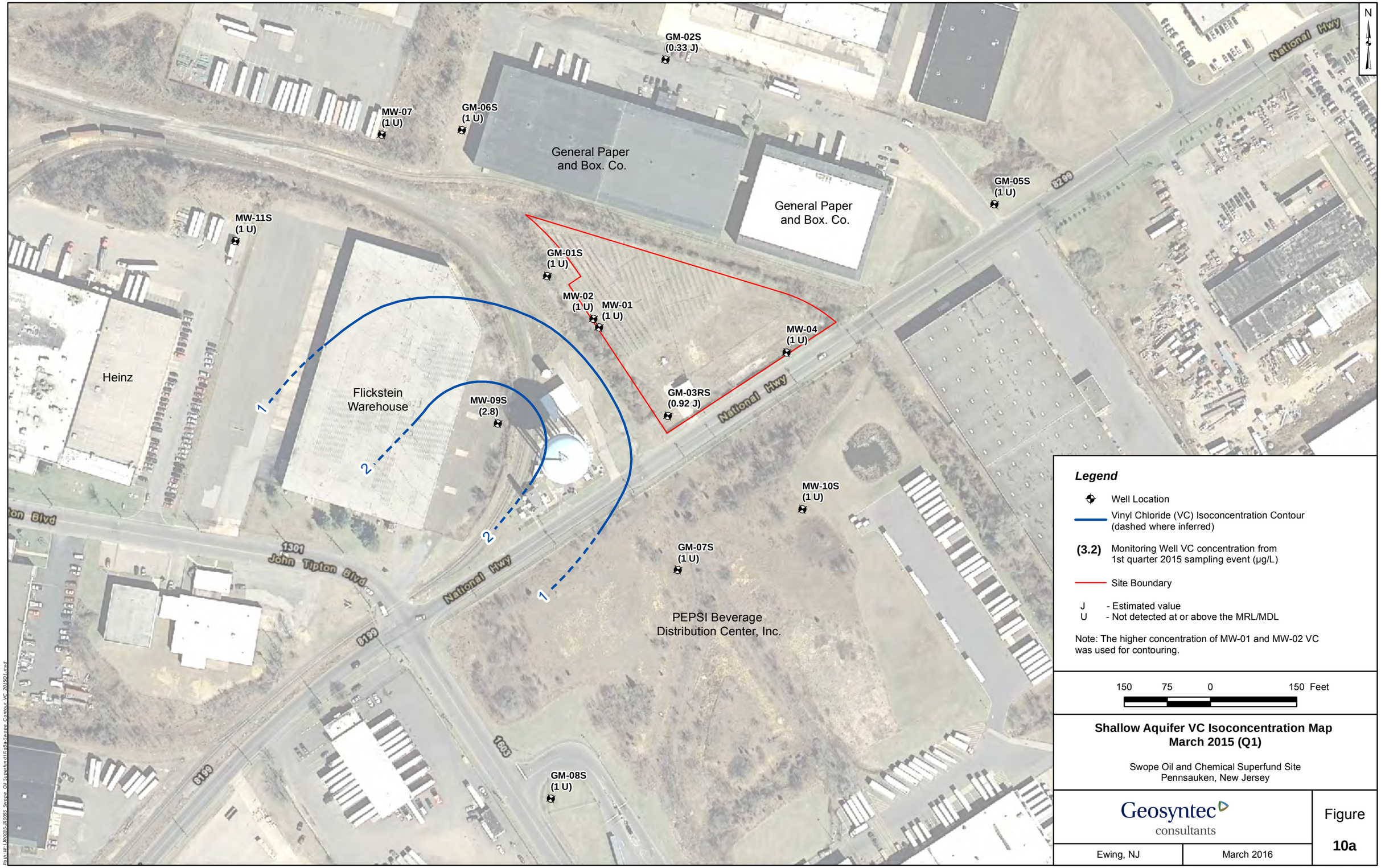
Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

Geosyntec consultants

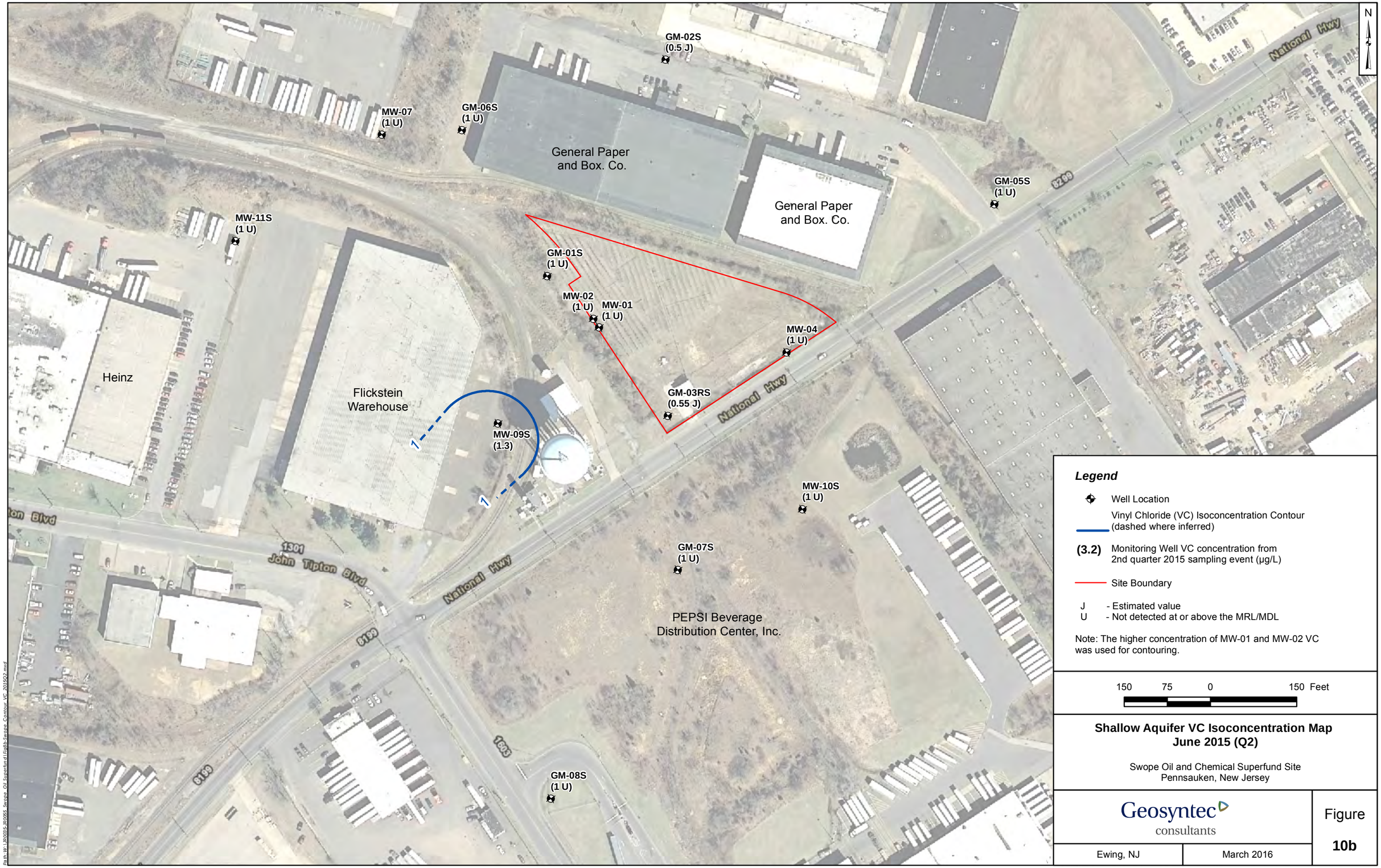
Ewing, NJ | March 2016

Figure **9d**

Path: W:\JR0035\JR0065_Swope_Oil_Superfund\Fig7d-Swope_Contour_C12DCE_2015Q4.mxd



Path: W:\JR0035\JR0055_Swope_Oil_Superfund\Fig8a-Swope_Contour_VC_2015Q1.mxd



Shallow Aquifer VC Isoconcentration Map
June 2015 (Q2)

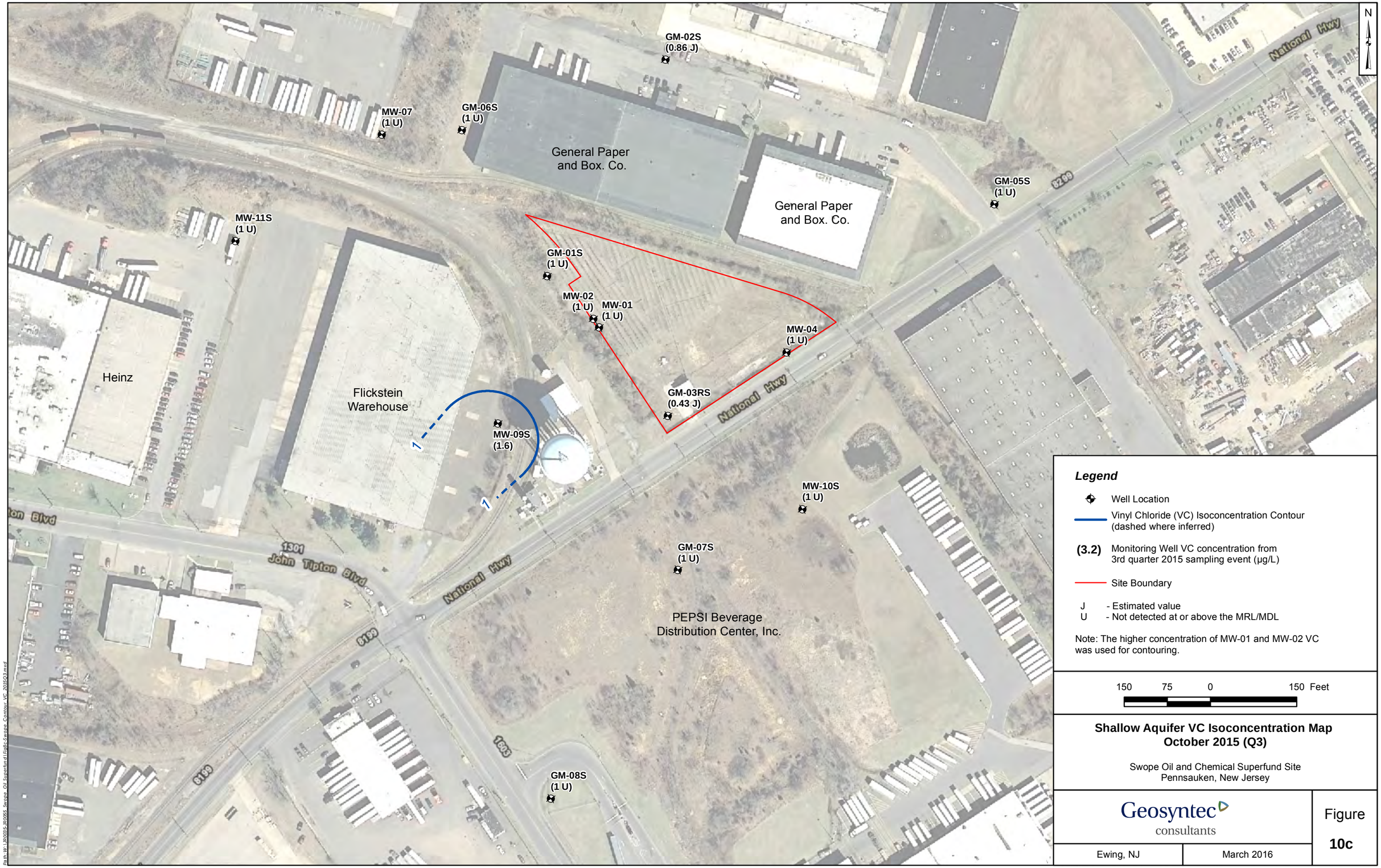
Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

Geosyntec consultants

Ewing, NJ | March 2016

Figure **10b**

Path: W:\JR0035-JR0055_Swope_Oil_Superfund\Fig8b-Swope_Contour_VC_2015Q2.mxd



Shallow Aquifer VC Isoconcentration Map
October 2015 (Q3)

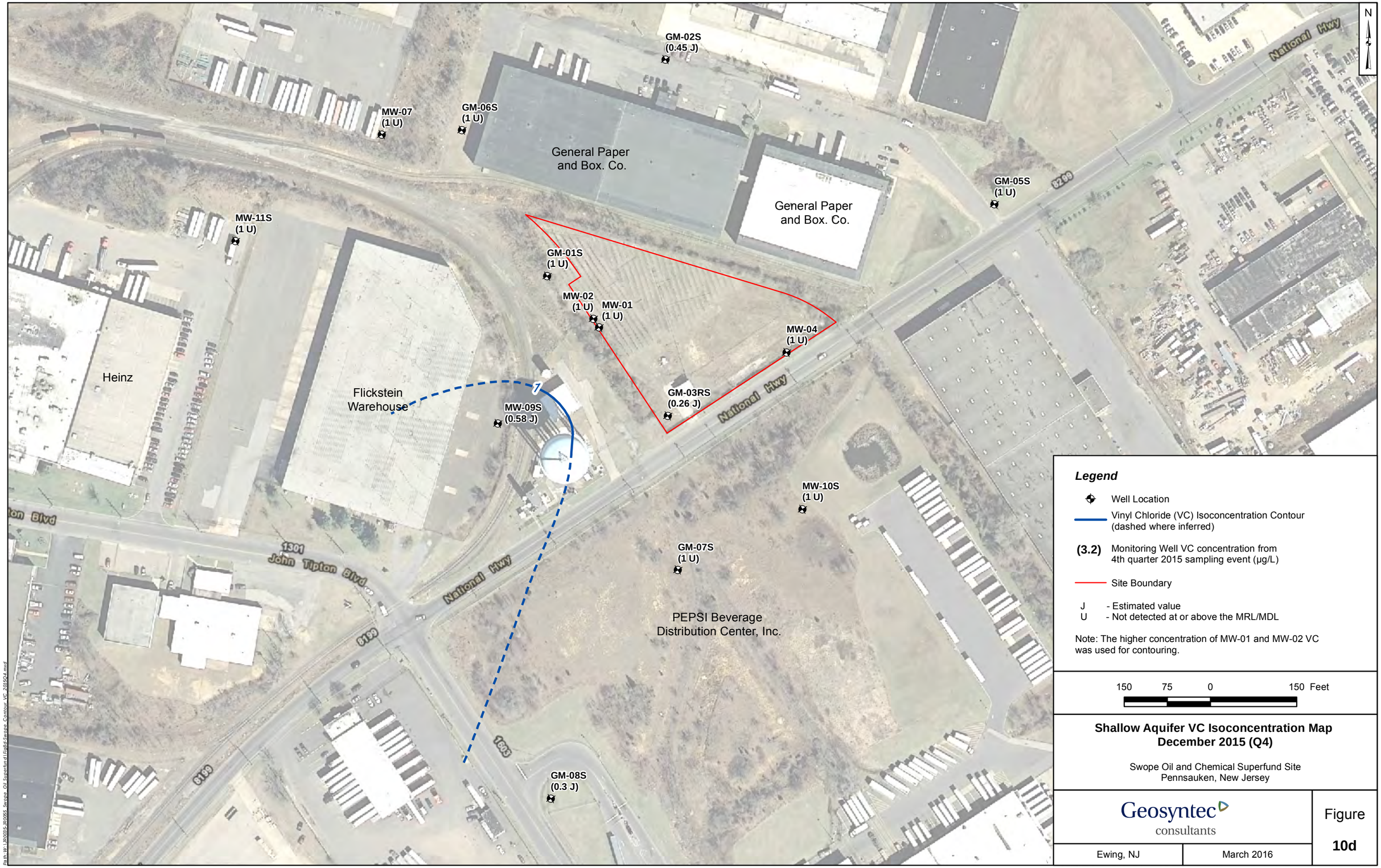
Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

Geosyntec consultants

Ewing, NJ | March 2016

Figure **10c**

Path: W:\JR0035\JR0065_Swope_Oil_Superfund\Fig8c-Swope_Contour_VC_2015Q3.mxd



Shallow Aquifer VC Isoconcentration Map
December 2015 (Q4)

Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

Geosyntec consultants

Ewing, NJ | March 2016

Figure **10d**

Path: W:\JR0035\JR0065_Swope_Oil_Superfund\Fig8d-Swope_Contour_VC_20150Q4.mxd

APPENDICES (on CD)

APPENDIX A

Selected Historic Tables and Figures

Table 2
Shallow Monitoring Wells
Swope Oil and Chemical Superfund Site, Pennsauken, New Jersey

Location	Screen Setting (ft bgs)	Location Relative to the Site
GM-01S	110-130	On-Site
GM-02S	110-130	Off-Site upgradient
GM-03RS	110-130	On-Site
GM-05S	107-127	Off-Site sidegradient
GM-06S	110-130	Off-Site sidegradient
GM-07S	110-130	Off-Site downgradient
GM-08S	110-130	Off-Site downgradient
MW-01	110-130	On-Site
MW-02	77-102	On-Site
MW-04	110-130	On-Site
MW-07	95-115	Off-Site sidegradient
MW-09S	120-130	Off-Site downgradient
MW-10S	123-133	Off-Site upgradient
MW-11S	117-127	Off-Site sidegradient

*Note: All shallow wells depth to water ~70-75 feet below ground surface.

Table 5
Historical Groundwater Volatile Organic Compound Sampling Results
Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

Location	Date Sampled	1,1,1-TCA	1,1-DCA	Chloro-benzene	cis-1,2-DCE	trans-1,2-DCE	PCE	TCE	Vinyl chloride
NJ Groundwater Quality Standard (ug/L)		30	50	50	70	100	1	1	1
GM-01D	06-Oct-89	18.0	19.0	5.0 U	--	--	14.0	24.0	2.00 J
	24-Jan-90	19.0	18.0	2.00 J	--	--	18.0	29.0	*10 U*
	04-Dec-96	10 U	4.00 J	4.00 J	--	--	6.00 J	7.00 J	*10 U*
	10-Feb-97	10 U	3.00 J	10 U	--	--	6.00 J	7.00 J	*10 U*
	11-Dec-97	10 U	10 U	10 U	--	--	*10 U*	*10 U*	*10 U*
	26-Mar-98	10 U	3.00 J	2.00 J	--	--	4.00 J	6.00 J	*10 U*
	18-Jun-98	10 U	3.00 J	2.00 J	--	--	4.00 J	5.00 J	*10 U*
	17-Sep-98	10 U	4.00 J	3.00 J	--	--	5.00 J	6.00 J	*10 U*
	10-Dec-98	10 U	3.00 J	10 U	--	--	6.00 J	9.00 J	*10 U*
	25-Mar-99	10 U	3.00 J	10 U	--	--	5.00 J	*10 U*	*10 U*
	23-Sep-99	10 U	4.00 J	3.00 J	--	--	6.00 J	7.00 J	*10 U*
	16-Mar-00	10.0	18.0	10 U	--	--	21.0	45.0	*10 U*
	12-Oct-00	1.10 J	3.00 J	2.40 J	--	--	9.70 J	11.0	*10 U*
	29-Mar-01	1.30 J	3.70 J	2.80 J	--	--	12.0	13.0	*10 U*
	27-Sep-01	10 U	3.70 J	2.70 J	--	--	11.0	12.0	*10 U*
	28-Mar-02	10 U	2.90 J	2.90 J	--	--	8.00 J	9.70 J	*10 U*
	25-Mar-04	0.770	3.90	3.90	19.0	0.50 U	7.60	7.90	0.900
	22-Oct-12	6.0 U	1.8 J	2.3 J	8.4	6.0 U	3.0 J	3.8 J	*6.0 U*
GM-01S	05-Oct-89	9.00 J	24.0	5.0 U	--	--	3.00 J	5.00	5.00 J
	24-Jan-90	13.0	38.0	1.00 J	--	--	3.00 J	5.00	*10 U*
	04-Dec-96	10.0	8.00 J	10 U	--	--	11.0	9.00 J	*10 U*
	10-Feb-97	4.00 J	6.00 J	10 U	--	--	6.00 J	11.0	*10 U*
	11-Dec-97	10 U	10 U	10 U	--	--	*10 U*	*10 U*	*10 U*
	26-Mar-98	3.00 J	4.00 J	10 U	--	--	4.00 J	7.00 J	*10 U*
	18-Jun-98	2.00 J	2.00 J	10 U	--	--	*10 U*	*10 U*	*10 U*
	17-Sep-98	10 U	2.00 J	10 U	--	--	*10 U*	*10 U*	*10 U*
	10-Dec-98	10 U	10 U	10 U	--	--	*10 U*	*10 U*	*10 U*
	25-Mar-99	10 U	10 U	10 U	--	--	*10 U*	3.00 J	*10 U*
	23-Sep-99	4.00 J	8.00 J	10 U	--	--	6.00 J	14.0	*10 U*
	16-Mar-00	10 U	10 U	10 U	--	--	40.0	27.0	*10 U*
	12-Oct-00	15.0	24.0	10 U	--	--	26.0	42.0	*10 U*
	29-Mar-01	14.0	28.0	10 U	--	--	25.0	52.0	*10 U*
	27-Sep-01	8.40 J	19.0	10 U	--	--	19.0	35.0	*10 U*
	28-Mar-02	8.40 J	18.0	10 U	--	--	18.0	30.0	*10 U*
	24-Sep-02	7.10 J	19.0	10 U	--	--	19.0	31.0	*10 U*
	25-Mar-04	3.50	16.0	0.50 U	76.0 E	0.50 U	14.0	22.0	0.50 U
	20-Dec-05	5.20	17.0	0.50 U	130 D	0.480 J	13.0	45.0 D	0.250 J
	22-Jun-07	1.60	5.50	0.50 U	64.0 E	0.50 U	6.40	44.0 E	0.50 U
	22-Oct-08	0.330 J	1.10	0.50 U	23.0 E	0.440 J	2.20	50.0 E	0.50 U
	04-Oct-12	5.0 U	0.30 J	5.0 U	0.81 J	5.0 U	*5.0 U*	2.6 J	*5.0 U*
GM-02D	05-Oct-89	9.00	11.0	5.0 U	--	--	14.0	18.0	*10 U*
	23-Jan-90	5.0 U	5.0 U	5.0 U	--	--	2.00 J	2.00 J	*10 U*
	02-Dec-96	10 U	10 U	10 U	--	--	8.00 J	7.00 J	*10 U*
	10-Feb-97	10 U	10 U	10 U	--	--	21.0	18.0	*10 U*
	10-Dec-97	10 U	10 U	10 U	--	--	26.0	23.0	*10 U*
	25-Mar-98	10 U	10 U	10 U	--	--	*10 U*	*10 U*	*10 U*
	17-Jun-98	10 U	10 U	10 U	--	--	7.00 J	5.00 J	*10 U*
	16-Sep-98	10 U	10 U	10 U	--	--	16.0	13.0	*10 U*
	09-Dec-98	10 U	10 U	10 U	--	--	14.0	12.0	*10 U*
	24-Mar-99	10 U	10 U	10 U	--	--	4.00 J	3.00 J	*10 U*
	22-Sep-99	10 U	10 U	10 U	--	--	15.0	14.0	*10 U*
	15-Mar-00	10 U	1.00 J	10 U	--	--	25.0	26.0	*10 U*
	11-Oct-00	10 U	10 U	10 U	--	--	18.0	16.0	*10 U*
	28-Mar-01	10 U	1.60 J	10 U	--	--	33.0	28.0	*10 U*
	26-Sep-01	10 U	1.10 J	10 U	--	--	38.0	33.0	*10 U*
	26-Mar-02	10 U	10 U	10 U	--	--	41.0	34.0	*10 U*
	23-Mar-04	0.50 U	0.550	0.50 U	4.90	0.50 U	40.0 E	28.0 E	0.50 U
	22-Oct-12	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	*6.0 U*	*6.0 U*	*6.0 U*
GM-02S	05-Oct-89	3.00 J	4.00 J	5.0 U	--	--	3.00 J	5.00	*10 U*
	23-Jan-90	4.00 J	4.00 J	8.00	--	--	3.00 J	5.00	*10 U*
	02-Dec-96	10 U	10 U	10 U	--	--	*10 U*	*10 U*	*10 U*
	09-Feb-97	10 U	10 U	10 U	--	--	*10 U*	*10 U*	*10 U*
	10-Dec-97	10 U	10 U	4.00 J	--	--	*10 U*	*10 U*	*10 U*
	25-Mar-98	10 U	10 U	4.00 J	--	--	2.00 J	*10 U*	*10 U*
	17-Jun-98	10 U	10 U	1.00 J	--	--	4.00 J	*10 U*	*10 U*
	16-Sep-98	10 U	10 U	10 U	--	--	*10 U*	*10 U*	*10 U*
	09-Dec-98	10 U	10 U	10 U	--	--	*10 U*	*10 U*	*10 U*
	24-Mar-99	10 U	10 U	9.00 J	--	--	*10 U*	*10 U*	*10 U*
	22-Sep-99	10 U	10 U	7.00 J	--	--	*10 U*	*10 U*	*10 U*
	15-Mar-00	10 U	10 U	9.00 J	--	--	1.00 J	*10 U*	*10 U*
	11-Oct-00	10 U	10 U	6.00 J	--	--	*10 U*	*10 U*	*10 U*
	28-Mar-01	10 U	10 U	7.30 J	--	--	*10 U*	*10 U*	*10 U*
	26-Sep-01	10 U	10 U	4.60 J	--	--	1.90 J	*10 U*	*10 U*
	26-Mar-02	10 U	10 U	3.90 J	--	--	1.10 J	3.80 J	*10 U*
	24-Sep-02	10 U	1.00 J	3.10 J	--	--	1.10 J	3.30 J	*10 U*
	23-Mar-04	0.610	0.730	1.70	0.390 J	0.50 U	2.30	5.90	0.50 U
	22-Dec-05	0.50 U	0.50 U	1.40	0.480 J	0.50 U	0.870	0.400 J	0.50 U
	21-Jun-07	0.50 U	0.50 U	0.870	0.530	0.50 U	0.380 J	0.50 U	0.50 U
	21-Oct-08	0.50 U	0.50 U	0.530	0.290 J	0.50 U	0.410 J	0.230 J	0.50 U
	08-Oct-12	5.0 U	0.69 J	5.0 U	1.6 J	5.0 U	0.36 J	0.48 J	*5.0 U*

Notes:

Concentrations which exceed the GWQS are highlighted **blue**

Non-detectable concentrations which exceed any NJDEP GWQS are *italicized and brown*

---: No result reported

D: Concentrations identified from analysis of the sample at a secondary dilution.

E: Compounds whose concentrations exceed the upper limit of the calibration range.

J: Estimated value

U: Compound was not detected at a concentration above the reporting limit.

X: The addition of two or more isomers.

Table 5
Historical Groundwater Volatile Organic Compound Sampling Results
Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

Location	Date Sampled	1,1,1-TCA	1,1-DCA	Chloro-benzene	cis-1,2-DCE	trans-1,2-DCE	PCE	TCE	Vinyl chloride
NJ Groundwater Quality Standard (ug/L)		30	50	50	70	100	1	1	1
GM-03D	06-Oct-89	14.0	21.0	10 U	--	--	7.00 J	22.0	***20 U***
	24-Jan-90	8.00	10.0	5.00	--	--	3.00 J	10.0	***10 U***
	05-Dec-96	10 U	6.00 J	10 U	--	--	21.0	19.0	***10 U***
	10-Feb-97	10 U	5.00 J	10 U	--	--	20.0	18.0	***10 U***
	11-Dec-97	10 U	10 U	10 U	--	--	***10 U***	***10 U***	***10 U***
	26-Mar-98	10 U	10 U	2.00 J	--	--	6.00 J	7.00 J	***10 U***
	17-Jun-98	10 U	4.00 J	4.00 J	--	--	7.00 J	8.00 J	***10 U***
	17-Sep-98	10 U	3.00 J	5.00 J	--	--	7.00 J	7.00 J	***10 U***
	09-Dec-98	10 U	2.00 J	2.00 J	--	--	8.00 J	7.00 J	***10 U***
	24-Mar-99	10 U	10 U	6.00 J	--	--	***10 U***	***10 U***	***10 U***
	22-Sep-99	10 U	3.00 J	6.00 J	--	--	***10 U***	3.00 J	***10 U***
	14-Mar-00	1.00 J	2.00 J	6.00 J	--	--	2.00 J	3.00 J	***10 U***
	11-Oct-00	1.60 J	2.50 J	5.20 J	--	--	1.70 J	2.40 J	***10 U***
	28-Mar-01	1.30 J	2.90 J	5.20 J	--	--	2.40 J	2.80 J	***10 U***
	26-Sep-01	10 U	2.20 J	5.00 J	--	--	1.80 J	2.20 J	***10 U***
	27-Mar-02	10 U	1.70 J	4.80 J	--	--	1.60 J	2.60 J	***10 U***
	24-Mar-04	0.510	1.60	5.00	5.20	0.50 U	1.80	1.60	0.680
	22-Oct-12	0.25 J	2.3 J	6.0 U	8.3	6.0 U	4.2 J	4.9 J	***6.0 U***
GM-03RS	05-Oct-89	47.0 J	9.00	2.00 J	--	--	6.00	13.0	2.00 J
	05-Dec-89	--	9.00	--	--	--	--	--	--
	24-Jan-90	51.0	10.0	5.0 U	--	--	7.00	14.0	***10 U***
	05-Dec-96	7.00 J	5.00 J	3.00 J	--	--	3.00 J	4.00 J	***10 U***
	10-Feb-97	9.00 J	5.00 J	4.00 J	--	--	4.00 J	5.00 J	***10 U***
	11-Dec-97	7.00 J	4.00 J	3.00 J	--	--	***10 U***	***10 U***	***10 U***
	26-Mar-98	8.00 J	4.00 J	2.00 J	--	--	3.00 J	3.00 J	***10 U***
	17-Jun-98	10.0 J	5.00 J	2.00 J	--	--	4.00 J	3.00 J	***10 U***
	17-Sep-98	8.00 J	6.00 J	3.00 J	--	--	***10 U***	***10 U***	***10 U***
	09-Dec-98	6.00 J	4.00 J	2.00 J	--	--	***10 U***	***10 U***	***10 U***
	24-Mar-99	5.00 J	4.00 J	10 U	--	--	***10 U***	4.00 J	***10 U***
	22-Sep-99	3.00 J	7.00 J	10 U	--	--	***10 U***	3.00 J	***10 U***
	14-Mar-00	2.00 J	10.0	1.00 J	--	--	2.00 J	3.00 J	4.00 J
	11-Oct-00	10 U	12.0	1.30 J	--	--	1.60 J	3.30 J	2.80 J
	28-Mar-01	10 U	14.0	1.40 J	--	--	2.70 J	6.10 J	3.50 J
	26-Sep-01	10 U	21.0	1.20 J	--	--	2.10 J	8.40 J	7.10 J
	27-Mar-02	10 U	29.0	1.20 J	--	--	1.60 J	9.80 J	12.0
	24-Sep-02	10 U	24.0	1.10 J	--	--	1.60 J	7.40 J	12.0
	24-Mar-04	1.10	32.0 E	1.10	75.0 E	0.450 J	6.80	22.0	15.0
	21-Dec-05	0.460 J	33.0 D	0.580	40.0 DB	0.440 J	3.70	12.0	6.30
	22-Jun-07	1.40	23.0 E	0.460 J	69.0 E	0.360 J	8.00	20.0	5.00
	20-Oct-08	1.60	19.0	0.740	85.0 E	0.290 J	9.80	24.0 E	4.10
	08-Oct-12	0.82 J	7.6	5.0 U	42	5.0 U	5.9	18	***5.0 U***
GM-04D	06-Oct-89	16.0	20.0	5.0 U	--	--	9.00	22.0	8.00 J
	24-Jan-90	14.0	19.0	17.0	--	--	8.00	25.0	12.0
	04-Dec-96	2.00 J	6.00 J	5.00 J	--	--	4.00 J	7.00 J	***10 U***
	09-Feb-97	10 U	8.00 J	6.00 J	--	--	4.00 J	9.00 J	***10 U***
	12-Dec-97	10 U	10.0	8.00 J	--	--	***10 U***	***10 U***	***10 U***
	26-Mar-98	2.00 J	7.00 J	6.00 J	--	--	4.00 J	6.00 J	***10 U***
	18-Jun-98	2.00 J	6.00 J	5.00 J	--	--	***10 U***	6.00 J	***10 U***
	17-Sep-98	10 U	6.00 J	4.00 J	--	--	***10 U***	5.00 J	***10 U***
	10-Dec-98	10 U	4.00 J	4.00 J	--	--	***10 U***	5.00 J	***10 U***
	25-Mar-99	10 U	10 U	4.00 J	--	--	***10 U***	***10 U***	***10 U***
	23-Sep-99	10 U	4.00 J	6.00 J	--	--	2.00 J	5.00 J	***10 U***
	16-Mar-00	1.00 J	10 U	10 U	--	--	***10 U***	***10 U***	***10 U***
	12-Oct-00	10 U	1.70 J	6.30 J	--	--	1.20 J	1.60 J	***10 U***
	29-Mar-01	10 U	1.60 J	6.30 J	--	--	1.40 J	2.00 J	***10 U***
	27-Sep-01	10 U	10 U	6.30 J	--	--	***10 U***	1.00 J	***10 U***
	27-Mar-02	10 U	10 U	4.20 J	--	--	***10 U***	***10 U***	***10 U***
	23-Mar-04	0.700	3.10	5.80	13.0	0.50 U	2.30	3.40	0.50 U
	22-Oct-12	6.0 U	2.0 J	2.7 J	6.6	6.0 U	1.0 J	2.4 J	***6.0 U***
GM-05D	05-Oct-89	15.0	17.0	5.0 U	--	--	13.0	25.0	***10 U***
	23-Jan-90	19.0	28.0	5.0 U	--	--	8.00	31.0	5.00 J
	03-Dec-96	6.00 J	20.0	10 U	--	--	5.00 J	10.0	***10 U***
	10-Feb-97	5.00 J	22.0	10 U	--	--	4.00 J	11.0	***10 U***
	10-Dec-97	4.00 J	31.0	10 U	--	--	8.00 J	18.0	***10 U***
	25-Mar-98	4.00 J	18.0	3.00 J	--	--	5.00 J	12.0	3.00 J
	17-Jun-98	3.00 J	17.0	1.00 J	--	--	5.00 J	12.0	3.00 J
	16-Sep-98	8.00 J	26.0	5.00 J	--	--	6.00 J	18.0	8.00 J
	09-Dec-98	3.00 J	15.0	4.00 J	--	--	8.00 J	16.0	3.00 J
	24-Mar-99	5.00 J	19.0	10 U	--	--	6.00 J	19.0	5.00 J
	22-Sep-99	4.00 J	16.0	10 U	--	--	5.00 J	15.0	***10 U***
	14-Mar-00	2.00 J	9.00 J	10 U	--	--	8.00 J	13.0	***10 U***
	11-Oct-00	1.80 J	6.00 J	1.40 J	--	--	5.40 J	9.10 J	***10 U***
	28-Mar-01	1.40 J	5.80 J	1.30 J	--	--	7.20 J	9.30 J	***10 U***
	26-Sep-01	10 U	3.20 J	10 U	--	--	6.80 J	7.40 J	***10 U***
	27-Mar-02	10 U	2.90 J	10 U	--	--	6.40 J	8.10 J	***10 U***
	24-Mar-04	0.540	1.70	0.320 J	8.10	0.50 U	4.40	4.10	0.50 U
	22-Oct-12	0.25 J	2.0 J	6.0 U	9.0	6.0 U	4.5 J	5.9 J	***6.0 U***

Notes:

Concentrations which exceed the GWQS are highlighted **blue**

Non-detectable concentrations which exceed any NJDEP GWQS are *italicized and brown*

---: No result reported

D: Concentrations identified from analysis of the sample at a secondary dilution.

E: Compounds whose concentrations exceed the upper limit of the calibration range.

J: Estimated value

U: Compound was not detected at a concentration above the reporting limit.

X: The addition of two or more isomers.

Table 5
Historical Groundwater Volatile Organic Compound Sampling Results
Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

Location	Date Sampled	1,1,1-TCA	1,1-DCA	Chloro-benzene	cis-1,2-DCE	trans-1,2-DCE	PCE	TCE	Vinyl chloride
NJ Groundwater Quality Standard (ug/L)		30	50	50	70	100	1	1	1
GM-05S	05-Oct-89	16.0	8.00	4.00 J	--	--	2.00 J	5.00	3.00 J
	23-Jan-90	40.0 B	10.0	5.00	--	--	2.00 J	7.00	*10 U*
	03-Dec-96	7.00 J	12.0	10 U	--	--	6.00 J	6.00 J	*10 U*
	09-Feb-97	4.00 J	7.00 J	3.00 J	--	--	4.00 J	5.00 J	*10 U*
	10-Dec-97	8.00 J	14.0	10 U	--	--	*10 U*	*10 U*	*10 U*
	25-Mar-98	4.00 J	5.00 J	2.00 J	--	--	5.00 J	3.00 J	*10 U*
	17-Jun-98	8.00 J	7.00 J	10 U	--	--	8.00 J	5.00 J	*10 U*
	16-Sep-98	6.00 J	9.00 J	2.00 J	--	--	6.00 J	3.00 J	*10 U*
	09-Dec-98	8.00 J	8.00 J	2.00 J	--	--	10.0	4.00 J	*10 U*
	24-Mar-99	10 U	10 U	10 U	--	--	*10 U*	*10 U*	*10 U*
	22-Sep-99	10 U	10 U	10 U	--	--	*10 U*	*10 U*	*10 U*
	14-Mar-00	2.00 J	4.00 J	3.00 J	--	--	4.00 J	3.00 J	*10 U*
	11-Oct-00	1.20 J	2.20 J	3.30 J	--	--	1.80 J	1.70 J	*10 U*
	28-Mar-01	10 U	1.60 J	6.10 J	--	--	2.10 J	1.30 J	*10 U*
	26-Sep-01	10 U	1.20 J	5.70 J	--	--	2.10 J	*10 U*	*10 U*
	27-Mar-02	10 U	1.40 J	6.50 J	--	--	2.30 J	*10 U*	*10 U*
	24-Sep-02	10 U	1.10 J	4.90 J	--	--	2.20 J	*10 U*	*10 U*
	24-Mar-04	1.10	1.10	5.90	1.90	0.50 U	3.90	0.630	0.50 U
	22-Dec-05	0.440 J	0.580	3.90	1.00	0.50 U	1.70	0.410 J	0.50 U
	21-Jun-07	0.50 U	0.960	1.00	2.70	0.50 U	1.30	1.10	0.50 U
	22-Oct-08	0.50 U	1.10	0.750	2.90	0.50 U	1.20	1.30	0.400 J
	08-Oct-12	5.0 U	4.5 J	5.0 U	15	5.0 U	2.2 J	4.6 J	*5.0 U*
GM-06D	05-Oct-89	10.0	12.0	5.0 U	--	--	14.0	22.0	*10 U*
	23-Jan-90	7.00	8.00	5.0 U	--	--	20.0	28.0	*10 U*
	03-Dec-96	10 U	10 U	10 U	--	--	33.0	22.0	*10 U*
	09-Feb-97	10 U	10 U	10 U	--	--	34.0	21.0	*10 U*
	10-Dec-97	10 U	10 U	10 U	--	--	34.0	30.0	*10 U*
	25-Mar-98	10 U	10 U	10 U	--	--	33.0	25.0	*10 U*
	17-Jun-98	10 U	10 U	10 U	--	--	28.0	18.0	*10 U*
	16-Sep-98	10 U	10 U	10 U	--	--	26.0	18.0	*10 U*
	09-Dec-98	10 U	10 U	10 U	--	--	28.0	15.0	*10 U*
	24-Mar-99	10 U	10 U	10 U	--	--	18.0	16.0	*10 U*
	22-Sep-99	10 U	10 U	10 U	--	--	16.0	12.0	*10 U*
	15-Mar-00	10 U	10 U	10 U	--	--	14.0	11.0	*10 U*
	10-Oct-00	10 U	10 U	10 U	--	--	15.0	10.0	*10 U*
	27-Mar-01	10 U	10 U	10 U	--	--	15.0	9.80 J	*10 U*
	25-Sep-01	10 U	10 U	10 U	--	--	12.0	7.50 J	*10 U*
	26-Mar-02	10 U	10 U	10 U	--	--	9.50 J	6.50 J	*10 U*
	23-Mar-04	0.50 U	0.780	0.750	2.50	0.50 U	6.50	3.30	0.50 U
	22-Oct-12	0.22 J	1.3 J	6.0 U	5.4 J	6.0 U	11	9.5	*6.0 U*
GM-06S	05-Oct-89	4.00 J	3.00 J	5.0 U	--	--	3.00 J	5.00	*10 U*
	23-Jan-90	5.0 U	5.0 U	5.0 U	--	--	*5.0 U*	*5.0 U*	*10 U*
	03-Dec-96	10 U	10 U	10 U	--	--	*10 U*	*10 U*	*10 U*
	09-Feb-97	10 U	10 U	10 U	--	--	*10 U*	*10 U*	*10 U*
	10-Dec-97	10 U	10 U	10 U	--	--	*10 U*	*10 U*	*10 U*
	25-Mar-98	10 U	10 U	2.00 J	--	--	*10 U*	*10 U*	*10 U*
	17-Jun-98	10 U	10 U	3.00 J	--	--	*10 U*	*10 U*	*10 U*
	16-Sep-98	10 U	10 U	3.00 J	--	--	*10 U*	*10 U*	*10 U*
	09-Dec-98	10 U	10 U	1.00 J	--	--	*10 U*	*10 U*	*10 U*
	24-Mar-99	10 U	10 U	3.00 J	--	--	*10 U*	*10 U*	*10 U*
	22-Sep-99	10 U	10 U	4.00 J	--	--	*10 U*	*10 U*	*10 U*
	15-Mar-00	10 U	10 U	4.00 J	--	--	*10 U*	*10 U*	*10 U*
	10-Oct-00	10 U	10 U	4.30 J	--	--	*10 U*	*10 U*	*10 U*
	27-Mar-01	10 U	10 U	7.80 J	--	--	*10 U*	*10 U*	*10 U*
	25-Sep-01	10 U	1.40 J	9.80 J	--	--	1.00 J	*10 U*	1.00 J
	26-Mar-02	10 U	2.00 J	13.0	--	--	*10 U*	1.10 J	1.50 J
	23-Sep-02	10 U	3.10 J	8.70 J	--	--	1.80 J	1.70 J	*10 U*
	23-Mar-04	0.50 U	5.20	9.10	24.0	0.50 U	3.30	8.10	0.810
	22-Dec-05	1.00	12.0	3.80	69.0 D	0.50 U	7.80	20.0	0.530
	21-Jun-07	0.50 U	1.20	2.00	11.0	0.50 U	1.50	8.30	0.50 U
	21-Oct-08	0.50 U	0.320 J	0.230 J	2.40	0.50 U	1.60	3.20	0.50 U
	08-Oct-12	0.16 J	0.80 J	5.0 U	7.2	5.0 U	1.3 J	4.7 J	*5.0 U*
GM-07D	23-Jan-90	--	17.0	--	--	--	--	--	--
	25-Jan-90	14.0 B	17.0	13.0	--	--	7.00	20.0	8.00 J
	04-Dec-96	9.00 J	22.0	12.0	--	--	7.00 J	15.0	6.00 J
	08-Feb-97	8.00 J	18.0	10.0 J	--	--	6.00 J	13.0	4.00 J
	09-Dec-97	8.00 J	22.0	8.00 J	--	--	9.00 J	17.0	*10 U*
	24-Mar-98	7.00 J	16.0	7.00 J	--	--	8.00 J	14.0	*10 U*
	16-Jun-98	6.00 J	18.0	8.00 J	--	--	8.00 J	18.0	4.00 J
	15-Sep-98	5.00 J	20.0	26.0	--	--	8.00 J	12.0	*10 U*
	08-Dec-98	4.00 J	12.0	4.00 J	--	--	6.00 J	11.0	*10 U*
	23-Mar-99	4.00 J	11.0	7.00 J	--	--	5.00 J	10.0	3.00 J
	21-Sep-99	4.00 J	11.0	7.00 J	--	--	5.00 J	10.0	3.00 J
	15-Mar-00	2.00 J	7.00 J	5.00 J	--	--	7.00 J	10.0	2.00 J
	10-Oct-00	2.20 J	5.30 J	6.40 J	--	--	2.70 J	5.10 J	1.70 J
	27-Mar-01	1.70 J	5.00 J	6.10 J	--	--	2.80 J	4.60 J	1.50 J
	25-Sep-01	1.20 J	3.80 J	4.20 J	--	--	7.00 J	7.60 J	*10 U*
	26-Mar-02	1.20 J	3.40 J	3.70 J	--	--	8.80 J	8.20 J	*10 U*
	23-Mar-04	0.900	2.90	4.40	11.0	0.50 U	7.90	6.70	0.870
	22-Oct-12	0.27 J	1.7 J	2.9 J	7.7	0.57 J	9.5	8.4	*6.0 U*

Notes:

Concentrations which exceed the GWQS are highlighted **blue**

Non-detectable concentrations which exceed any NJDEP GWQS are *italicized and brown*

---: No result reported

D: Concentrations identified from analysis of the sample at a secondary dilution.

E: Compounds whose concentrations exceed the upper limit of the calibration range.

J: Estimated value

U: Compound was not detected at a concentration above the reporting limit.

X: The addition of two or more isomers.

Table 5
Historical Groundwater Volatile Organic Compound Sampling Results
Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

Location	Date Sampled	1,1,1-TCA	1,1-DCA	Chloro-benzene	cis-1,2-DCE	trans-1,2-DCE	PCE	TCE	Vinyl chloride
NJ Groundwater Quality Standard (ug/L)		30	50	50	70	100	1	1	1
GM-07S	25-Jan-90	14.0 B	4.00 J	5.0 U	--	--	6.00	14.0	***10 U***
	04-Dec-96	8.00 J	7.00 J	10 U	--	--	4.00 J	26.0	***10 U***
	08-Feb-97	10.0	5.00 J	10 U	--	--	***10 U***	9.00 J	***10 U***
	09-Dec-97	6.00 J	4.00 J	10 U	--	--	***10 U***	***10 U***	***10 U***
	24-Mar-98	3.00 J	5.00 J	10 U	--	--	2.00 J	4.00 J	***10 U***
	16-Jun-98	3.00 J	6.00 J	0.900 J	--	--	3.00 J	5.00 J	***10 U***
	15-Sep-98	2.00 J	10.0 J	10 U	--	--	***10 U***	***10 U***	***10 U***
	08-Dec-98	3.00 J	4.00 J	10 U	--	--	***10 U***	4.00 J	***10 U***
	23-Mar-99	5.00 J	6.00 J	10 U	--	--	3.00 J	5.00 J	***10 U***
	21-Sep-99	10 U	6.00 J	10 U	--	--	***10 U***	***10 U***	***10 U***
	15-Mar-00	10 U	6.00 J	1.00 J	--	--	***10 U***	2.00 J	1.00 J
	10-Oct-00	10 U	6.30 J	1.80 J	--	--	***10 U***	1.20 J	***10 U***
	27-Mar-01	10 U	8.80 J	1.70 J	--	--	***10 U***	2.50 J	1.10 J
	25-Sep-01	10 U	9.60 J	1.20 J	--	--	1.30 J	4.40 J	1.70 J
	26-Mar-02	10 U	13.0	1.30 J	--	--	3.20 J	10.0	3.00 J
	23-Sep-02	10 U	13.0	1.10 J	--	--	3.60 J	11.0	6.20 J
	23-Mar-04	0.50 U	14.0	0.620	12.0	0.50 U	1.10	6.10	3.90
	20-Dec-05	0.50 U	14.0	0.230 J	2.10 B	0.50 U	0.50 U	1.60	0.600
	20-Jun-07	0.50 U	9.50	0.50 U	1.70	0.50 U	0.50 U	1.00	0.560
	21-Oct-08	0.210 J	7.60	0.50 U	9.00	0.50 U	1.00	3.30	0.680
	04-Oct-12	0.54 J	3.0 J	5.0 U	28	5.0 U	***5.0 U***	10	***5.0 U***
GM-08D	23-Jan-90	--	5.0 U	--	--	--	--	--	--
	25-Jan-90	5.0 U	5.0 U	5.0 U	--	--	4.00 J	3.00 J	***10 U***
	03-Dec-96	10 U	3.00 J	10 U	--	--	8.00 J	21.0	***10 U***
	08-Feb-97	10 U	3.00 J	10 U	--	--	6.00 J	18.0	***10 U***
	09-Dec-97	10 U	5.00 J	10 U	--	--	***10 U***	9.00 J	***10 U***
	24-Mar-98	2.00 J	4.00 J	3.00 J	--	--	5.00 J	7.00 J	***10 U***
	16-Jun-98	2.00 J	5.00 J	4.00 J	--	--	5.00 J	9.00 J	1.00 J
	15-Sep-98	10 U	5.00 J	13.0	--	--	6.00 J	7.00 J	***10 U***
	08-Dec-98	10 U	2.00 J	3.00 J	--	--	***10 U***	4.00 J	***10 U***
	23-Mar-99	10 U	10 U	4.00 J	--	--	4.00 J	5.00 J	***10 U***
	21-Sep-99	10 U	10 U	3.00 J	--	--	4.00 J	5.00 J	***10 U***
	14-Mar-00	10 U	1.00 J	2.00 J	--	--	12.0	11.0	***10 U***
	10-Oct-00	10 U	1.80 J	2.10 J	--	--	6.10 J	7.60 J	***10 U***
	27-Mar-01	10 U	3.30 J	2.60 J	--	--	5.70 J	5.80 J	***10 U***
	25-Sep-01	10 U	4.50 J	3.80 J	--	--	4.60 J	6.10 J	1.50 J
	25-Mar-02	10 U	4.50 J	4.80 J	--	--	4.10 J	6.30 J	2.30 J
	22-Mar-04	0.470 J	2.00	3.50	8.00	0.50 U	4.50	4.80	1.00
	22-Oct-12	0.25 J	5.6 J	3.9 J	16	6.0 U	5.5 J	10	***6.0 U***
GM-08S	25-Jan-90	7.00 B	35.0	3.00 J	--	--	2.00 J	7.00	***10 U***
	03-Dec-96	10 U	3.00 J	10 U	--	--	***10 U***	***10 U***	***10 U***
	08-Feb-97	10 U	4.00 J	10 U	--	--	***10 U***	***10 U***	***10 U***
	09-Dec-97	10 U	5.00 J	10 U	--	--	***10 U***	***10 U***	***10 U***
	24-Mar-98	10 U	6.00 J	2.00 J	--	--	***10 U***	***10 U***	***10 U***
	16-Jun-98	10 U	2.00 J	10 U	--	--	***10 U***	***10 U***	***10 U***
	15-Sep-98	10 U	10 U	10 U	--	--	***10 U***	***10 U***	***10 U***
	08-Dec-98	10 U	10 U	10 U	--	--	***10 U***	***10 U***	***10 U***
	23-Mar-99	10 U	4.00 J	10 U	--	--	***10 U***	***10 U***	***10 U***
	21-Sep-99	10 U	6.00 J	10 U	--	--	***10 U***	***10 U***	3.00 J
	14-Mar-00	10 U	7.00 J	10 U	--	--	***10 U***	***10 U***	8.00 J
	10-Oct-00	10 U	3.10 J	10 U	--	--	***10 U***	***10 U***	***10 U***
	27-Mar-01	10 U	9.90 J	10 U	--	--	***10 U***	4.90 J	8.00 J
	25-Sep-01	10 U	11.0	10 U	--	--	***10 U***	2.90 J	5.00 J
	25-Mar-02	10 U	17.0	10 U	--	--	***10 U***	16.0	19.0
	23-Sep-02	10 U	15.0	10 U	--	--	***10 U***	8.40 J	10.0
	22-Mar-04	0.50 U	20.0	1.90	30.0 E	0.50 U	0.50 U	20.0	20.0
	20-Dec-05	0.50 U	6.70	0.400 J	0.640 B	0.50 U	0.50 U	0.820	0.50 U
	20-Jun-07	0.50 U	6.20	0.50 U	0.940	0.50 U	0.50 U	1.40	0.50 U
	22-Oct-08	0.50 U	1.40	0.50 U	0.230 J	0.50 U	0.50 U	0.300 J	0.50 U
	04-Oct-12	5.0 U	2.9 J	5.0 U	0.28 J	5.0 U	***5.0 U***	0.43 J	***5.0 U***

Notes:
Concentrations which exceed the GWQS are highlighted **blue**
Non-detectable concentrations which exceed any NJDEP GWQS are *italicized and brown*
---: No result reported
D: Concentrations identified from analysis of the sample at a secondary dilution.
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Location	Date Sampled	1,1,1-TCA	1,1-DCA	Chloro-benzene	cis-1,2-DCE	trans-1,2-DCE	PCE	TCE	Vinyl chloride
NJ Groundwater Quality Standard (ug/L)		30	50	50	70	100	1	1	1
MW-01	06-Oct-89	9.00	4.00 J	5.0 U	--	--	*5.0 U*	4.00 J	*10 U*
	24-Jan-90	9.00	4.00 J	5.0 U	--	--	*5.0 U*	6.00	*10 U*
	05-Dec-96	10 U	8.00 J	10 U	--	--	2.00 J	*10 U*	*10 U*
	10-Feb-97	6.00 J	4.00 J	10 U	--	--	4.00 J	4.00 J	*10 U*
	12-Dec-97	7.00 J	10 U	10 U	--	--	*10 U*	*10 U*	*10 U*
	27-Mar-98	5.00 J	3.00 J	3.00 J	--	--	4.00 J	2.00 J	*10 U*
	18-Jun-98	6.00 J	3.00 J	10 U	--	--	4.00 J	*10 U*	*10 U*
	18-Sep-98	4.00 J	4.00 J	1.00 J	--	--	4.00 J	*10 U*	*10 U*
	10-Dec-98	10 U	4.00 J	2.00 J	--	--	*10 U*	*10 U*	*10 U*
	25-Mar-99	10 U	3.00 J	10 U	--	--	*10 U*	*10 U*	*10 U*
	24-Sep-99	10 U	3.00 J	3.00 J	--	--	*10 U*	4.00 J	*10 U*
	17-Mar-00	10 U	10 U	10 U	--	--	*10 U*	*10 U*	*10 U*
	12-Oct-00	1.40 J	7.30 J	3.50 J	--	--	4.10 J	9.40 J	1.90 J
	30-Mar-01	2.90 J	10.0	5.00 J	--	--	8.50 J	17.0	1.60 J
	28-Sep-01	1.60 J	12.0	4.50 J	--	--	8.30 J	16.0	2.00 J
	28-Mar-02	1.80 J	11.0	4.70 J	--	--	8.10 J	16.0	1.60 J
	24-Sep-02	1.40 J	11.0	5.80 J	--	--	9.10 J	15.0	2.10 J
	25-Sep-02	1.50 J	11.0	5.80 J	--	--	9.10 J	15.0	2.10 J
	24-Mar-04	1.50	19.0	2.70	76.0 E	0.50 U	16.0	27.0 E	0.880
	21-Dec-05	2.90	19.0	0.50 U	94.0 D	0.220 J	13.0	19.0 D	4.60
	22-Jun-07	0.920	3.00	1.50	30.0 E	0.50 U	4.00	20.0	0.50 U
	23-Oct-08	0.310 J	0.960	0.700	10.0	0.50 U	2.00	19.0	0.50 U
	02-Oct-12	0.28 J	0.54 J	5.0 U	2.3 J	5.00 U	*5.0 U*	1.6 J	*5.0 U*
MW-02	06-Oct-89	5.0 U	26.0	5.0 U	--	--	*5.0 U*	2.00 J	*10 U*
	24-Jan-90	5.00	23.0	5.0 U	--	--	*5.0 U*	2.00 J	*10 U*
	05-Dec-96	7.00 J	10.0	10 U	--	--	6.00 J	7.00 J	3.00 J
	10-Feb-97	4.00 J	9.00 J	10 U	--	--	4.00 J	7.00 J	*10 U*
	12-Dec-97	10 U	16.0	10 U	--	--	*10 U*	*10 U*	*10 U*
	27-Mar-98	10 U	15.0	10 U	--	--	4.00 J	4.00 J	4.00 J
	18-Jun-98	10 U	13.0	10 U	--	--	3.00 J	*10 U*	5.00 J
	18-Sep-98	10 U	14.0	10 U	--	--	3.00 J	*10 U*	6.00 J
	10-Dec-98	10 U	14.0	10 U	--	--	5.00 J	14.0	3.00 J
	25-Mar-99	10 U	12.0	10 U	--	--	4.00 J	12.0	3.00 J
	24-Sep-99	10 U	17.0	10 U	--	--	*10 U*	7.00 J	8.00 J
	17-Mar-00	10 U	26.0	10 U	--	--	7.00 J	18.0	16.0
	12-Oct-00	2.40 J	32.0	10 U	--	--	15.0	36.0	10.0
	30-Mar-01	3.20 J	31.0	10 U	--	--	16.0	37.0	7.00 J
	28-Sep-01	1.50 J	26.0	10 U	--	--	12.0	28.0	5.30 J
	28-Mar-02	10 U	16.0	10 U	--	--	6.70 J	12.0	5.10 J
	24-Sep-02	1.60 J	25.0	10 U	--	--	14.0	24.0	8.20 J
	25-Sep-02	1.60 J	25.0	10 U	--	--	14.0	24.0	8.20 J
	24-Mar-04	0.340 J	22.0	0.50 U	72.0 E	0.50 U	13.0	21.0	5.30
	21-Dec-05	0.50 U	14.0	0.50 U	20.0 B	0.50 U	4.00	6.00	2.00
	22-Jun-07	0.350 J	8.30	0.50 U	35.0 E	0.290 J	3.60	25.0 E	0.650
	22-Oct-08	0.50 U	10.0	0.50 U	52.0 E	0.340 J	4.00	33.0 E	3.70
	08-Oct-12	0.74 J	5.5	5.0 U	21	5.0 U	8.5	20	*5.0 U*
MW-04	06-Oct-89	27.0	12.0	5.0 U	--	--	6.00	60.0	*10 U*
	24-Jan-90	37.0	11.0	4.00 J	--	--	5.00	30.0	*10 U*
	04-Dec-96	14.0	3.00 J	10 U	--	--	7.00 J	5.00 J	*10 U*
	09-Feb-97	10.0 J	5.00 J	10 U	--	--	6.00 J	6.00 J	*10 U*
	12-Dec-97	5.00 J	10 U	10 U	--	--	*10 U*	*10 U*	*10 U*
	26-Mar-98	5.00 J	6.00 J	4.00 J	--	--	5.00 J	6.00 J	*10 U*
	18-Jun-98	7.00 J	4.00 J	2.00 J	--	--	4.00 J	3.00 J	*10 U*
	17-Sep-98	4.00 J	5.00 J	5.00 J	--	--	*10 U*	4.00 J	*10 U*
	10-Dec-98	10 U	3.00 J	4.00 J	--	--	*10 U*	*10 U*	*10 U*
	25-Mar-99	10 U	3.00 J	4.00 J	--	--	*10 U*	*10 U*	*10 U*
	23-Sep-99	10 U	4.00 J	6.00 J	--	--	*10 U*	4.00 J	*10 U*
	16-Mar-00	10 U	10 U	10 U	--	--	*10 U*	*10 U*	*10 U*
	11-Oct-00	1.30 J	4.00 J	6.10 J	--	--	2.40 J	4.10 J	*10 U*
	29-Mar-01	1.60 J	3.80 J	6.00 J	--	--	3.10 J	4.60 J	*10 U*
	27-Sep-01	10 U	2.80 J	5.90 J	--	--	2.00 J	3.00 J	*10 U*
	27-Mar-02	1.20 J	3.00 J	6.00 J	--	--	3.00 J	3.60 J	*10 U*
	24-Sep-02	10 U	3.10 J	5.70 J	--	--	2.10 J	3.40 J	*10 U*
	23-Mar-04	2.60	7.60	3.20	58.0 E	0.50 U	5.30	9.20	0.320 J
	21-Dec-05	3.10	7.20	2.80	67.0 DB	0.50 U	5.40	12.0	0.390 J
	21-Jun-07	1.80	3.20	1.30	44.0 E	0.50 U	4.90	48.0 E	0.50 U
	29-Oct-08	0.620	1.30	0.570	22.0 E	0.210 J	2.80	70.0 E	0.50 U
	02-Oct-12	0.24 J	0.33 J	5.0 U	8.0	5.0 U	*5.0 U*	43	*5.0 U*
MW-07	25-Mar-02	6.30 J	20.0	10 U	--	--	16.0	29.0	*10 U*
	23-Sep-02	3.20 J	11.0	10 U	--	--	10.0	17.0	*10 U*
	22-Mar-04	0.940	6.60	0.50 U	38.0 E	1.70	3.10	20.0	0.50 U
	09-Jan-06	0.980	5.40	0.50 U	43.0 D	0.330 J	4.20	30.0 D	0.50 U
	20-Jun-07	0.260 J	1.40	0.50 U	17.0	0.700	1.60	29.0 E	0.50 U
	22-Oct-08	0.50 U	0.660	0.50 U	5.10	0.50 U	1.10	10.0	0.50 U
	04-Oct-12	5.0 U	0.35 J	5.0 U	4.0 J	5.0 U	*5.00 U*	5.9	*5.0 U*
MW-09S	12-Feb-04	1.80	12.0	3.60	38.0 E	0.50 U	11.0	20.0	0.50 U
	25-Mar-04	1.70	24.0	1.20	89.0 E	0.50 U	20.0	43.0 E	1.50
	20-Dec-05	0.500	19.0	0.580	25.0 D	0.240 J	2.40	8.50	3.20
	21-Jun-07	1.20	12.0	0.50 U	84.0 E	0.50 U	8.60	42.0 E	1.10
	21-Oct-08	0.750	7.10	0.50 U	50.0 E	0.50 U	5.40	27.0 E	0.630
	08-Oct-12	5.0 U	5.9	5.0 U	11	5.0 U	0.49 J	7.8	*5.0 U*
MW-10S	12-Feb-04	0.900	4.70	0.50 U	3.90	0.50 U	0.990	2.30	0.990
	25-Mar-04	0.860	6.10	0.340 J	7.10	0.50 U	1.20	2.70	1.70
	20-Dec-05	1.10	18.0	0.330 J	38.0 D	0.230 J	3.50	9.50	5.50
	20-Jun-07	2.40	15.0	0.480 J	78.0 E	2.20	7.50	15.0	2.20
	21-Oct-08	2.90	12.0	0.530	110 E	0.370 J	10.0	40.0 E	1.60
	02-Oct-12	0.80 J	2.2 J	5.0 U	67	5.00 U	*5.0 U*	220 E	*5.0 U*
MW-11S	12-Feb-04	1.30	2.40	4.50	6.60	0.50 U	5.90	41.0 E	0.50 U
	26-Mar-04	1.60	3.30	3.70	6.70	0.50 U	7.10	53.0 E	0.50 U
	20-Dec-05	0.600	1.60	0.50 U	2.30 B	0.50 U	3.40	12.0	0.50 U
	21-Jun-07	0.50 U	3.00	0.980	9.60	0.50 U	2.20	8.40	0.50 U
	20-Oct-08	0.50 U	1.30	0.370 J	5.40	0.50 U	1.60	6.20	0.50 U
	08-Oct-12	0.23 J	3.1 J	5.0 U	9.4	5.0 U	2.5 J	10	*5.0 U*

Notes:

Concentrations which exceed the GWQS are highlighted **blue**

Non-detectable concentrations which exceed any NJDEP GWQS are *italicized and brown*

---: No result reported

D: Concentrations identified from analysis of the sample at a secondary dilution.

E: Compounds whose concentrations exceed the upper limit of the calibration range.

J: Estimated value

U: Compound was not detected at a concentration above the reporting limit.

X: The addition of two or more isomers.

Table 7
Field Parameter and Biogeochemical Parameter Results – Historical Results
Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

Location	Date Sampled	Temperature	pH	Specific Conductance	ORP	DO	Turbidity
Units		°C	standard units	µS/cm	mV	mg/L	NTU
GM-01S	Oct. 2000	15.40	5.28	107	199.2	0.70	6
	Mar. 2001	14.23	5.32	62	156.2	0.64	13.5
	Sept. 2001	15.12	5.19	79	209.6	1.17	0
	Mar. 2002	13.14	5.35	59	241.0	0.39	2.1
	Sept. 2002	16.40	5.13	68	196.3	0.40	1.6
	Oct. 2008	15.89	5.05	44	232.0	4.67	3.76
	Oct. 2012	14.87	4.79	112	287.6	0.55	4.33
GM-02S	Oct. 2000	15.99	5.60	262	216.1	1.10	0
	Mar. 2001	14.37	5.34	220	167.2	0.82	0.97
	Sept. 2001	16.93	5.57	230	214.0	0.35	1.2
	Mar. 2002	14.07	5.70	274	221.3	0.58	0
	Sept. 2002	18.15	5.90	305	78.0	0.75	3.2
	Oct. 2008	18.69	5.71	285	101.3	0.99	3.35
	Oct. 2012	17.65	6.21	307	145.7	1.06	4.27
GM-03RS	Oct. 2000	16.85	4.99	176	204.7	0.36	0.3
	Mar. 2001	14.34	5.29	150	162.5	0.69	0
	Sept. 2001	16.71	5.25	151	216.0	0.60	1.5
	Mar. 2002	15.07	5.36	135	127.2	0.46	0
	Sept. 2002	15.21	5.06	142	157.0	0.70	2.04
	Oct. 2008	16.76	5.05	109	82.9	0.57	0.99
	Oct. 2012	14.64	5.05	148	186.1	1.41	2.55
GM-5S	Oct. 2000	16.42	5.44	220	252.1	0.39	0
	Mar. 2001	14.80	5.64	215	188.7	0.44	0
	Sept. 2001	16.51	5.64	236	274.1	0.33	1.1
	Mar. 2002	13.79	5.72	245	276.6	0.47	0
	Sept. 2002	17.19	5.54	245	228.2	0.64	0
	Oct. 2008	16.11	5.49	291	191.9	1.32	0
	Oct. 2012	15.44	5.61	247	167.8	0.76	3.87
GM-6S	Oct. 2000	15.31	5.46	245	231.5	0.88	0
	Mar. 2001	14.28	5.23	290	159.4	0.84	0
	Sept. 2001	16.00	5.29	510	258.4	0.41	1.5
	Mar. 2002	13.14	5.97	667	167.3	1.63	0
	Sept. 2002	16.51	5.68	478	110.5	0.47	2.56
	Oct. 2008	15.46	5.25	123	183.0	0.57	0.23
	Oct. 2012	14.73	5.99	201	181.8	3.78	0.27
GM-7S	Oct. 2000	15.10	5.64	241	174.5	0.90	5.5
	Mar. 2001	14.27	5.28	194	122.8	1.06	4.8
	Sept. 2001	15.62	4.85	176	193.0	0.58	4.2
	Mar. 2002	14.00	5.69	169	116.8	0.45	0
	Sept. 2002	16.70	5.46	162	84.9	0.65	2.57
	Oct. 2008	15.46	5.25	123	183.0	0.57	0.23
	Oct. 2012	16.16	4.97	194	197.7	0.37	2.89
GM-8S	Oct. 2000	15.90	6.34	280	-7.6	0.50	1.5
	Mar. 2001	13.91	6.46	279	-58.9	0.62	13.7
	Sept. 2001	16.86	6.55	277	-85.1	0.38	10.2
	Mar. 2002	14.28	6.48	354	-57.2	0.39	8.17
	Sept. 2002	18.20	6.31	315	-85.2	0.42	55
	Oct. 2008	16.32	6.40	97	-63.7	1.56	46.4
	Oct. 2012	16.51	6.24	191	-10.6	0.77	132.0
MW-1	Oct. 2000	15.53	5.38	219	133.6	0.79	0
	Mar. 2001	14.48	5.46	197	89.8	0.74	0
	Sept. 2001	14.99	5.45	247	190.1	2.18	0
	Mar. 2002	13.29	5.68	269	214.6	0.63	0
	Sept. 2002	16.12	5.63	301	12.9	0.28	0.6
	Oct. 2008	14.59	5.22	55	220.7	1.13	0.2
	Oct. 2012	15.79	5.50	175	210.6	1.25	2.73
MW-2	Oct. 2000	16.87	5.48	179	96.1	0.78	0
	Mar. 2001	14.01	5.68	145	68.9	1.24	4.5
	Sept. 2001	15.80	5.72	174	122.4	0.47	9.1
	Mar. 2002	15.02	5.82	145	128.3	0.67	3.9
	Sept. 2002	17.39	5.89	152	35.7	1.00	1.6
	Oct. 2008	16.14	5.63	92	4.1	1.05	9.93
	Oct. 2012	13.78	5.47	189	105.0	0.80	12.1
MW-4	Oct. 2000	16.10	5.48	218	237.9	0.73	13
	Mar. 2001	14.99	5.55	174	171.1	0.33	3.5
	Sept. 2001	16.09	5.13	204	228.0	0.60	4.1
	Mar. 2002	13.51	5.25	188	336.0	0.49	0
	Sept. 2002	14.99	4.95	201	233.0	0.67	1.7
	Oct. 2008	14.50	5.38	60	258.7	1.20	6.43
	Oct. 2012	16.21	5.09	145	465.3	0.44	2.42
MW-9S	Oct. 2008	17.06	6.37	202	-65.4	0.42	4.81
	Oct. 2012	15.17	6.47	292	-65.5	0.60	26.9
MW-10S	Oct. 2008	15.65	14.92	137	120.3	0.78	7.77
	Oct. 2012	15.14	4.84	151	290.0	0.07	2.69
MW-11S	Oct. 2008	18.20	5.46	100	127.4	1.21	13.4
	Oct. 2012	16.92	5.43	84	232.1	1.60	0.83
MW-7	Sept. 2002	18.90	4.94	37	263.5	1.11	3.7
	Oct. 2008	16.31	4.66	101	223.8	2.52	1.29
	Oct. 2012	15.88	4.85	102	269.6	5.80	6.22

Table 8
Historical Biogeochemical Parameter Results
Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

Location	Date Sampled	Iron (total)	Iron (dissolved)	Manganese (total)	Manganese (dissolved)	Ethane	Ethene	Methane	Alkalinity	Nitrate (as Nitrogen)	Sulfate	Total Organic Carbon (TOC)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L
NJDEP Class IIA Groundwater Quality Standards		300	300	50	50	NS	NS	NS	NS	NS	250	NS
GM-01S	05-Oct-89	109,000	---	603	---	---	---	---	---	0.050 U	27.1	---
	24-Jan-90	107,000	---	547	---	---	---	---	---	0.050 U	46.0	---
	04-Dec-96	31,600 J	15,700 J	193	185	---	---	---	---	---	---	---
	10-Feb-97	29,100 J	27,700 J	224 J	242 J	---	---	---	---	---	---	---
	17-Sep-98	2,400	132	88.1	92.4	---	---	---	---	---	---	---
	23-Sep-99	8,070	7,320	97.8	91.3	---	---	---	---	---	---	---
	01-Mar-00	---	---	---	---	0.010 U	0.0200	74.1	---	---	---	---
	12-Oct-00	3,790 J	3,210	87.7 J	91.6	---	---	---	---	---	---	---
	01-Mar-01	2,620	2,000	81.6	77.7	0.010 U	0.0100	12.2	---	---	6.20	0.230 B
	27-Sep-01	1,870	1,670	82.5	84.7	0.0200	0.0200	92.0	---	---	32.8	2.50 J
	25-Mar-04	520	180	60.5 J	61.4 J	---	---	---	---	0.0320 B	5.90	0.870 B
	20-Dec-05	282	100 U	61.1	---	0.010 U	0.010 U	0.400	---	---	5.0 U	1.0 U
	22-Jun-07	71.2 B	48 U	59.5	52.5	---	---	---	---	---	6.40	1.0 U
	22-Oct-08	452	376	459	444	0.00500 J	0.0190 J	0.310	6.80	0.150	29.3	1.0 U
	04-Oct-12	380	200 U	124	117	4.0 U	3.0 U	2.0 U	8.3	1.6	5.0	1.0 U
GM-02S	05-Oct-89	40.0 B	---	110	---	---	---	---	---	0.0700	23.4	---
	23-Jan-90	R	---	96.8	---	---	---	---	---	0.050 U	19.9	---
	02-Dec-96	1,360 J	12 U	32.9	4.90 B	---	---	---	---	---	---	---
	09-Feb-97	936	12 U	58.3	38.5	---	---	---	---	---	---	---
	16-Sep-98	491	71.2 B	31.6	28.4	---	---	---	---	---	---	---
	22-Sep-99	114 J	84.8 B	137	142	---	---	---	---	---	---	---
	01-Mar-00	---	---	---	---	0.010 U	0.0400	327	---	---	---	---
	11-Oct-00	102	99.2 B	481	457	---	---	---	---	---	---	---
	01-Mar-01	273	224	421	414	0.0400	0.0500	857	---	---	39.2	0.820 B
	26-Sep-01	127	130	310	333	0.120	2.60	1,880	---	---	44.4	1.40
	23-Mar-04	119	100 U	63.7	65.1 J	---	---	---	---	0.330	13.2	1.00
	22-Dec-05	1,080	170	339	---	0.0200	0.010 U	1.80	---	---	44.1	2.40
	21-Jun-07	5,030	72.5 B	266	249	---	---	---	---	---	34.4	1.20
	21-Oct-08	48 UR	597 R	560	557	0.0300	0.0310	7.50	45.9	0.740	25.2	1.70
	03-Oct-12*	802	200 U	488	424	4.0 U	3.0 U	3.1	37.7	0.49	27.8	1.4
GM-03RS	05-Oct-89	51.8	---	406	---	---	---	---	---	---	---	---
	05-Dec-89	51.8	---	406	---	---	---	---	---	0.680	18.0	---
	24-Jan-90	77.3 B	---	461	---	---	---	---	---	0.660	19.9	---
	05-Dec-96	941 J	880 J	336	351	---	---	---	---	---	---	---
	10-Feb-97	430 J	515 J	330 J	348 J	---	---	---	---	---	---	---
	17-Sep-98	647	403	282	288	---	---	---	---	---	---	---
	22-Sep-99	865 J	848	446	450	---	---	---	---	---	---	---
	01-Mar-00	---	---	---	---	0.0100	2.98	1,640	---	---	---	---
	11-Oct-00	1,020	946	643	621	---	---	---	---	---	---	---
	01-Mar-01	946	887	626	585	0.0400	4.49	1,390	---	---	18.2	2.00
	26-Sep-01	956	833	586	553	0.100	0.0200	417	---	---	16.6	2.70 J
	24-Mar-04	660	590	723 J	740 J	---	---	---	---	0.050 U	13.6	1.50
	21-Dec-05	676	590	684	---	0.120	1.10	576	---	---	11.8	1.0 U
	22-Jun-07	833	771	704	627	---	---	---	---	---	13.5	1.0 U
	20-Oct-08	727	684	523	550	0.120	1.10	540	5.0 U	0.10 U	11.3	1.30
	03-Oct-12*	691	571	622	567	4.0 U	3.0 U	66	12.5	0.10 U	13.5	1.0 U
GM-05S	05-Oct-89	36.3 B	---	199	---	---	---	---	---	0.420	23.0	---
	23-Jan-90	R	---	212	---	---	---	---	---	0.410	20.8	---
	03-Dec-96	1,840 J	12 U	406	41.3	---	---	---	---	---	---	---
	09-Feb-97	382	12 U	318	280	---	---	---	---	---	---	---
	16-Sep-98	68.4 B	221 J	241	242	---	---	---	---	---	---	---
	22-Sep-99	963 J	200	194	202	---	---	---	---	---	---	---
	01-Mar-00	---	---	---	---	0.010 U	0.010 U	192	---	---	---	---
	11-Oct-00	56.5 B	58.6 B	200	198	---	---	---	---	---	---	---
	01-Mar-01	130	20.8	183	182	0.0500	0.0400	132	---	---	21.4	1.00
	26-Sep-01	38.6 B	25.6 B	176	166	1.59	5.02	1,110	---	---	17.8	1.70 J
	24-Mar-04	30.0 B	100 U	248 J	268 J	---	---	---	---	0.270	39.3	1.50
	22-Dec-05	47.2	100 U	202	---	0.0500	0.010 U	15.9	---	---	28.0	1.20
	22-Oct-08	48 U	48 U	320	316	0.0570	0.0180 J	22.0	27.9	0.650	29.9	1.0 U
	03-Oct-12*	107 J	200 U	363	344	4.0 U	3.0 U	2.0 U	21.8	1.6	28.9	1.0 U
GM-06S	05-Oct-89	56.5 B	---	69.7	---	---	---	---	---	0.050 U	18.7	---
	23-Jan-90	R	---	40.6	---	---	---	---	---	0.050 U	17.9	---
	03-Dec-96	714 J	12 U	31.7	29.5	---	---	---	---	---	---	---
	09-Feb-97	1,150	12 U	38.8	28.9	---	---	---	---	---	---	---
	16-Sep-98	72.0 B	712	27.9	27.7	---	---	---	---	---	---	---
	22-Sep-99	522 J	751 J	102	96.6	---	---	---	---	---	---	---
	01-Mar-00	---	---	---	---	0.010 U	0.0100	662	---	---	---	---
	10-Oct-00	415	378	316	307	---	---	---	---	---	---	---
	01-Mar-01	628	612	756	729	0.0200	0.0500	881	---	---	62.4	1.60
	25-Sep-01	75.0 B	59.3 B	2,300	2,210	0.0200	0.0100	65.7	---	---	60.9	4.00 J
	23-Mar-04	64.2 B	100 U	5,610	5,360 J	---	---	---	---	0.050 U	31.1	3.00
	22-Dec-05	39 U	100 U	2,440	---	0.0400	0.010 U	0.300	---	---	29.9	1.10
	21-Jun-07	98.7 B	55.3 B	2,130	2,260	---	---	---	---	---	32.9	1.0 U
	21-Oct-08	91.9 B	62.0 B	866	809	0.0230 J	0.0170 J	6.10	12.8	2.40	21.3	1.60
	03-Oct-12*	200 U	200 U	35.2	35.1	4.0 U	3.0 U	2.0 U	41.1	1.8	12.1	1.1
GM-07S	25-Jan-90	109	---	488	---	---	---	---	---	0.240	26.8	---
	04-Dec-96	70.3 B	1,780	1,040	1,080	---	---	---	---	---	---	---
	08-Feb-97	12 U	65.4 B	1,470	1,290	---	---	---	---	---	---	---
	15-Sep-98	5,460	5,020	2,700	2,770	---	---	---	---	---	---	---
	21-Sep-99	1,270 J	1,270	1,050	1,080	---	---	---	---	---	---	---
	01-Mar-00	---	---	---	---	0.0500	1.48	2,510	---	---	---	---
	10-Oct-00	2,150	2,020	2,330	2,170	---	---	---	---	---	---	---
	01-Mar-01	2,520	2,490	2,180	2,040	0.010 U	0.930	1,930	---	---	18.2	4.70
	25-Sep-01	2,040	2,120	2,080	2,180	0.0600	0.0300	425	---	---	16.5	5.30 J
	23-Mar-04	3,880	4,000	1,770	1,860 J	---	---	---	---	0.050 U	9.30	2.30
	20-Dec-05	2,590	2,200	1,230	---	0.010 U	0.010 U	46.2	---	---	8.20	1.0 U
	21-Oct-08	2,060	2,400	1,330	1,410	0.0250 J	0.240	180	11.3	0.10 U	21.7	1.40
	04-Oct-12	1,070	872	1,390	1,310	4.0 U	3.0 U	3.5	5.0 U	0.10 U	20.2	1.0 U

Notes:
Concentrations which exceed the GWQS are highlighted blue
---: No result reported
B: Reported value is less than the Reporting Limit but greater than the Instrument Detection Limit.
J: Estimated value.
R: Data rejected based on anomalous results.
H: Holding Time Exceeded

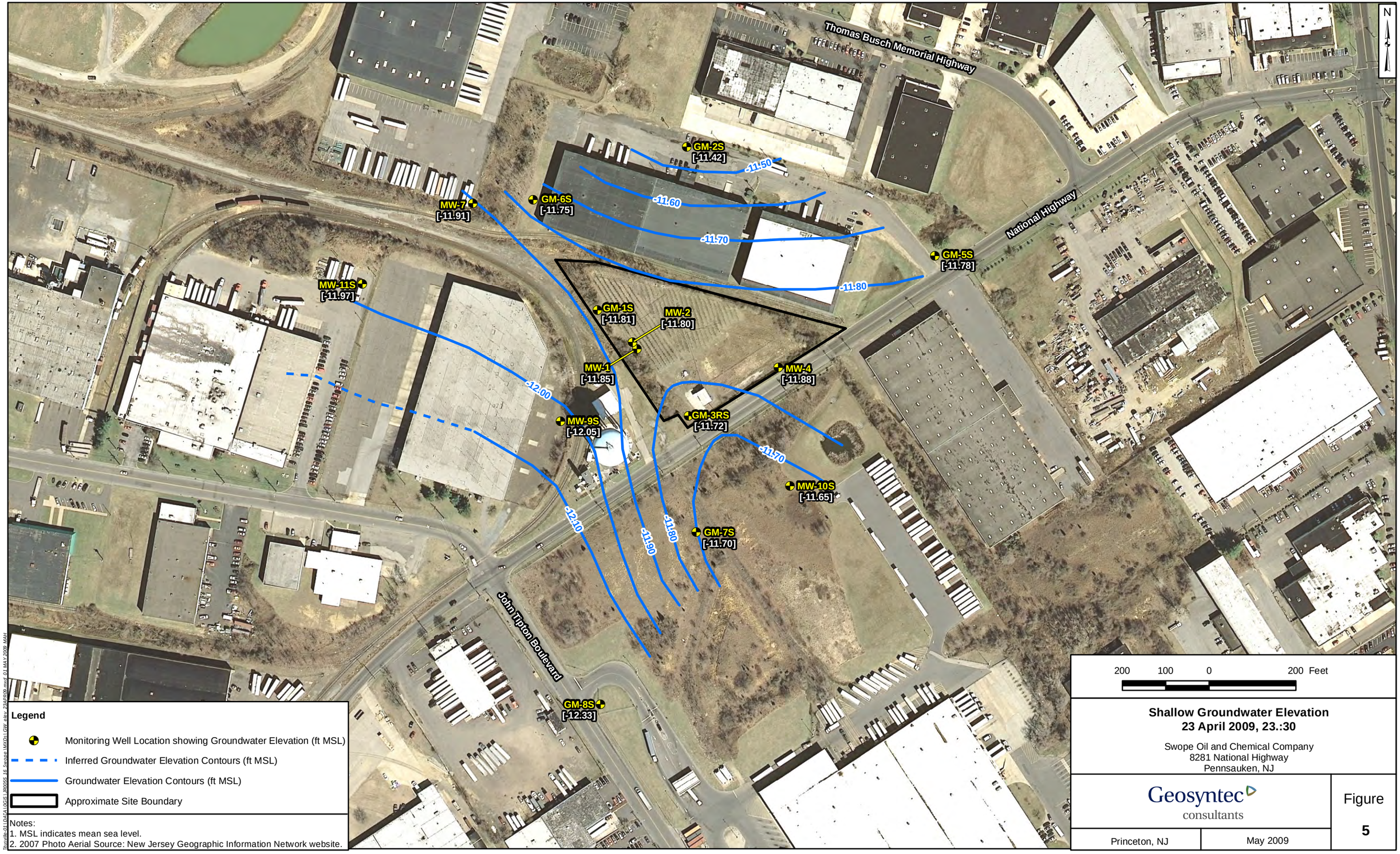
*Sample was resampled due to shipping issues.
U: The compound was not detected at the indicated reporting limit.
Bold results indicate an exceedance of NJDEP GWQS (N.J.A.C. 7:9C) dated 7 July 2008
NS: No NJDEP Class IIA Groundwater Quality Standards (GWQS)

Table 8
Historical Biogeochemical Parameter Results
Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

Location	Date Sampled	Iron (total)	Iron (dissolved)	Manganese (total)	Manganese (dissolved)	Ethane	Ethene	Methane	Alkalinity	Nitrate (as Nitrogen)	Sulfate	Total Organic Carbon (TOC)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L
NJDEP Class IIA Groundwater Quality Standards		300	300	50	50	NS	NS	NS	NS	NS	250	NS
GM-08S	25-Jan-90	65,400	---	5,920	---	---	---	---	---	0.050 U	40.8	---
	03-Dec-96	41,300 J	43,900 J	1,430	1,570	---	---	---	---	---	---	---
	08-Feb-97	51,000	43,200	1,630	1,640	---	---	---	---	---	---	---
	15-Sep-98	1,300	37.5 B	48.7	1.30 B	---	---	---	---	---	---	---
	21-Sep-99	48,400 J	45,200	1,280	1,220	---	---	---	---	---	---	---
	01-Mar-00	---	---	---	---	2.02	3.82	1,410	---	---	---	---
	10-Oct-00	53,300	49,500	1,280	1,200	---	---	---	---	---	---	---
	01-Mar-01	50,700	44,000	1,370	1,250	1.73	2.77	1,090	---	---	4.50	1.70
	25-Sep-01	54,600	51,300	1,360	1,310	0.08	0.0100	135	---	---	3.90	3.20 J
	22-Mar-04	75,000	16,300	1,860	1,690 J	---	---	---	---	0.050 U	8.00	1.40
	20-Dec-05	35,100	17,100	1,020	---	0.140	0.130	173	---	---	5.0 U	1.0 U
	22-Oct-08	19,900	14,300	722	636	0.0280	0.0300	69.0	21.2	0.10 U	11.2	1.0 U
	04-Oct-12	33,400	6,710	751	648	4.0 U	3.0 U	33	41.6	0.10 U	11.9	1.1
MW-01	06-Oct-89	6.00 B	---	295	---	---	---	---	---	0.630	15.8	---
	24-Jan-90	115	---	293	---	---	---	---	---	0.620	17.1	---
	05-Dec-96	2,490 J	2,390 J	165	176	---	---	---	---	---	---	---
	10-Feb-97	530 J	84.3 B	207 J	203 J	---	---	---	---	---	---	---
	18-Sep-98	1,640	1,150	145	142	---	---	---	---	---	---	---
	24-Sep-99	1,120	1,070	218	213	---	---	---	---	---	---	---
	01-Mar-00	---	---	---	---	0.0100	0.270	588	---	---	---	---
	12-Oct-00	3,250 J	3,410	491 J	514	---	---	---	---	---	---	---
	01-Mar-01	3,910	4,270	595	589	0.0400	0.170	503	---	---	38.2	1.40
	28-Sep-01	3,290	3,450	530	576	0.120	0.340	605	---	---	37.8	1.50 J
	24-Mar-04	3,330	3,000	646 J	677 J	---	---	---	---	0.050 U	15.3	1.30
	21-Dec-05	2,470	2,300	319	---	0.010 U	0.970	12.1	---	---	6.37	1.0 U
	22-Jun-07	214	185	556	513	---	---	---	---	---	9.20	1.90
	23-Oct-08	192	48 U	69.0	67.8	0.0300	0.0140 J	36.0	5.0 U	1.50	5.90	1.0 U
	02-Oct-12	273	161 J	326	315	4.0 U	3.0 U	3.1	21.2	1.0 J	15.5	1.0 U
MW-02	06-Oct-89	15,500	---	2,040	---	---	---	---	---	0.050 U	5.0 U	---
	24-Jan-90	20,400	---	2,000	---	---	---	---	---	0.050 U	8.60	---
	05-Dec-96	32,600 J	7,690 J	881	845	---	---	---	---	---	---	---
	10-Feb-97	19,000 J	4,950 J	802 J	801 J	---	---	---	---	---	---	---
	18-Sep-98	237,000	22,200	2,450	818	---	---	---	---	---	---	---
	24-Sep-99	16,200 J	18,800 J	887	877	---	---	---	---	---	---	---
	01-Mar-00	---	---	---	---	0.0100	10.1	1,260	---	---	---	---
	12-Oct-00	26,200 J	27,300	786 J	778	---	---	---	---	---	---	---
	01-Mar-01	16,600	18,500	617	604	0.010 U	1.28	349	---	---	10.5	1.50
	28-Sep-01	4,580	5,540	533	512	0.0400	4.47	166	---	---	21.1	3.00 J
	24-Mar-04	1,280	2,700	462 J	484 J	---	---	---	---	0.160	10.6	1.20
	21-Dec-05	9,170	7,200	616	---	0.0400	0.440	108	---	---	22.7	1.30
	22-Jun-07	1,800	318	471	414	---	---	---	---	---	13.1	1.0 U
	22-Oct-08	95.5 B	84.3 B	371	384	0.0360	1.30	120	13.4	0.480	9.60	1.0 U
	03-Oct-12*	3,050	1,160	632	553	4.0 U	3.0 U	3.2	15.7	0.10 U	11.7	1.5
MW-04	06-Oct-89	56 U	---	241	---	---	---	---	---	0.580	18.8	---
	24-Jan-90	42.5 B	---	161	---	---	---	---	---	0.570	16.0	---
	04-Dec-96	465 J	12 U	266	243	---	---	---	---	---	---	---
	09-Feb-97	424	12 U	284	283	---	---	---	---	---	---	---
	17-Sep-98	787	85.9 B	384	380	---	---	---	---	---	---	---
	23-Sep-99	507	480	462	455	---	---	---	---	---	---	---
	01-Mar-00	---	---	---	---	0.010 U	0.0100	205	---	---	---	---
	11-Oct-00	1,430	299	411	400	---	---	---	---	---	---	---
	01-Mar-01	665	459	346	345	0.0100	0.010 U	186	---	---	25.1	0.690 B
	27-Sep-01	757	571	398	381	0.0200	0.0100	122	---	---	30.1	2.00 J
	23-Mar-04	122	100 U	328 J	349 J	---	---	---	---	0.110	22.9	1.30
	21-Dec-05	121	100 U	363	---	0.0300	0.010 U	7.10	---	---	31.8	1.0 U
	21-Jun-07	48 U	48 U	288	294	---	---	---	---	---	20.2	1.0 U
	29-Oct-08	635	48 U	217	209	0.0180 J	0.0180 J	19.0 M	21.8	1.70	21.0	1.0 U
	02-Oct-12	141 J	200 U	370	333	4.0 U	3.0 U	2.0 U	13.3	1.2 J	18.3	1.0 U
MW-07	09-Jan-06	119	100 U	117	---	---	---	---	---	---	5.0 U	1.0 U
	20-Jun-07	66.5 B	52.7 B	122	112	---	---	---	---	---	5.0 U	1.20
	22-Oct-08	82.0 B	92.7 B	658	664	0.00600 J	0.0170 J	0.430	5.0 U	2.30	5.0 U	1.0 U
	04-Oct-12	550	200 U	341	50.9	4.0 U	3.0 U	2.0 U	5.0 U	2.5	2.7 J	1.3
MW-09S	25-Mar-04	15,700	12,000	220 J	213 J	---	---	---	---	0.050 U	6.80	8.40
	20-Dec-05	85,700	4,900	660	---	0.0600	13.2	247	---	---	5.0 U	2.70
	21-Jun-07	7,890	5,800	612	574	---	---	---	---	---	8.40	1.30
	21-Oct-08	7,510	6,960	540	506	0.0330	2.60	170	66.3	0.10 U	9.30	1.10
	03-Oct-12*	27,600	25,600	295	267	4.0 U	3.0 U	38	50.9	0.10 U	28.5	9.9
MW-10S	25-Mar-04	1,430	1,200	459 J	475 J	---	---	---	---	0.050 U	54.8	3.10
	20-Dec-05	185	320	291	---	0.0400	0.930	234	---	---	33.8	1.90
	21-Oct-08	365	121 B	187	184	0.0870	1.10	270	5.0 U	1.00	22.5	1.40
	02-Oct-12	74.4 J	200 U	192	193	4.0 U	3.0 U	2.0 U	5.6	1.7 J	18.5	1.0 U
MW-11S	26-Mar-04	9,880	6,800	883 J	767 J	---	---	---	---	0.140	5.20	1.20
	20-Dec-05	1,160	100 U	161	---	0.010 U	0.0800	0.20 U	---	---	5.0 U	1.0 U
	21-Jun-07	438	316	454	445	---	---	---	---	---	7.30	1.0 U
	20-Oct-08	732	265	536	539	0.0340	0.250	110	9.50	0.850	6.10	1.20
	03-Oct-12*	200 U	200 U	16.3	12.8 J	4.0 U	3.0 U	2.0 U	10.3	1.9	3.4 J	1.0 U

Notes:
Concentrations which exceed the GWQS are highlighted blue
---: No result reported
B: Reported value is less than the Reporting Limit but greater than the Instrument Detection Limit.
J: Estimated value.
H: Holding Time Exceeded

*Sample was resampled due to shipping issues.
U: The compound was not detected at the indicated reporting limit.
Bold results indicate an exceedance of NJDEP GWQS (N.J.A.C. 7:9C) dated 7 July 2008
NS: No NJDEP Class IIA Groundwater Quality Standards (GWQS)
Nitrate results with J flag are due to a holding time exceedance



Legend

- Monitoring Well Location showing Groundwater Elevation (ft MSL)
- Inferred Groundwater Elevation Contours (ft MSL)
- Groundwater Elevation Contours (ft MSL)
- Approximate Site Boundary

Notes:
1. MSL indicates mean sea level.
2. 2007 Photo Aerial Source: New Jersey Geographic Information Network website.

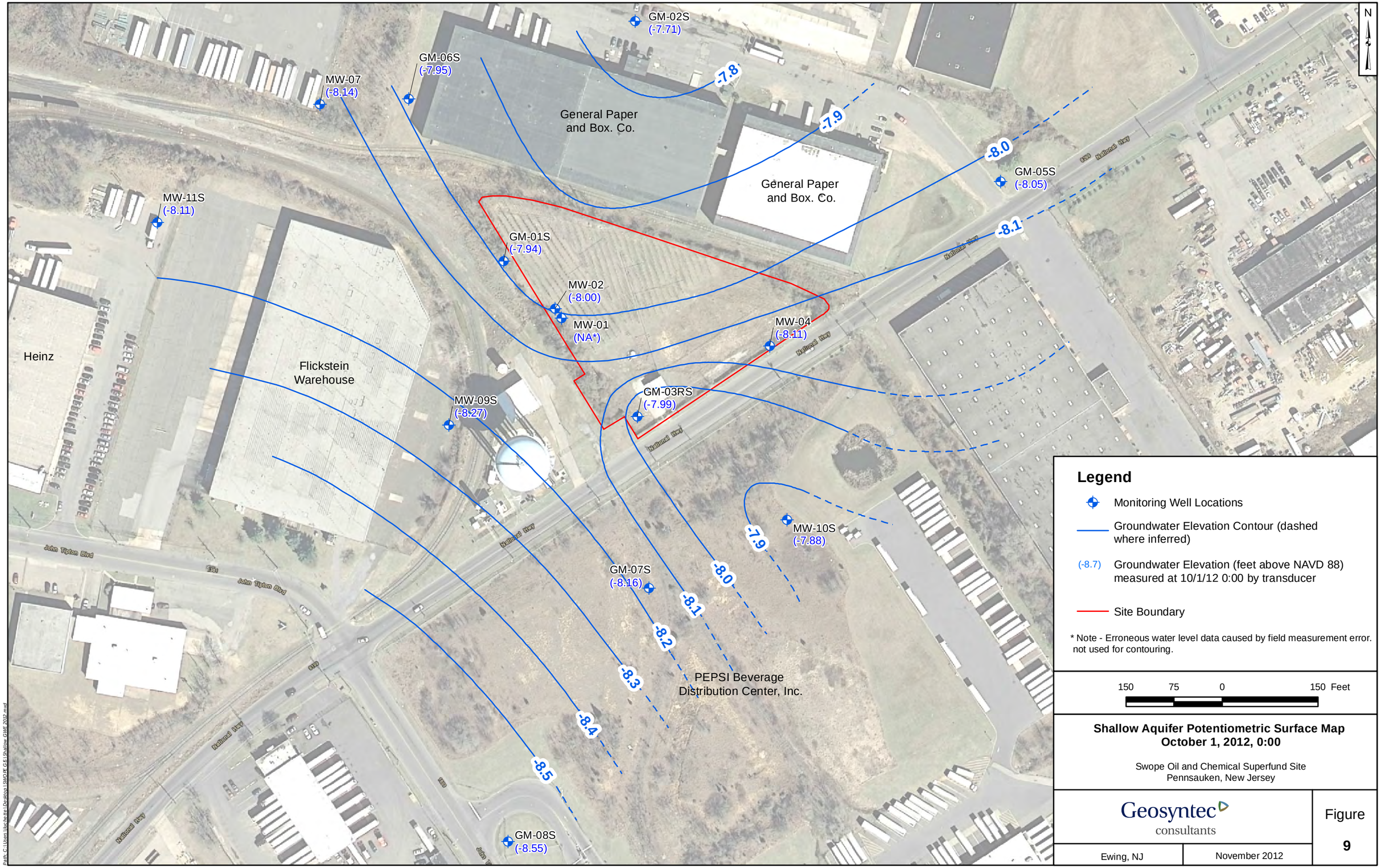
Shallow Groundwater Elevation
23 April 2009, 23.:30

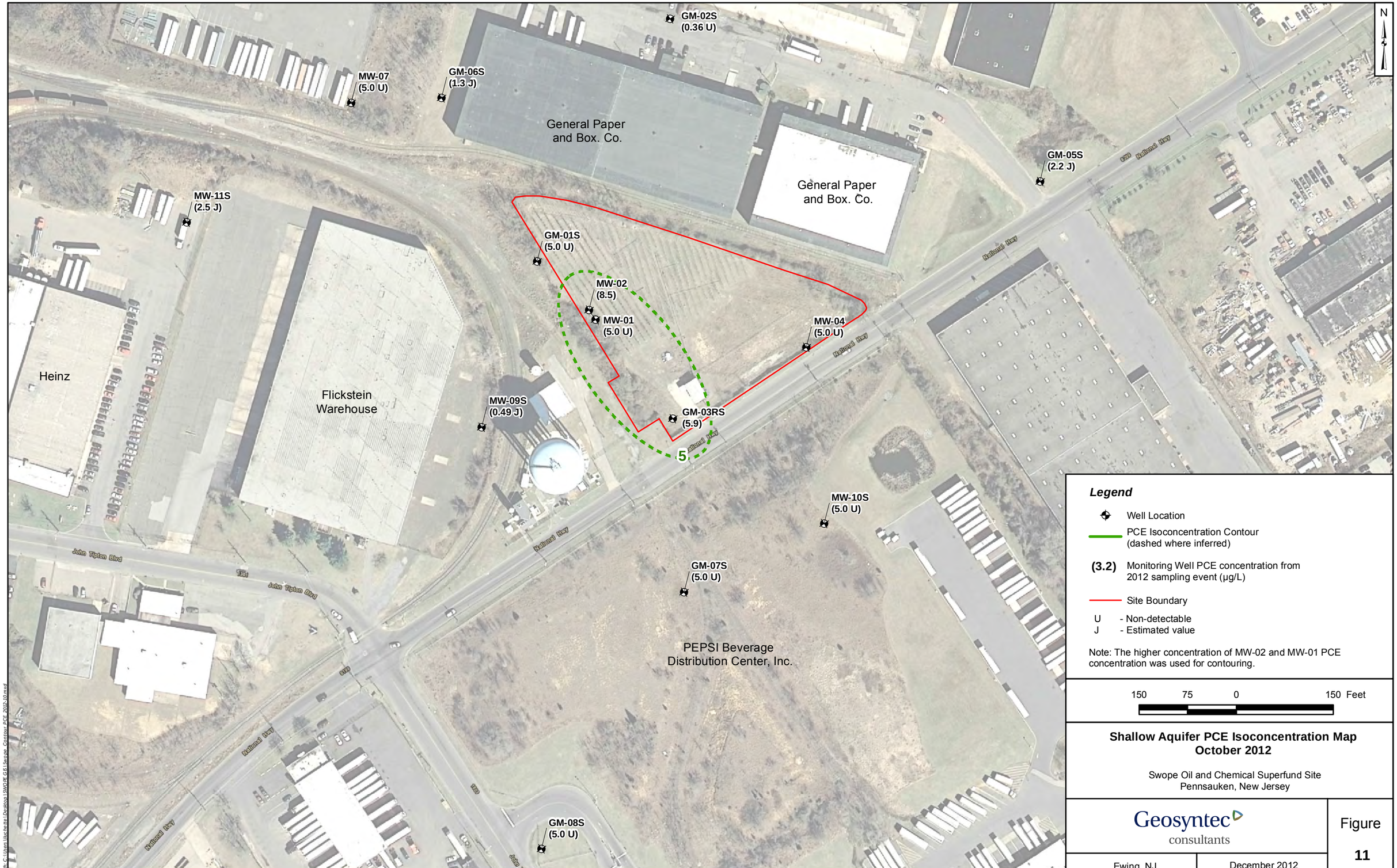
Swope Oil and Chemical Company
8281 National Highway
Pennsauken, NJ

Geosyntec consultants

Princeton, NJ | May 2009

Figure 5


N
GM-02S
(-7.71)
GM-06S
(-7.95)
MW-07
(-8.14)
General Paper
and Box. Co.
General Paper
and Box. Co.
-7.8
-7.9
-8.0
-8.1
GM-05S
(-8.05)
MW-11S
(-8.11)
GM-01S
(-7.94)
MW-02
(-8.00)
MW-01
(NA*)
MW-04
(-8.11)
Heinz
Flickstein
Warehouse
MW-09S
(-8.27)
GM-03RS
(-7.99)
MW-10S
(-7.88)
-7.9
GM-07S
(-8.16)
-8.0
-8.1
-8.2
-8.3
-8.4
-8.5
PEPSI Beverage
Distribution Center, Inc.
GM-08S
(-8.55)
John Tipton Blvd
National Hwy
Legend
Monitoring Well Locations
Groundwater Elevation Contour (dashed where inferred)
(-8.7) Groundwater Elevation (feet above NAVD 88) measured at 10/1/12 0:00 by transducer
Site Boundary
* Note - Erroneous water level data caused by field measurement error. not used for contouring.
150 75 0 150 Feet
Shallow Aquifer Potentiometric Surface Map
October 1, 2012, 0:00
Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey
Geosyntec consultants
Ewing, NJ
November 2012
Figure
9



Shallow Aquifer PCE Isoconcentration Map
October 2012

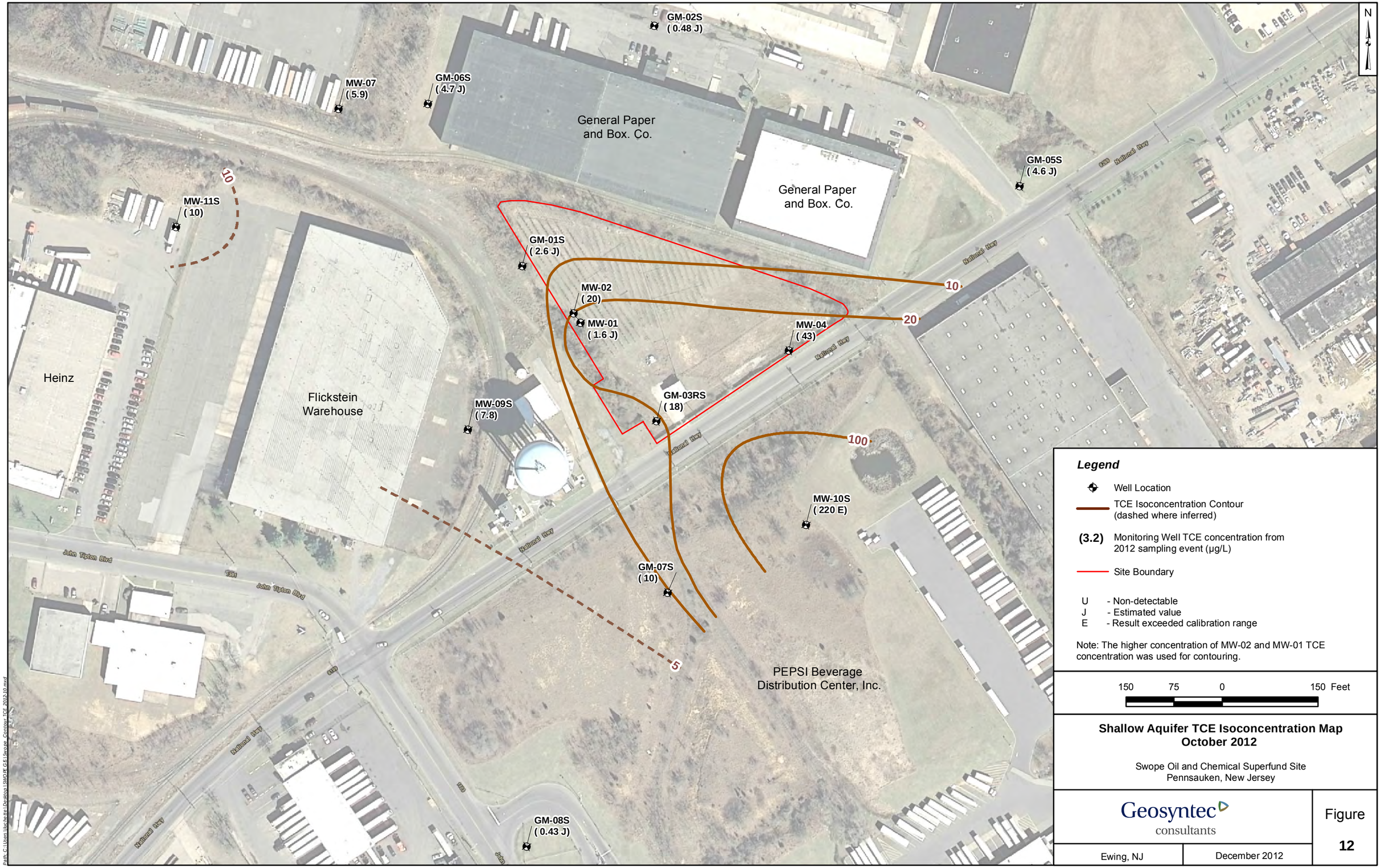
Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

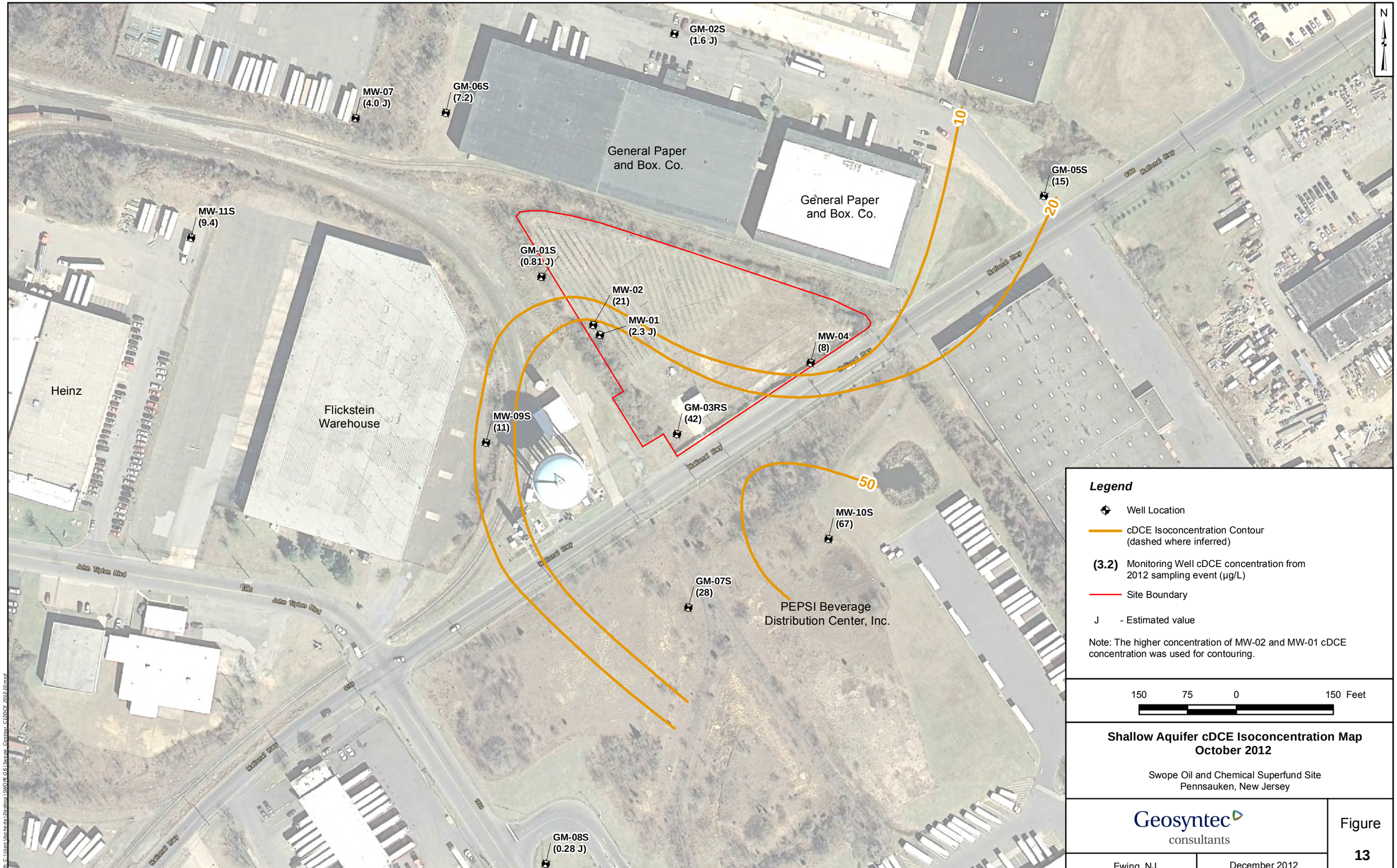
Geosyntec consultants

Ewing, NJ | December 2012

Figure 11

Path: C:\Users\lluchetra\Desktop\SWOPE GIS\Swope_Contour_PCE_2012-10.mxd


N
GM-02S
(0.48 J)
MW-07
(5.9)
GM-06S
(4.7 J)
General Paper
and Box. Co.
General Paper
and Box. Co.
GM-05S
(4.6 J)
MW-11S
(10)
10
GM-01S
(2.6 J)
MW-02
(20)
MW-01
(1.6 J)
MW-04
(43)
10
20
100
Heinz
Flickstein
Warehouse
MW-09S
(7.8)
GM-03RS
(18)
MW-10S
(220 E)
GM-07S
(10)
5
PEPSI Beverage
Distribution Center, Inc.
GM-08S
(0.43 J)
National Hwy
John Tipton Blvd
Legend
Well Location
TCE Isoconcentration Contour
(dashed where inferred)
(3.2) Monitoring Well TCE concentration from
2012 sampling event (µg/L)
Site Boundary
U - Non-detectable
J - Estimated value
E - Result exceeded calibration range
Note: The higher concentration of MW-02 and MW-01 TCE
concentration was used for contouring.
150 75 0 150 Feet
Shallow Aquifer TCE Isoconcentration Map
October 2012
Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey
Geosyntec
consultants
Ewing, NJ
December 2012
Figure
12
Path: C:\Users\lauchette\Desktop\SWOPE GIS\Swope_Contour_TCE_2012-10.mxd



Shallow Aquifer cDCE Isoconcentration Map
October 2012

Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

Geosyntec consultants

Ewing, NJ | December 2012

Figure 13

Path: C:\Users\jluchette\Desktop\SWOPE GIS\Swope_Contour_C12DCE_2012-10.mxd

MW-11S	
Dissolved Gases (ug/L)	
Ethane	4.0 u
Ethene	3.0 u
Methane	2.0 u
General Chemistry (mg/L)	
Bicarbonate Alkalinity as CaCO3	10.3
Carbonate Alkalinity as CaCO3	5.0 u
Hydroxide Alkalinity	5.0 u
Nitrate	1.9
Sulfate	3.4 j
Total Carbon	1.0 u
Total Dissolved Solids	56.0
Metals (ug/L)	
Iron (dissolved)	200 u
Iron (total)	200 u
Manganese (dissolved)	12.8 j
Manganese (total)	16.3
VOCs (ug/L)	
cis-1,2-Dichloroethene	9.4
Tetrachloroethene	2.5 j
Trichloroethene	10

MW-07	
Dissolved Gases (ug/L)	
Ethane	4.0 u
Ethene	3.0 u
Methane	2.0 u
General Chemistry (mg/L)	
Bicarbonate Alkalinity as CaCO3	5.0 u
Carbonate Alkalinity as CaCO3	5.0 u
Hydroxide Alkalinity	5.0 u
Nitrate	2.5
Sulfate	2.7 j
Total Carbon	1.3
Total Dissolved Solids	94.0
Metals (ug/L)	
Iron (dissolved)	200 u
Iron (total)	550
Manganese (dissolved)	50.9
Manganese (total)	341
VOCs (ug/L)	
cis-1,2-Dichloroethene	4.0 j
Trichloroethene	5.9

GM-06S	
Dissolved Gases (ug/L)	
Ethane	4.0 u
Ethene	3.0 u
Methane	2.0 u
General Chemistry (mg/L)	
Bicarbonate Alkalinity as CaCO3	41.1
Carbonate Alkalinity as CaCO3	5.0 u
Hydroxide Alkalinity	5.0 u
Nitrate	1.8
Sulfate	12.1
Total Carbon	1.1
Total Dissolved Solids	83.0
Metals (ug/L)	
Iron (dissolved)	200 u
Iron (total)	200 u
Manganese (dissolved)	35.1
Manganese (total)	35.2
VOCs (ug/L)	
cis-1,2-Dichloroethene	7.2
Tetrachloroethene	1.3 j
Trichloroethene	4.7 j

GM-02S	
Dissolved Gases (ug/L)	
Ethane	4.0 u
Ethene	3.0 u
Methane	3.1
General Chemistry (mg/L)	
Bicarbonate Alkalinity as CaCO3	37.7
Carbonate Alkalinity as CaCO3	5.0 u
Hydroxide Alkalinity	5.0 u
Nitrate	0.49
Sulfate	27.8
Total Carbon	1.4
Total Dissolved Solids	79.0
Metals (ug/L)	
Iron (dissolved)	200 u
Iron (total)	802
Manganese (dissolved)	424
Manganese (total)	488
VOCs (ug/L)	
cis-1,2-Dichloroethene	1.6 j
Tetrachloroethene	0.36 j
Trichloroethene	0.48 j

GM-05S	
Dissolved Gases (ug/L)	
Ethane	4.0 u
Ethene	3.0 u
Methane	2.0 u
General Chemistry (mg/L)	
Bicarbonate Alkalinity as CaCO3	21.8
Carbonate Alkalinity as CaCO3	5.0 u
Hydroxide Alkalinity	5.0 u
Nitrate	1.6
Sulfate	28.9
Total Carbon	1.0 u
Total Dissolved Solids	190
Metals (ug/L)	
Iron (dissolved)	200 u
Iron (total)	107 j
Manganese (dissolved)	344
Manganese (total)	363
VOCs (ug/L)	
cis-1,2-Dichloroethene	15
Tetrachloroethene	2.2 j
Trichloroethene	4.6 j

MW-04	
Dissolved Gases (ug/L)	
Ethane	4.0 u
Ethene	3.0 u
Methane	2.0 u
General Chemistry (mg/L)	
Bicarbonate Alkalinity as CaCO3	13.3
Carbonate Alkalinity as CaCO3	5.0 u
Hydroxide Alkalinity	5.0 u
Nitrate	1.2 h
Sulfate	18.3
Total Carbon	1.0 u
Total Dissolved Solids	112 b
Metals (ug/L)	
Iron (dissolved)	200 u
Iron (total)	141 j
Manganese (dissolved)	333
Manganese (total)	370
VOCs (ug/L)	
cis-1,2-Dichloroethene	8.0
Trichloroethene	43

GM-01S	
Dissolved Gases (ug/L)	
Ethane	4.0 u
Ethene	3.0 u
Methane	2.0 u
General Chemistry (mg/L)	
Bicarbonate Alkalinity as CaCO3	8.3
Carbonate Alkalinity as CaCO3	5.0 u
Hydroxide Alkalinity	5.0 u
Nitrate	1.6
Sulfate	5.0
Total Carbon	1.0 u
Total Dissolved Solids	86.0
Metals (ug/L)	
Iron (dissolved)	200 u
Iron (total)	380
Manganese (dissolved)	117
Manganese (total)	124
VOCs (ug/L)	
cis-1,2-Dichloroethene	0.81 j
Trichloroethene	2.6 j

MW-02	
Dissolved Gases (ug/L)	
Ethane	4.0 u
Ethene	3.0 u
Methane	3.2
General Chemistry (mg/L)	
Bicarbonate Alkalinity as CaCO3	15.7
Carbonate Alkalinity as CaCO3	5.0 u
Hydroxide Alkalinity	5.0 u
Nitrate	0.10 u
Sulfate	11.7
Total Carbon	1.5
Total Dissolved Solids	23.0
Metals (ug/L)	
Iron (dissolved)	1,160
Iron (total)	3,050
Manganese (dissolved)	553
Manganese (total)	632
VOCs (ug/L)	
cis-1,2-Dichloroethene	21
Tetrachloroethene	8.5
Trichloroethene	20

MW-01	
Dissolved Gases (ug/L)	
Ethane	4.0 u
Ethene	3.0 u
Methane	3.1
General Chemistry (mg/L)	
Bicarbonate Alkalinity as CaCO3	21.2
Carbonate Alkalinity as CaCO3	5.0 u
Hydroxide Alkalinity	5.0 u
Nitrate	1.0 h
Sulfate	15.5
Total Carbon	1.0 u
Total Dissolved Solids	105 b
Metals (ug/L)	
Iron (dissolved)	161 j
Iron (total)	273
Manganese (dissolved)	315
Manganese (total)	326
VOCs (ug/L)	
cis-1,2-Dichloroethene	2.3 j
Trichloroethene	1.6 j

MW-09S	
Dissolved Gases (ug/L)	
Ethane	4.0 u
Ethene	3.0 u
Methane	38
General Chemistry (mg/L)	
Bicarbonate Alkalinity as CaCO3	50.9
Carbonate Alkalinity as CaCO3	5.0 u
Hydroxide Alkalinity	5.0 u
Nitrate	0.10 u
Sulfate	28.5
Total Carbon	9.9
Total Dissolved Solids	328
Metals (ug/L)	
Iron (dissolved)	25,600
Iron (total)	27,600
Manganese (dissolved)	267
Manganese (total)	295
VOCs (ug/L)	
cis-1,2-Dichloroethene	11
Tetrachloroethene	0.49 j
Trichloroethene	7.8

GM-08S	
Dissolved Gases (ug/L)	
Ethane	4.0 u
Ethene	3.0 u
Methane	33
General Chemistry (mg/L)	
Bicarbonate Alkalinity as CaCO3	41.6
Carbonate Alkalinity as CaCO3	5.0 u
Hydroxide Alkalinity	5.0 u
Nitrate	0.10 u
Sulfate	11.9
Total Carbon	1.1
Total Dissolved Solids	159
Metals (ug/L)	
Iron (dissolved)	6,710
Iron (total)	33,400
Manganese (dissolved)	648
Manganese (total)	751
VOCs (ug/L)	NDE
cis-1,2-Dichloroethene	0.28 j
Trichloroethene	0.43 j

GM-07S	
Dissolved Gases (ug/L)	
Ethane	4.0 u
Ethene	3.0 u
Methane	3.5
General Chemistry (mg/L)	
Bicarbonate Alkalinity as CaCO3	5.0 u
Carbonate Alkalinity as CaCO3	5.0 u
Hydroxide Alkalinity	5.0 u
Nitrate	0.10 u
Sulfate	20.2
Total Carbon	1.0 u
Total Dissolved Solids	116
Metals (ug/L)	
Iron (dissolved)	872
Iron (total)	1,070
Manganese (dissolved)	1,310
Manganese (total)	1,390
VOCs (ug/L)	
cis-1,2-Dichloroethene	28
Trichloroethene	10

MW-10S	
Dissolved Gases (ug/L)	
Ethane	4.0 u
Ethene	3.0 u
Methane	2.0 u
General Chemistry (mg/L)	
Bicarbonate Alkalinity as CaCO3	5.6
Carbonate Alkalinity as CaCO3	5.0 u
Hydroxide Alkalinity	5.0 u
Nitrate	1.7 h
Sulfate	18.5
Total Carbon	1.0 u
Total Dissolved Solids	111 b
Metals (ug/L)	
Iron (dissolved)	200 u
Iron (total)	74.4 j
Manganese (dissolved)	193
Manganese (total)	192
VOCs (ug/L)	
cis-1,2-Dichloroethene	67
Trichloroethene	220 e

GM-03RS	
Dissolved Gases (ug/L)	
Ethane	4.0 u
Ethene	3.0 u
Methane	66
General Chemistry (mg/L)	
Bicarbonate Alkalinity as CaCO3	12.5
Carbonate Alkalinity as CaCO3	5.0 u
Hydroxide Alkalinity	5.0 u
Nitrate	0.10 u
Sulfate	13.5
Total Carbon	1.0 u
Total Dissolved Solids	104
Metals (ug/L)	
Iron (dissolved)	571
Iron (total)	691
Manganese (dissolved)	567
Manganese (total)	622
VOCs (ug/L)	
cis-1,2-Dichloroethene	42
Tetrachloroethene	5.9
Trichloroethene	18

Legend

Monitoring Well Locations

Site Boundary

Groundwater Data Notes:

- Value exceeds the NJ Class IIA Groundwater Quality Standards.

u - Not detected at or above the MRL/MDL
j - Estimated value
b - Analyte detected in blank
e - Result exceeded calibration range

*Constituents of Concern are Trichloroethene, Tetrachloroethene & cis-1,2-Dichloroethene.

150 75 0 150 Feet

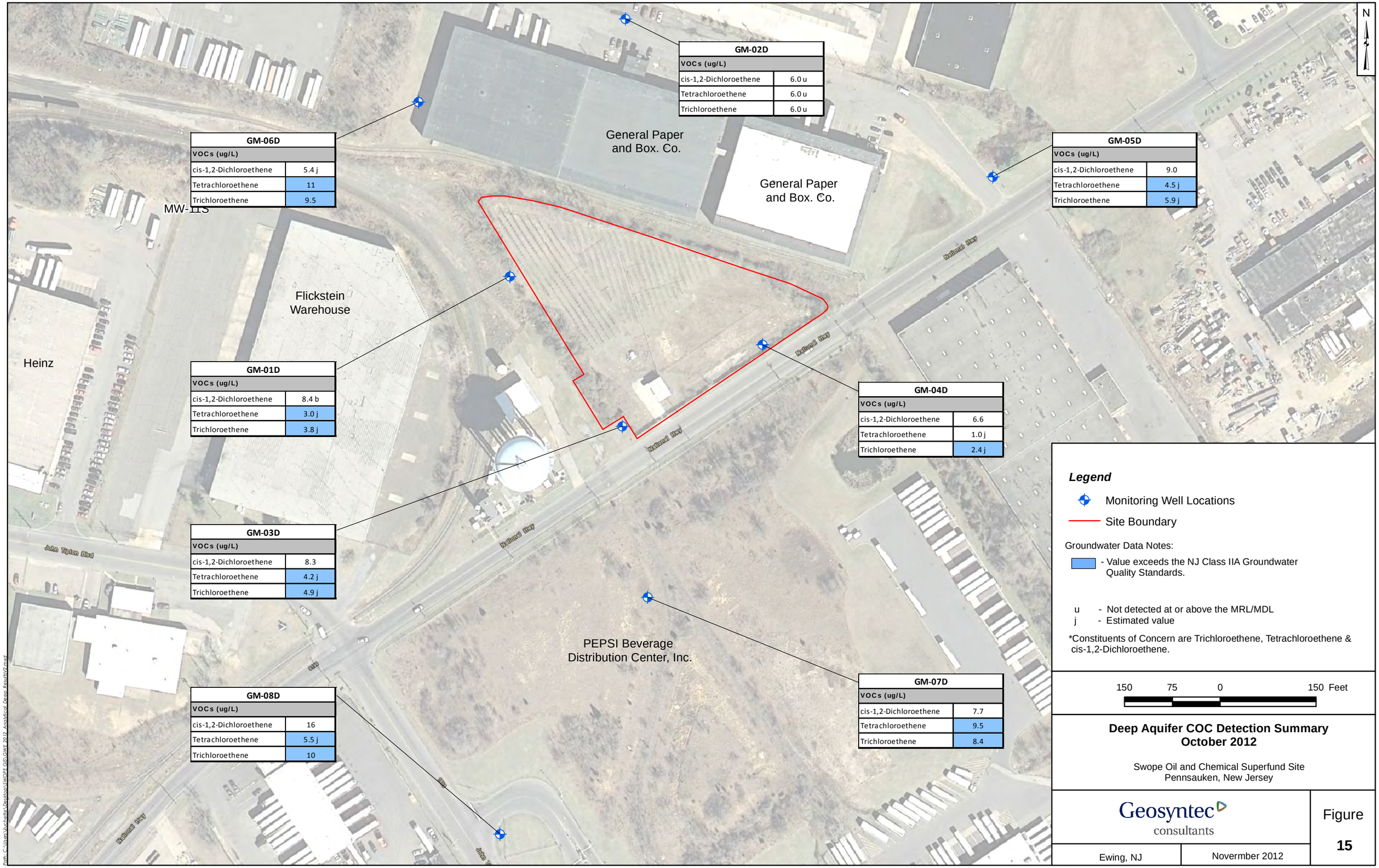
Shallow Aquifer Biogeochemical Results and COC Detections Summary - October 2012

Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

Geosyntec consultants

Ewing, NJ | December 2012

Figure 14



Legend

Monitoring Well Locations

Site Boundary

Groundwater Data Notes:

- Value exceeds the NJ Class IIA Groundwater Quality Standards.

u - Not detected at or above the MRL/MDL
j - Estimated value

*Constituents of Concern are Trichloroethene, Tetrachloroethene & cis-1,2-Dichloroethene.

150 75 0 150 Feet

Deep Aquifer COC Detection Summary
October 2012

Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

Geosyntec consultants

Ewing, NJ | Novermber 2012

Figure **15**

Path: C:\Users\Vluchette\Desktop\SWOPE GIS\GWE 2012 Analytical Deep Results\2.mxd

APPENDIX B

March 2015 Monitoring Well Survey Data

Dennis W. Sklar, Inc. - Professional Land Surveying

2837 Ogden Avenue - Bensalem - Pennsylvania - 19020

Telephone: 215-268-7988 Fax: 215-268-7966 Email: dwspls@comcast.net

MONITORING WELL SURVEY
SWOPE OIL AND CHEMICAL SUPERFUND SITE
PENNSAUKEN - NEW JERSEY

Project #: 1657 March 23, 2015

Horizontal Datum: New Jersey State Plane Coordinates - NAD 83

Vertical Datum: NAVD 88

Monuments Used: NGS "NJTW" (CORS) (NAD 83_2011) (EPOCH 2010.0000) (GEOID 12A)

Additional Comments:

	Elevations (U.S. Survey Feet)			Coordinates (U.S. Survey Feet)		
Monitoring Wells	Ground Surface	Measuring Point Casing (Marked)	Protective Vault/Outer	State Plane Northing	State Plane Easting	Date of Survey
GM-01D	64.73	66.44	66.89	419030.44	342269.35	March 23, 2015
GM-01S	64.59	66.49	67.04	419054.50	342258.27	March 23, 2015
GM-02D	59.89	59.38	59.92	419433.57	342450.90	March 13, 2015
GM-02S	59.88	59.44	59.92	419430.57	342464.28	March 13, 2015
GM-03D	64.91	65.30	65.63	418795.86	342445.69	March 23, 2015
GM-03RS	65.68	69.46	69.69	418811.67	342468.77	March 23, 2015
GM-04D	60.67	63.86	64.20	418923.41	342665.33	March 23, 2015
GM-05D	52.39	52.00	52.40	419186.49	343026.25	March 13, 2015
GM-05S	51.93	51.51	52.12	419179.02	343036.47	March 13, 2015
GM-06D	60.45	59.81	60.46	419303.27	342126.09	March 13, 2015
GM-06S	60.58	60.19	60.68	419307.79	342110.51	March 13, 2015
GM-07D	63.63	64.95	65.61	418528.00	342485.50	March 23, 2015
GM-07S	63.89	65.37	66.17	418542.82	342486.01	March 23, 2015
GM-08D	68.99	68.66	69.12	418157.50	342253.91	March 23, 2015
GM-08S	69.88	69.67	70.18	418145.72	342265.06	March 23, 2015
MW-01	65.06	68.64	69.06	418964.81	342349.15	March 23, 2015

Dennis W. Sklar, Inc. - Professional Land Surveying

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MONITORING WELL SURVEY
SWOPE OIL AND CHEMICAL SUPERFUND SITE
PENNSAUKEN - NEW JERSEY

Project #: 1657 March 23, 2015

Horizontal Datum: New Jersey State Plane Coordinates - NAD 83

Vertical Datum: NAVD 88

Monuments Used: NGS "NJTW" (CORS) (NAD 83_2011) (EPOCH 2010.0000) (GEOID 12A)

Additional Comments:

	Elevations (U.S. Survey Feet)			Coordinates (U.S. Survey Feet)		
Monitoring Wells	Ground Surface	Measuring Point Casing (Marked)	Protective Vault/Outer	State Plane Northing	State Plane Easting	Date of Survey
MW-02	65.04	69.02	69.49	418979.93	342338.62	March 23, 2015
MW-04	60.41	63.30	63.67	418921.76	342675.07	March 23, 2015
MW-07	70.41	69.77	70.41	419300.11	341970.75	March 23, 2015
MW-09RS	69.73	69.57	69.81	418798.03	342172.92	March 23, 2015
MW-10S	68.99	70.81	71.18	418649.02	342702.37	March 23, 2015
MW-11S	69.80	69.56	69.84	419115.17	341716.35	March 23, 2015

APPENDIX C

2015 Monitoring Well Low-Flow Purging and Sampling Records

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

Geosyntec Consultants, Inc.
7 Graphics Drive, Suite 106
Ewing, New Jersey 08628
Phone: 609-895-1400
Fax: 609-895-1401

Geosyntec consultants
engineers | scientists | innovators

Well ID: GM-01S
Pump Intake Depth [ft]: 117.9
Project Name: Swope Superfund
Sampling Program: MNA
Date: 3/10/2015
Recorded By: E. Jacesko
Sample ID: GM-1S.20150310
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]: 130
Initial Depth to Water [ft]: 73.49 **Time:** 10:05
Casing Volume [gal]:
Final Depth to Water [ft]: 73.51 **Time:** 11:25
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Overcast, ~45F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
1020	117.9	0.18	-	12.81	6.13	0.084	3.08	259.7	2.92	73.51	
1025	117.9	0.18	-	13.41	5.17	0.079	1.33	277.0	1.53	73.51	
1030	117.9	0.18	-	13.45	5.02	0.078	0.98	284.0	0.91	73.52	
1035	117.9	0.18	-	13.48	5.01	0.078	0.92	286.4	0.67	73.50	
1040	117.9	0.18	-	13.53	5.00	0.078	0.85	288.9	0.56	73.50	
1045	117.9	0.18	~4	13.57	5.00	0.078	0.80	293.3	0.58	73.52	
1050	117.9	0.18	-	13.61	5.00	0.079	0.77	294.1	0.79	73.50	
1055	117.9	0.18	-	13.60	5.01	0.079	0.73	295.4	0.73	73.52	
1100	117.9	0.18	-	13.59	5.01	0.079	0.72	297.5	0.69	73.50	
1105	117.9	0.18	-	13.60	5.01	0.079	0.71	298.6	0.55	73.51	
1110	117.9	0.18	-	13.62	5.02	0.079	0.69	299.1	0.42	73.53	
1115	117.9	0.18	-	13.59	5.02	0.079	0.68	300.4	0.50	73.50	
1120	117.9	0.18	-	13.65	5.04	0.079	0.66	300.5	0.49	73.50	
1125	117.9	0.18	~6	13.64	5.04	0.079	0.65	300.9	0.50	73.51	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: A

Sample time at 11:30

Air qual around well = 0.0 - 0.2 ppm

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

Geosyntec Consultants, Inc.
7 Graphics Drive, Suite 106
Ewing, New Jersey 08628
Phone: 609-895-1400
Fax: 609-895-1401

Geosyntec consultants
engineers | scientists | innovators

Well ID: GM-02S
Pump Intake Depth [ft]: 115
Project Name: Swope Superfund
Sampling Program: Redevelop GM-02S
Date: 3/12/2015
Recorded By: B. Adams, E. Jacesko
Sample ID: NA
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]: 130
Initial Depth to Water [ft]: 66.67 **Time:** 08:30
Casing Volume [gal]:
Final Depth to Water [ft]: 66.70 **Time:** 13:45
Method of Purging: Grundfos Pump
Method of Sampling: NA
Weather: Windy, Sunny ~40F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
11:50	115	7.6	~80	15.55	6.64	1.472	6.61	177.2	216	66.8	sl. cloudy, grab samples
11:55	115	7.6	90	15.7	6.49	1.275	5.91	137.7	131	66.8	clear, weather: in shade
12:00	115	7.6	100	15.68	6.41	1.119	5.37	125.7	75.4	66.8	clear, weather: in shade
12:05	115	7.6	110	15.48	6.41	1.361	5.44	125.5	44.1	66.8	weather: in shade
12:10	115	7.6	120	15.47	6.36	1.094	5.28	127.2	39.2	66.8	weather: in shade
12:15	115	7.6	130	15.69	6.32	1.030/1.275	2.72	134.2	38.3	66.8	weather: in shade
12:20	115	7.6	140	15.71	6.2	1.161	4.20	140.8	32.9	66.8	weather: in shade
12:25	115	7.6	150	16.31	6.13	1.203	4.32	141.5	30.5	66.8	weather: in shade
12:30	115	7.6	160	16.03	6.11	1.099	4.19	145.5	30.6	66.8	weather: in shade
12:35	115	7.6	170	16.07	5.97	1.105	3.46	145.3	21.2	66.8	weather: in shade
12:40	115	7.6	180	15.99	5.94	1.078	3.28	145.2	15.8	66.8	decrease to 0.5 L/min
12:45	115	0.5	-	14.97	5.96	1.081	3.50	147.0	17.8	66.7	attach to YSI flow-through cell
12:50	115	0.5	-	15.53	5.97	1.088	1.34	139.0	17.1	66.7	sunny
12:55	115	0.5	-	15.27	5.94	1.084	0.79	139.3	18.6	66.7	sunny
13:00	115	0.5	-	14.81	5.95	1.077	0.79	134.7	19.0	66.7	sunny
13:05	115	0.5	-	14.84	5.97	1.100	0.79	129.4	19.8	66.7	sunny
13:10	115	0.5	-	14.76	5.98	1.111	0.85	125.7	21.8	66.7	sunny
13:15	115	0.5	-	15.11	5.97	1.123	0.89	122.7	26.4	66.7	sunny
13:20	115	0.5	-	15.05	5.98	1.134	0.93	119.7	23.4	66.7	sunny
13:25	115	0.5	-	15.13	5.96	1.143	1.00	117.7	25.2	66.7	sunny
13:30	115	0.5	-	15.46	6.04	1.159	1.32	112.0	25.5	66.7	sunny
13:35	115	0.5	-	15.61	6.07	1.166	1.18	110.0	26.0	66.7	sunny
13:40	115	0.5	-	15.49	6.05	1.175	1.19	109.0	24.4	66.7	sunny
13:45	115	0.5	~188	15.51	6.07	1.185	1.20	107.9	24.1	66.7	sunny
	Parameters within range, development complete										

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: B

7.6 Lpm = 2 Gpm. Pump at 2 gpm to stabilize, decrease to 500 ml/min.

Turbidity didn't stabilize at 2gpm, start resampling at 1240 @ 0.5Lpm. Purged 80 gallons due to silting. Was able to remove ~2.5' of silt from well.

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

Geosyntec Consultants, Inc.
7 Graphics Drive, Suite 106
Ewing, New Jersey 08628
Phone: 609-895-1400
Fax: 609-895-1401

Geosyntec consultants
engineers | scientists | innovators

Well ID: GM-02S
Pump Intake Depth [ft]: 117.7
Project Name: Swope Superfund
Sampling Program: MNA
Date: 3/12/2015
Recorded By: E. Jacesko
Sample ID: GM-2S.20150312
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]: 130
Initial Depth to Water [ft]: 66.69 **Time:** 15:15
Casing Volume [gal]:
Final Depth to Water [ft]: 66.69 **Time:** 16:20
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Sunny, Windy ~40F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
15:35	117.7	0.10	-	15.35	6.56	2.135	7.15	117.4	43.2	66.70	
15:40	117.7	0.12	-	15.04	6.43	1.899	3.99	110.2	30.1	66.69	
15:45	117.7	0.12	-	14.95	6.35	1.689	2.96	106.0	20.2	66.69	
15:50	117.7	0.12	-	14.80	6.31	1.619	2.64	104.3	16.2	66.69	
15:55	117.7	0.12	-	14.69	6.26	1.553	2.35	102.5	16.3	66.70	
16:00	117.7	0.12	-	14.54	6.24	1.536	2.24	101.7	15.5	66.69	
16:05	117.7	0.12	-	14.59	6.24	1.531	2.20	101.0	14.5	66.70	
16:10	117.7	0.12	-	14.73	6.24	1.528	2.15	100.1	13.9	66.69	
16:15	117.7	0.12	-	14.73	6.24	1.526	2.11	99.7	12.8	66.68	
16:20	117.7	0.12	~1.4	14.73	6.23	1.527	2.03	99.2	12.4	66.69	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: C and A, respectively

Sample time at 16:25

Air quality around well = 0.1 ppm

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

Geosyntec Consultants, Inc.
7 Graphics Drive, Suite 106
Ewing, New Jersey 08628
Phone: 609-895-1400
Fax: 609-895-1401

Geosyntec consultants
engineers | scientists | innovators

Well ID: GM-03RS
Pump Intake Depth [ft]: 124.6
Project Name: Swope Superfund
Sampling Program: MNA
Date: 3/11/2015
Recorded By: K. Hollerbach, E. Jacesko
Sample ID: GM-3RS.20150311
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]: 130
Initial Depth to Water [ft]: 76.25 **Time:** 15:45
Casing Volume [gal]:
Final Depth to Water [ft]: 76.27 **Time:** 17:00
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Cloudy, 50s - 60s F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
15:55	124.6	0.16	-	13.97	5.35	0.124	5.80	191.9	1.28	76.33	
16:00	124.6	0.22	-	14.18	5.22	0.122	3.45	185.9	1.23	76.35	
16:05	124.6	0.24	-	14.11	5.22	0.121	2.58	176.3	0.39	76.36	
16:10	124.6	0.20	-	14.15	5.23	0.121	1.96	171.5	0.58	76.35	
16:15	124.6	0.24	-	14.11	5.17	0.121	1.65	170.9	0.56	76.35	
16:20	124.6	0.20	-	14.08	5.19	0.121	1.41	168.2	0.58	76.35	
16:25	124.6	0.24	-	14.02	5.22	0.121	1.30	170.2	0.46	76.36	
16:30	124.6	0.24	-	13.99	5.14	0.121	1.15	172.8	0.49	76.35	
16:35	124.6	0.22	-	13.99	5.23	0.121	1.03	170.7	0.43	76.36	
16:40	124.6	0.24	-	13.98	5.21	0.121	0.94	170.3	0.45	76.36	
16:45	124.6	0.24	~4	13.95	5.22	0.12	1.04	169.6	0.42	76.36	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: B

Sample time at 17:00

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

Geosyntec Consultants, Inc.
7 Graphics Drive, Suite 106
Ewing, New Jersey 08628
Phone: 609-895-1400
Fax: 609-895-1401

Geosyntec consultants
engineers | scientists | innovators

Well ID: GM-05S
Pump Intake Depth [ft]: 116.6
Project Name: Swope Superfund
Sampling Program: MNA
Date: 3/10/2015
Recorded By: K. Hollerbach, E. Jacesko
Sample ID: GM-5S.20150310
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]: 127
Initial Depth to Water [ft]: 58.36 **Time:** 09:30
Casing Volume [gal]:
Final Depth to Water [ft]: 58.36 **Time:** 10:45
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Cloudy, 40s F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
09:55	116.6	0.24	-	14.21	5.92	0.182	5.37	164.0	28.3	58.36	
10:00	116.6	0.24	-	14.25	5.77	0.174	4.54	189.5	21.1	58.36	
10:05	116.6	0.26	-	14.25	5.77	0.183	3.90	190.5	15.2	58.36	
10:10	116.6	0.26	-	14.35	5.78	0.185	3.71	191.8	13.2	58.36	
10:15	116.6	0.24	-	14.32	5.79	0.186	3.62	193.0	12.4	58.36	
10:20	116.6	0.24	-	14.30	5.79	0.187	3.58	194.7	12.0	58.36	
10:25	116.6	0.24	~2	14.38	5.80	0.187	3.55	196.9	11.5	58.36	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: B

Sample time at 10:45

Controller set at 65 psi, 4 cpm

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

Geosyntec Consultants, Inc.
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Well ID: GM-06S
Pump Intake Depth [ft]: 118.5
Project Name: Swope Superfund
Sampling Program: MNA
Date: 3/10/2015
Recorded By: K. Hollerbach, E. Jacesko
Sample ID: GM-6S.20150310
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]: 130
Initial Depth to Water [ft]: 67.22 **Time:** 11:20
Casing Volume [gal]:
Final Depth to Water [ft]: 67.18 **Time:** 12:45
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Cloudy, 50s F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
11:35	118.5	0.24	-	12.78	6.33	0.220	10.36	145.0	18.1	67.22	
11:40	118.5	0.24	-	13.87	5.67	0.229	2.11	185.0	7.00	67.20	
11:45	118.5	0.26	-	13.92	5.62	0.230	1.14	176.9	3.48	67.20	
11:50	118.5	0.24	-	14.01	5.61	0.229	0.88	181.1	1.96	67.20	
11:55	118.5	0.26	-	14.03	5.60	0.229	0.77	182.8	1.66	67.20	
12:00	118.5	0.24	-	14.09	5.60	0.229	0.73	184.3	1.53	67.20	
12:05	118.5	0.24	-	14.10	5.60	0.228	0.69	187.9	1.19	67.20	
12:10	118.5	0.26	-	14.14	5.59	0.227	0.68	190.4	0.97	67.20	
12:15	118.5	0.26	-	14.16	5.59	0.227	0.69	192.5	0.81	67.20	
12:20	118.5	0.26	-	14.15	5.59	0.226	0.69	195.1	0.57	67.20	
12:25	118.5	0.26	-	14.20	5.59	0.226	0.70	198.1	0.54	67.20	
12:30	118.5	0.26	~4	14.18	5.59	0.226	0.70	200.5	0.58	67.20	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: B

Sample time at 12:45

Controller set to 65 psi, 4 cpm

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

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Well ID: GM-07S
Pump Intake Depth [ft]: 119.7
Project Name: Swope Superfund
Sampling Program: MNA
Date: 3/11/2015
Recorded By: E. Jacesko
Sample ID: GM-7S.20150311
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]: 130
Initial Depth to Water [ft]: 72.12 **Time:** 15:53
Casing Volume [gal]:
Final Depth to Water [ft]: 72.37 **Time:** 17:31
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Sunny, ~60F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
16:05	119.7	0.2	-	13.84	4.63	0.306	4.51	307.2	2.36	72.52	
16:10	119.7	0.2	-	13.76	4.50	0.324	3.22	334.3	1.88	72.49	
16:15	119.7	0.2	-	13.74	4.49	0.326	3.10	343.6	1.09	72.44	
16:20	119.7	0.2	-	13.72	4.48	0.326	2.96	347.7	1.02	72.41	
16:25	119.7	0.2	-	13.80	4.48	0.326	2.91	351.2	1.16	72.38	
16:30	119.7	0.2	-	13.65	4.49	0.326	2.86	352.6	1.31	72.38	
16:35	119.7	0.2	-	13.64	4.50	0.327	2.75	353.0	1.54	72.38	
16:40	119.7	0.2	-	13.60	4.50	0.327	2.65	351.2	2.69	72.38	
16:45	119.7	0.2	-	13.57	4.53	0.333	2.56	330.4	3.61	72.38	
16:50	119.7	0.2	-	13.56	4.54	0.335	2.50	323.4	3.02	72.38	
16:55	119.7	0.2	-	13.56	4.54	0.336	2.51	320.4	3.20	72.39	
17:00	119.7	0.2	~2.9	13.54	4.54	0.337	2.50	317.2	2.97	72.37	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: A

Sample time at 17:05

Air quality around well and over purge water = 0.0 ppm

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

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Well ID: GM-08S
Pump Intake Depth [ft]: 119.9
Project Name: Swope Superfund
Sampling Program: MNA
Date: 3/11/2015
Recorded By: E. Jacesko
Sample ID: GM-8S.20150311
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]: 130
Initial Depth to Water [ft]: 76.50 **Time:** 10:40
Casing Volume [gal]:
Final Depth to Water [ft]: 76.54 **Time:** 11:50
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Sunny, ~50F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
10:50	119.9	0.24	-	13.66	6.38	0.134	3.80	38.5	59.5	76.51	
10:55	119.9	0.24	-	13.69	6.30	0.118	3.08	6.5	48.3	76.51	
11:00	119.9	0.24	-	13.70	6.29	0.118	2.83	-1.4	39.9	76.52	
11:05	119.9	0.24	-	13.72	6.29	0.117	2.76	-5.4	34.4	76.52	
11:10	119.9	0.24	-	13.87	6.29	0.117	2.67	-9.8	32.3	76.52	
11:15	119.9	0.24	-	13.87	6.29	0.117	2.62	-10.0	30.8	76.52	
11:20	119.9	0.24	~1.9	13.90	6.29	0.116	2.54	-13.5	29.7	76.53	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: A

Sample time at 11:25

Air quality around well = 0.0 ppm

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

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Well ID: MW-01
Pump Intake Depth [ft]: 126.3
Project Name: Swope Superfund
Sampling Program: MNA
Date: 3/10/2015
Recorded By: E. Jacesko
Sample ID: MW-1.20150310
Duplicate ID: MW-1.20150310.MS, MW-1.20150310

Well Diameter [in]: 4
Total Depth of Well [ft]: 130
Initial Depth to Water [ft]: 75.53 **Time:** 12:45
Casing Volume [gal]:
Final Depth to Water [ft]: 75.49 **Time:** 15:22
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Overcast, ~45F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
13:05	126.3	0.16	-	13.68	6.16	0.171	3.80	227.6	2.06	75.53	
13:10	126.3	0.16	-	13.61	5.93	0.16	3.01	230.7	0.90	75.52	
13:15	126.3	0.16	-	13.55	5.84	0.159	2.77	230.2	1.23	75.51	
13:20	126.3	0.16	-	13.51	5.77	0.157	2.45	231.6	0.88	75.50	
13:25	126.3	0.16	-	13.57	5.74	0.156	2.20	231.8	0.60	75.49	
13:30	126.3	0.16	-	13.56	5.73	0.155	2.09	232.1	0.50	75.49	
13:35	126.3	0.16	-	13.59	5.72	0.156	1.97	231.8	0.48	75.50	
13:40	126.3	0.16	-	13.52	5.71	0.157	1.87	231.9	0.41	75.50	
13:45	126.3	0.16	-	13.51	5.72	0.157	1.81	230.6	0.52	75.49	
13:50	126.3	0.16	-	13.55	5.71	0.158	1.71	229.6	0.37	75.50	
13:55	126.3	0.16	-	13.63	5.71	0.159	1.58	226.1	0.43	75.50	
14:00	126.3	0.16	-	13.63	5.72	0.159	1.53	225.0	0.38	75.50	estimated water level
14:05	126.3	0.16	~1.2	13.68	5.71	0.160	1.45	223.8	0.41	75.49	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: A

Sample time at 14:10

Screen 110-130' BGS. Bob and Mike w/ EPA okay sampling when turbidity is <1 NTU if all other parameters are stable. Air quality around well 0.0 ppm

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

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Well ID: MW-02
Pump Intake Depth [ft]: 96.7
Project Name: Swope Superfund
Sampling Program: MNA
Date: 3/12/2015
Recorded By: E. Jacesko
Sample ID: MW-2.20150312
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]: 102
Initial Depth to Water [ft]: 76.23 **Time:** 12:00
Casing Volume [gal]:
Final Depth to Water [ft]: 76.58 **Time:** 13:00
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Sunny, Windy ~38F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
12:20	96.7	0.2	-	13.39	5.35	0.175	1.54	94.4	17.9	76.58	
12:25	96.7	0.2	-	12.96	5.36	0.175	1.82	94.6	16.6	76.59	
13:30	96.7	0.2	-	12.96	5.37	0.175	1.86	95.7	16.6	76.58	
12:35	96.7	0.2	-	12.98	5.36	0.175	1.81	97.7	18.0	76.59	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: C and A, respectively

Sample time at 12:40

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

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Well ID: MW-04
Pump Intake Depth [ft]: 124.8
Project Name: Swope Superfund
Sampling Program: MNA
Date: 3/10/2015
Recorded By: E. Jacesko
Sample ID: MW-4.20150310
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]: 130
Initial Depth to Water [ft]: 70.05 **Time:** 15:30
Casing Volume [gal]:
Final Depth to Water [ft]: 70.06 **Time:** 16:10
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Overcast, ~45F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
15:45	124.8	0.3	-	13.88	5.60	0.138	4.84	240.5	3.59	70.09	
15:50	124.8	0.3	-	13.99	5.48	0.138	3.70	250.5	1.44	70.03	
15:55	124.8	0.3	-	14.01	5.46	0.137	3.58	253.9	1.01	70.09	
16:00	124.8	0.3	-	14.03	5.44	0.137	3.56	260.5	2.16	70.05	
16:05	124.8	0.3	-	14.01	5.43	0.137	3.54	264.5	2.08	70.03	
16:10	124.8	0.3	~2	14.02	5.43	0.136	3.59	266.9	1.97	70.06	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: A

Sample time at 16:20

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

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Well ID: MW-07
Pump Intake Depth [ft]: 102.9
Project Name: Swope Superfund
Sampling Program: MNA
Date: 3/11/2015
Recorded By: K. Hollerbach, E. Jacesko
Sample ID: MW-7.20150311
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]: 115
Initial Depth to Water [ft]: 76.75 **Time:** 13:20
Casing Volume [gal]:
Final Depth to Water [ft]: 76.77 **Time:** 14:50
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Cloudy, 50s F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
13:30	102.9	0.12	-	9.11	7.42	0.133	12.24	141.5	3.59	76.83	
13:35	102.9	0.28	-	13.72	6.39	0.065	9.31	183.8	3.80	76.90	
13:40	102.9	0.16	-	13.49	6.22	0.042	9.14	195.8	4.21	76.86	
13:45	102.9	0.22	-	13.41	6.17	0.037	9.17	197.1	6.68	76.84	
13:50	102.9	0.20	-	13.64	6.19	0.032	9.17	196.4	9.08	76.87	
13:55	102.9	0.24	-	13.65	6.22	0.031	9.12	195.2	11.1	76.87	
14:00	102.9	0.24	-	13.71	6.22	0.031	9.09	193.4	12.8	76.87	
14:05	102.9	0.26	-	13.71	6.23	0.031	9.06	193.7	14.8	76.87	
14:10	102.9	0.22	-	13.73	6.23	0.031	9.04	190.6	14.9	76.87	
14:15	102.9	0.24	-	13.67	6.23	0.031	9.03	190.7	16.6	76.83	
14:20	102.9	0.22	-	13.72	6.23	0.031	8.96	191.9	17.5	76.83	
14:25	102.9	0.24	~4	13.72	6.21	0.031	8.94	191.4	17.5	76.83	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: B

Sample time at 14:50

Controller set to 60 psi, 4 cpm

SITE NAME: SWOPE Superfund

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Well ID: MW-09S
Pump Intake Depth [ft]: 124.9
Project Name: Swope Superfund
Sampling Program: MNA
Date: 3/10/2015
Recorded By: K. Hollerbach, E. Jacesko
Sample ID: MW-9S.20150310
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]: 130
Initial Depth to Water [ft]: 76.45 **Time:** 14:40
Casing Volume [gal]:
Final Depth to Water [ft]: 76.42 **Time:** 15:45
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Rainy, 50s F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
14:55	124.9	0.16	-	13.42	8.35	0.223	10.51	123.5	51.3	76.45	
15:00	124.9	0.32	-	13.74	7.19	0.359	1.62	-105.6	15.5	76.45	
15:05	124.9	0.28	-	13.65	6.60	0.395	0.91	-75.0	9.42	76.45	
15:10	124.9	0.30	-	13.71	6.51	0.399	0.82	-71.3	8.57	76.45	
15:15	124.9	0.26	-	13.63	6.45	0.405	0.72	-68.1	7.45	76.45	
15:20	124.9	0.26	-	13.61	6.43	0.407	0.72	-66.1	6.17	76.45	
15:25	124.9	0.26	-	13.62	6.41	0.409	0.70	-64.2	5.67	76.45	
15:30	124.9	0.26	~3	13.59	6.40	0.411	0.69	-63.2	6.09	76.45	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: B

Sample time at 1545

Controller set to 70 psi, 4 cpm

SITE NAME: SWOPE Superfund

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Well ID: MW-10S
Pump Intake Depth [ft]: 130.3
Project Name: Swope Superfund
Sampling Program: MNA
Date: 3/11/2015
Recorded By: E. Jacesko
Sample ID: MW-10S.20150311
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]: 133
Initial Depth to Water [ft]: 77.60 **Time:** 13:20
Casing Volume [gal]:
Final Depth to Water [ft]: 77.58 **Time:** 14:56
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Partly Cloudy, ~60F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
13:55	130.3	0.26	-	13.63	4.42	0.407	7.03	355.8	1.80	77.60	
14:00	130.3	0.26	-	13.57	4.38	0.406	6.77	361.6	0.47	77.62	
14:08	130.3	0.26	-	13.64	4.36	0.406	6.55	369.9	0.65	77.61	
14:13	130.3	0.26	-	13.57	4.35	0.406	6.50	372.6	0.48	77.61	
14:18	130.3	0.26	~1.6	13.56	4.35	0.404	6.45	372.0	0.56	77.60	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: A

Sample time at 14:23

Air bubble is line initially from flow through cell prior to taking readings. Changed cell and no more bubbles. Air quality around well and over purge water = 0.0 ppm.

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

Geosyntec Consultants, Inc.
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Ewing, New Jersey 08628
Phone: 609-895-1400
Fax: 609-895-1401

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Well ID: MW-11S
Pump Intake Depth [ft]: 121.5
Project Name: Swope Superfund
Sampling Program: MNA
Date: 3/11/2015
Recorded By: K. Hollerbach, E. Jacesko
Sample ID: MW-11S.20150311
Duplicate ID: DUP-1.20150311

Well Diameter [in]: 4
Total Depth of Well [ft]: 127
Initial Depth to Water [ft]: 76.62 **Time:** 10:15
Casing Volume [gal]:
Final Depth to Water [ft]: 76.63 **Time:** 11:45
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Cloudy, 50s F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
10:30	121.5	0.24	-	14.07	6.73	0.085	10.58	140.1	12.4	76.62	
10:35	121.5	0.24	-	14.93	5.95	0.084	9.49	190.3	8.23	76.62	
10:40	121.5	0.24	-	14.93	5.56	0.082	9.08	222.2	7.11	76.62	
10:45	121.5	0.24	-	14.93	5.45	0.082	8.82	232.2	6.25	76.62	
10:50	121.5	0.26	-	15.04	5.39	0.080	8.68	241.8	6.59	76.62	
10:55	121.5	0.26	-	15.04	5.38	0.080	8.60	245.2	6.30	76.62	
11:00	121.5	0.26	-	15.00	5.37	0.080	8.56	249.9	5.71	76.62	
11:05	121.5	0.26	-	15.03	5.37	0.079	8.54	254.3	5.69	76.65	
11:10	121.5	0.28	-	15.02	5.36	0.078	8.50	258.5	5.06	76.65	
11:15	121.5	0.28	-	15.02	5.36	0.079	8.46	260.5	5.30	76.65	
11:20	121.5	0.28	-	15.04	5.35	0.077	8.46	262.9	4.54	76.65	
11:25	121.5	0.28	-	15.02	5.35	0.077	8.47	265.5	4.14	76.64	
11:30	121.5	0.28	~5	15.05	5.34	0.076	8.46	267.8	4.22	76.64	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: B

Sample time at 11:45

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Well ID: GM-01S
Pump Intake Depth [ft]: 117.9
Project Name: Swope Superfund
Sampling Program: MNA
Date: 6/10/2015
Recorded By: E. Ockert
Sample ID: GM-1S.20150610
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 73.18 **Time:** 14:43
Casing Volume [gal]:
Final Depth to Water [ft]: 73.21 **Time:** 15:55
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Sunny, 80s F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
14:50	117.9	0.20	-	14.90	4.93	0.950	9.24	331.8	1.20	73.20	
14:55	117.9	0.20	-	14.98	5.02	0.117	4.02	329.3	0.96	73.20	
15:00	117.9	0.20	-	15.07	5.06	0.128	2.12	356.2	0.47	73.20	
15:05	117.9	0.20	-	15.09	5.06	0.128	2.06	361.7	0.32	73.19	
15:10	117.9	0.20	-	14.87	5.06	0.127	1.76	367.5	0.51	73.19	
15:15	117.9	0.20	-	14.81	5.07	0.126	1.30	370.9	0.34	73.19	
15:20	117.9	0.20	-	14.89	5.07	0.125	1.31	371.7	0.40	73.20	
15:25	117.9	0.20	-	15.12	5.08	0.124	1.05	372.1	0.22	73.19	
15:30	117.9	0.20	-	15.00	5.07	0.123	0.95	374.3	0.37	73.20	
15:35	117.9	0.20	-	15..07	5.07	0.122	0.87	376.0	0.32	73.19	
15:40	117.9	0.20	-	15.00	5.08	0.120	0.80	375.8	0.27	73.19	
15:45	117.9	0.20	-	14.99	5.08	0.119	0.77	376.4	0.25	73.19	
15:50	117.9	0.20	~4.5	14.97	5.07	0.119	0.74	377.9	0.31	73.19	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: B

Sample time at 1555

Snap Sampler inspection at GM-01D: DTW = 73.91' btoic at 16:12. 4 samplers

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Monitoring Well Low-Flow Purging & Sampling Record

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Well ID: GM-02S
Pump Intake Depth [ft]: 117.7
Project Name: Swope Superfund
Sampling Program: MNA
Date: 6/10/2015
Recorded By: E. Jacesko
Sample ID: GM-2S.20150610
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 66.09 **Time:** 12:11
Casing Volume [gal]:
Final Depth to Water [ft]: 66.10 **Time:** 13:12
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Sunny, Hot, ~85F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
12:20	117.7	0.20	-	18.57	6.54	1.327	1.87	73.9	5.28	66.12	
12:25	117.7	0.20	-	17.84	6.23	0.352	1.20	94.2	2.99	66.11	
12:30	117.7	0.20	-	17.97	6.13	0.512	1.16	107.6	1.18	66.11	
12:35	Missed due to phone call from SDo										
12:40	117.7	0.20	-	17.65	5.91	0.425	0.96	151.3	0.92	66.11	
12:45	117.7	0.20	-	17.75	5.90	0.424	0.92	152.8	0.98	66.11	
12:50	117.7	0.20	~2.5	17.67	5.88	0.421	0.92	160.9	0.98	66.12	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: C

Sample time at 12:55 Snap Sampler inspection at GM-02D: DTW = 66.65' btoic at 13:25. Measured to casing, not snap cover. 2 bottle assembly, found bottles closed.

Moisture under manhole and water between outer and inner casing. Water is very silty and silt is on tubing and assembly. Rinsed them off then set & redeployed.

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Well ID: GM-03RS
Pump Intake Depth [ft]: 124.6
Project Name: Swope Superfund
Sampling Program: MNA
Date: 6/9/2015
Recorded By: E. Jacesko
Sample ID: GM-3RS.20150609
Duplicate ID: NA

Well Diameter [in]: 2
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 75.89 **Time:** 15:10
Casing Volume [gal]:
Final Depth to Water [ft]: 75.95 **Time:** 16:37
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Sunny, Hot, ~80F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
15:25	124.6	0.20	-	17.26	5.15	0.116	2.01	158.8	1.86	76.08	
15:30	124.6	0.20	-	16.64	5.11	0.115	1.21	176.1	1.45	76.04	
15:35	124.6	0.20	-	16.24	5.13	0.115	0.89	189.2	1.49	76.06	
15:40	124.6	0.20	-	16.41	5.15	0.114	0.86	190.9	1.87	76.05	
15:45	124.6	0.20	-	16.76	5.16	0.114	0.80	197.7	1.44	76.04	
15:50	124.6	0.20	-	16.95	5.13	0.114	0.77	202.0	1.61	76.05	
15:55	124.6	0.20	-	16.86	5.13	0.114	0.75	207.4	1.61	76.04	
16:00	124.6	0.20	-	16.76	5.16	0.114	0.75	210.7	1.08	76.03	
16:05	124.6	0.20	-	16.75	5.15	0.114	0.72	214.4	0.93	76.03	
16:10	124.6	0.20	-	16.51	5.14	0.115	0.73	217.2	1.01	76.06	
16:15	124.6	0.20	~3.5	16.50	5.13	0.115	0.72	218.9	0.97	76.06	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: C

Sample time at 16:20

SITE NAME: SWOPE Superfund

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Well ID: GM-05S
Pump Intake Depth [ft]: 116.6
Project Name: Swope Superfund
Sampling Program: MNA
Date: 6/10/2015
Recorded By: E. Jacesko
Sample ID: GM-5S.20150610
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 57.95 **Time:** 14:49
Casing Volume [gal]:
Final Depth to Water [ft]: 57.99 **Time:** 16:15
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Partly Cloudy, Hot, ~88F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
15:00	116.6	0.20	-	16.40	6.36	0.210	3.14	123.9	10.2	57.99	
15:05	116.6	0.20	-	15.92	5.38	0.121	3.48	191.6	2.79	57.99	
15:10	116.6	0.20	-	15.83	5.34	0.117	3.48	194.5	2.11	57.99	
15:15	116.6	0.20	-	16.05	5.26	0.113	3.72	203.6	2.00	57.97	
15:20	116.6	0.20	-	16.02	5.20	0.112	3.94	213.2	2.94	57.99	
15:25	116.6	0.20	-	16.02	5.18	0.111	4.03	221.6	2.50	57.96	
15:30	116.6	0.20	-	16.09	5.17	0.111	4.11	225.6	3.02	57.99	
15:35	116.6	0.20	-	16.62	5.15	0.112	4.18	229.9	4.27	57.98	
15:40	116.6	0.20	-	16.10	5.14	0.113	4.32	234.8	3.35	57.99	
15:45	116.6	0.20	-	16.07	5.11	0.114	4.37	237.9	0.96	57.99	
15:50	116.6	0.20	-	16.03	5.10	0.114	4.41	239.4	0.77	57.99	
15:55	116.6	0.20	~4	16.02	5.10	0.114	4.38	240.8	0.57	57.98	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: C

Sample time at 16:00

Snap Sampler inspection at GM-05D: DTW = 59.41' btoic at 16:20, read to casing, not to snap cap. 2 bottle assembly, all closed on inspection.

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

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Well ID: GM-06S
Pump Intake Depth [ft]: 118.5
Project Name: Swope Superfund
Sampling Program: MNA
Date: 6/10/2015
Recorded By: E. Jacesko
Sample ID: GM-6S.20150610
Duplicate ID: NA

Well Diameter [in]: 2
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 67.00 **Time:** 09:58
Casing Volume [gal]:
Final Depth to Water [ft]: 67.04 **Time:** 11:25
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Sunny, Clear, Hot, ~85F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
10:06	118.5	0.20	-	15.28	5.96	0.214	4.10	109.7	2.17	67.05	
10:10	118.5	0.20	-	15.38	5.64	0.227	1.44	128.2	4.25	67.06	
10:15	118.5	0.20	-	15.33	5.60	0.228	1.02	134.8	4.51	67.06	
10:20	118.5	0.20	-	15.24	5.63	0.226	0.89	137.9	3.70	67.03	
10:25	118.5	0.20	-	15.36	5.61	0.226	0.81	145.6	2.97	67.04	
10:30	118.5	0.20	-	15.38	5.60	0.225	0.76	155.8	1.64	67.04	
10:35	118.5	0.20	-	15.43	5.59	0.224	0.79	161.6	1.89	67.04	
10:40	118.5	0.20	-	15.49	5.57	0.223	0.76	172.3	1.74	67.04	
10:45	118.5	0.20	-	15.55	5.54	0.222	0.76	182.4	0.60	67.04	
10:50	118.5	0.20	-	15.50	5.54	0.222	0.76	183.8	0.51	67.04	
10:55	118.5	0.20	~4	15.51	5.52	0.222	0.77	188.2	0.69	67.04	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: C Used 70 psi on controller

Sample time at 11:00 Snap Sampler inspection at GM-06D: DTW = 67.12' btoic at 11:30. 2 bottle assembly - bottles were closed.

Note: measured to casing, not snap sampler ring because ring was removable and added height to the casing.

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Well ID: GM-07S
Pump Intake Depth [ft]: 119.7
Project Name: Swope Superfund
Sampling Program: MNA
Date: 6/9/2015
Recorded By: E. Jacesko
Sample ID: GM-7S.20150609
Duplicate ID: NA

Well Diameter [in]: 2
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 71.79 **Time:** 12:14
Casing Volume [gal]:
Final Depth to Water [ft]: 71.94 **Time:** 13:16
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Partly Cloudy, Hot, ~80F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
12:25	119.7	0.20	-	15.31	5.02	0.332	3.20	173.3	2.07	72.04	
12:30	119.7	0.20	-	15.25	4.83	0.358	2.49	189.1	2.00	72.06	
12:35	119.7	0.20	-	15.11	4.77	0.360	2.01	207.7	1.44	72.15	
12:40	119.7	0.20	-	15.06	4.76	0.362	1.92	215.0	1.13	72.18	
12:45	119.7	0.20	-	15.05	4.77	0.364	1.86	216.6	0.70	72.19	
12:50	119.7	0.20	-	14.90	4.77	0.364	1.82	216.2	0.72	72.17	
12:55	119.7	0.20	~3	15.14	4.78	0.369	1.80	217.0	0.82	72.18	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: C

Sample time at 13:00 Snap Sampler inspection at GM-03D: DTW = 72.41' btoic at 10:45. 2 bottle assembly.

Snap sampler inspection at GM-07D: DTW = 72.33' btoic at 14:40. Note: At both wells, all bottles were snapped shut. Some snapped while being pulled up.

SITE NAME: SWOPE Superfund

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Well ID: GM-08S
Pump Intake Depth [ft]: 119.9
Project Name: Swope Superfund
Sampling Program: MNA
Date: 6/9/2015
Recorded By: E. Ockert
Sample ID: GM-8S.20150609
Duplicate ID: NA

Well Diameter [in]: 2
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 76.30 **Time:** 14:24
Casing Volume [gal]:
Final Depth to Water [ft]: 76.34 **Time:** 15:20
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Sunny, 80s F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
14:45	119.9	0.20	-	16.37	6.47	0.156	3.04	174.1	23.8	76.35	
14:50	119.9	0.20	-	15.86	6.32	0.152	1.84	149.6	17.3	76.35	
14:55	119.9	0.20	-	15.73	6.30	0.151	1.47	105.4	15.9	76.36	
15:00	119.9	0.20	-	16.01	6.31	0.150	1.32	105.5	14.2	76.36	
15:05	119.9	0.20	-	15.95	6.30	0.150	1.24	104.3	13.7	76.36	
15:10	119.9	0.20	-	16.12	6.31	0.149	1.19	100.9	13.7	76.35	
15:15	119.9	0.20	~2.5	16.05	6.30	0.148	1.16	96.10	14.0	76.35	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: B

Sample time at 15:20

Snap Sampler inspection at GM-08D: DTW = 76.70' btoic at 15:50. 2 samplers.

SITE NAME: SWOPE Superfund

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Well ID: MW-01
Pump Intake Depth [ft]: 126.3
Project Name: Swope Superfund
Sampling Program: MNA
Date: 6/10/2015
Recorded By: E. Ockert
Sample ID: MW-1.20150610
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 75.35 **Time:** 09:42
Casing Volume [gal]:
Final Depth to Water [ft]: 75.37 **Time:** 11:05
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Sunny, 80s F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
09:50	126.3	0.20	-	15.87	5.40	0.144	11.21	218.5	0.83	75.36	
09:55	127.3	0.20	-	15.98	5.84	0.144	6.10	245.5	0.39	75.35	
10:00	128.3	0.20	-	15.99	5.84	0.144	6.10	245.5	0.32	75.35	
10:05	129.3	0.20	-	-	-	-	-	-	-	-	
10:25	130.3	0.20	-	16.01	5.57	0.146	3.38	244.3	0.25	75.35	
10:30	131.3	0.20	-	15.82	5.58	0.146	2.68	262.1	0.36	75.36	
10:35	132.3	0.20	-	16.07	5.58	0.145	2.27	272.0	0.17	75.37	
10:40	133.3	0.20	-	15.77	5.57	0.145	2.03	280.0	0.25	75.36	
10:45	134.3	0.20	-	15.99	5.60	0.145	1.79	285.9	0.21	75.36	
10:50	135.3	0.20	-	15.81	5.55	0.145	1.62	290.6	0.21	75.36	
10:55	136.3	0.20	-	15.86	5.60	0.145	1.49	292.5	0.19	75.35	
11:00	137.3	0.20	~4.5	15.98	5.62	0.145	1.51	293.8	0.24	75.36	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: B

Sample time at 11:05

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

Geosyntec Consultants, Inc.
7 Graphics Drive, Suite 106
Ewing, New Jersey 08628
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Fax: 609-895-1401

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Well ID: MW-02
Pump Intake Depth [ft]: 96.7
Project Name: Swope Superfund
Sampling Program: MNA
Date: 6/10/2015
Recorded By: E. Ockert
Sample ID: MW-2.20150610
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 75.70 **Time:** 13:13
Casing Volume [gal]:
Final Depth to Water [ft]: 75.80 **Time:** 14:05
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Sunny, 80F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
13:20	96.7	0.20	-	16.87	5.27	0.191	7.16	286.9	15.6	75.71	
13:25	96.7	0.20	-	16.59	5.29	0.190	5.50	298.3	4.93	75.71	
13:30	96.7	0.20	-	16.50	5.30	0.189	4.70	306.5	4.69	75.70	
13:35	96.7	0.20	-	16.61	5.33	0.188	3.74	311.1	4.31	75.71	
13:40	96.7	0.20	-	16.26	5.31	0.188	3.00	318.1	5.06	75.71	
13:45	96.7	0.20	-	16.19	5.32	0.187	2.63	319.4	7.16	75.71	
13:50	96.7	0.20	-	16.39	5.35	0.187	2.55	321.1	8.42	75.71	
13:55	96.7	0.20	-	16.28	5.38	0.187	2.66	318.2	8.26	75.71	
14:00	96.7	0.20	~4.5	16.28	5.38	0.187	2.66	314.7	9.06	75.71	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: B

Sample time at 14:05

SITE NAME: SWOPE Superfund

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Well ID: MW-04
Pump Intake Depth [ft]: 124.8
Project Name: Swope Superfund
Sampling Program: MNA
Date: 6/10/2015
Recorded By: J. Chambers
Sample ID: MW-4.20150610
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 70.07 **Time:** 09:50
Casing Volume [gal]:
Final Depth to Water [ft]: 70.08 **Time:** 11:50
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Sunny, 80s F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
09:50	Begin pumping at MW-04 at 0.20 L/min									70.07	
09:55	124.8	0.20	-	16.63	4.27	0.098	5.66	286.1	2.60	70.07	
10:00	124.8	0.20	-	16.52	4.30	0.097	5.35	285.8	1.26	70.08	
10:05	124.8	0.20	-	16.57	4.42	0.097	5.32	283.2	2.55	70.08	
10:10	124.8	0.20	-	16.52	4.28	0.096	5.24	291.1	2.63	70.08	
10:15	124.8	0.20	-	16.63	4.32	0.096	5.35	288.3	2.30	70.08	
10:20	124.8	0.20	-	16.63	4.32	0.095	5.37	290.3	1.56	70.08	
10:25	124.8	0.20	-	16.40	4.21	0.095	5.41	294.5	1.81	70.08	
10:30	124.8	0.20	-	16.48	4.29	0.095	5.41	292.9	2.04	70.08	
10:35	124.8	0.20	-	16.60	4.19	0.095	5.43	296.2	1.78	70.08	
10:40	124.8	0.20	-	16.26	4.18	0.095	5.53	299.4	1.44	70.08	
10:45	124.8	0.20	-	17.82	4.44	0.096	5.40	288.7	1.57	70.08	
10:50	124.8	0.20	-	16.57	4.22	0.095	5.54	308.3	1.64	70.08	
10:55	124.8	0.20	-	16.30	3.93	0.095	5.56	309.2	1.68	70.07	
11:00	124.8	0.20	-	16.94	4.11	0.094	5.47	302.2	1.61	70.08	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: A

Sample time at 11:05

SITE NAME: SWOPE Superfund

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Well ID: MW-07
Pump Intake Depth [ft]: 102.9
Project Name: Swope Superfund
Sampling Program: MNA
Date: 6/10/2015
Recorded By: J. Chambers
Sample ID: MW-7.20150610
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 76.79 **Time:** 13:50
Casing Volume [gal]:
Final Depth to Water [ft]: 76.87 **Time:** 14:35
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Sunny, High 80s F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
13:50	102.9	Begin pumping at MW-07. Adjusting flow rate.								76.79	
14:00	102.9	0.20	-	15.10	5.46	0.034	10.17	271.7	8.18	76.89	
14:05	102.9	0.20	-	15.41	4.11	0.095	6.32	321.5	3.59	76.89	
14:10	102.9	0.20	-	15.42	3.99	0.114	7.07	329.4	2.46	76.87	
14:15	102.9	0.20	-	15.48	4.00	0.118	7.21	331.7	3.60	76.88	
14:20	102.9	0.20	-	15.47	4.02	0.121	7.31	335.9	1.41	76.89	
14:25	102.9	0.20	-	15.09	4.01	0.123	7.41	340.6	1.38	76.87	
14:30	102.9	0.20	-	15.41	3.99	0.123	7.37	342.9	1.31	76.88	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: C

Sample time at 14:40

SITE NAME: SWOPE Superfund

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Well ID: MW-09S
Pump Intake Depth [ft]: 124.9
Project Name: Swope Superfund
Sampling Program: MNA
Date: 6/9/2015
Recorded By: J. Chambers
Sample ID: MW-9S.20150609
Duplicate ID: NA

Well Diameter [in]: 2
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 76.12 **Time:** 15:05
Casing Volume [gal]:
Final Depth to Water [ft]: 76.12 **Time:** 16:00
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Sunny, 80s F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
15:05	Begin pumping at MW-09S. Adjusting flow rate.									76.11	
15:10	124.9	0.20	-	16.16	4.42	0.266	10.50	227.2	50.7	76.12	
15:15	124.9	0.20	-	16.51	4.87	0.312	2.25	120.8	61.1	76.12	
15:20	124.9	0.20	-	16.49	5.45	0.320	1.52	20.7	39.1	76.12	
15:25	124.9	0.20	-	16.26	5.61	0.337	1.02	-11.1	28.9	76.12	
15:30	124.9	0.20	-	16.03	5.65	0.342	0.95	-13.5	26.2	76.12	
15:35	124.9	0.20	-	15.82	5.78	0.345	0.88	-16.6	26.1	76.12	
15:40	124.9	0.20	-	15.78	5.85	0.348	0.83	-18.4	21.6	76.12	
15:45	124.9	0.20	-	16.26	6.00	0.346	0.84	-29.1	21.8	76.12	
15:50	124.9	0.20	-	16.40	6.04	0.344	0.87	-32.7	20.0	76.12	
15:55	124.9	0.20	-	16.38	5.97	0.343	0.89	-30.2	19.9	76.12	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: A

Sample time at 16:00

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

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Well ID: MW-10S
Pump Intake Depth [ft]: 130.3
Project Name: Swope Superfund
Sampling Program: MNA
Date: 6/9/2015
Recorded By: E. Ockert
Sample ID: MW-10S.20150609
Duplicate ID: NA

Well Diameter [in]: 2
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 77.35 **Time:** 11:36
Casing Volume [gal]:
Final Depth to Water [ft]: 77.35 **Time:** 13:26
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Sunny, 80s F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
11:55	130.3	0.20	-	15.55	4.66	0.333	7.93	363.5	18.0	77.35	
12:00	130.3	0.20	-	15.40	4.66	0.279	6.53	388.0	1.35	77.36	
12:05	130.3	0.20	-	15.52	4.66	0.273	6.12	396.2	1.36	77.36	
12:10	130.3	0.20	-	15.58	4.65	0.267	5.77	404.9	1.07	77.37	
12:15	130.3	0.20	-	15.60	4.66	0.261	5.52	408.3	1.00	77.37	
12:20	130.3	0.20	-	15.44	4.64	0.267	5.43	413.6	0.90	77.36	
12:25	130.3	0.20	-	15.58	4.63	0.266	5.34	413.9	0.21	77.36	
12:30	130.3	0.20	-	15.55	4.61	0.259	5.19	413.5	0.61	77.37	
12:35	130.3	0.20	-	15.53	4.59	0.255	5.09	418.3	0.24	77.37	
12:40	130.3	0.20	-	15.50	4.59	0.255	5.00	419.6	0.31	77.37	
12:45	130.3	0.20	~3	15.51	4.60	0.254	4.91	422.9	0.31	77.37	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: B

Sample time at 12:50

SITE NAME: SWOPE Superfund

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Well ID: MW-11S
Pump Intake Depth [ft]: 121.5
Project Name: Swope Superfund
Sampling Program: MNA
Date: 6/9/2015
Recorded By: J. Chambers
Sample ID: MW-11S.20150609
Duplicate ID: DUP-1.20150609

Well Diameter [in]: 2
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 76.32 **Time:** 11:15
Casing Volume [gal]:
Final Depth to Water [ft]: 76.32 **Time:** 12:25
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Sunny, 70s F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
11:15	Begin pumping at MW-11S. Adjusting flow rate.									76.32	
11:20	121.5	0.35	-	16.61	4.85	0.074	9.79	258.1	5.00	76.32	
11:25	121.5	0.20	-	17.27	4.51	0.072	8.22	298.1	5.00	76.32	
11:30	121.5	0.20	-	17.40	4.80	0.072	8.04	290.9	3.24	76.32	
11:35	121.5	0.20	-	17.51	4.83	0.071	7.96	293.4	2.94	76.32	
11:40	121.5	0.20	-	17.78	4.91	0.071	7.84	290.4	3.06	76.32	
11:45	121.5	0.20	-	17.72	4.86	0.071	7.74	294.4	3.22	76.32	
11:50	121.5	0.20	-	17.60	4.74	0.071	7.65	304.6	3.39	76.32	
11:55	121.5	0.20	-	17.74	4.68	0.071	7.52	308.3	3.83	76.32	
12:00	121.5	0.20	-	17.57	4.75	0.072	7.47	308.7	3.79	76.32	
12:05	121.5	0.20	-	17.61	4.75	0.072	7.41	310.1	2.27	76.32	
12:10	121.5	0.20	-	17.57	4.78	0.072	7.36	308.3	2.68	76.32	
12:15	121.5	0.20	-	17.60	4.68	0.072	7.35	314.1	2.58	76.32	
12:20	121.5	0.20	-	17.77	4.82	0.072	7.27	307.8	2.75	76.32	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: A

Sample time at 12:25

SITE NAME: SWOPE Superfund

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Well ID: GM-01S
Pump Intake Depth [ft]: 117.9
Project Name: Swope Superfund
Sampling Program: MNA
Date: 10/6/2015
Recorded By: M. Mraw
Sample ID: GM-01S.20151006
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 72.88 **Time:** 13:05
Casing Volume [gal]:
Final Depth to Water [ft]: 72.85 **Time:** 14:18
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Sunny, 70s F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
13:15	117.9	0.30	-	14.72	4.99	0.110	1.12	245.7	1.16	72.89	clear
13:20	117.9	0.30	-	14.76	4.92	0.106	0.51	257.2	0.72	72.89	
13:25	117.9	0.30	-	14.76	4.92	0.106	0.42	264.1	0.15	72.89	
13:30	117.9	0.30	-	14.73	4.97	0.106	0.40	266.3	0.40	72.89	
13:35	117.9	0.30	-	14.67	4.99	0.106	0.38	268.5	0.13	72.89	clear
13:40	117.9	0.30	-	14.73	5.00	0.106	0.38	269.4	0.35	72.89	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: B

Sample time at 13:45

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

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Well ID: GM-02S
Pump Intake Depth [ft]: 117.7
Project Name: Swope Superfund
Sampling Program: MNA
Date: 10/8/2015
Recorded By: J. Evans
Sample ID: GM-02S.20151008
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 65.06 **Time:** 09:15
Casing Volume [gal]:
Final Depth to Water [ft]: 65.06 **Time:** 11:05
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Cloudy, ~70F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
09:40	117.7	0.35	-	16.99	6.25	0.392	1.96	157.5	0.61	66.06	clear, colorless
09:45	117.7	0.40	~1	16.79	5.68	0.273	0.76	178.3	0.36	66.06	
09:50	117.7	0.40	-	17.09	5.65	0.272	0.75	187.5	0.45	65.94	
09:55	117.7	0.40	-	17.20	5.61	0.272	0.87	198.4	0.53	66.05	
10:00	117.7	0.40	-	16.89	5.60	0.270	0.77	203.1	0.36	66.05	
10:05	117.7	0.40	~2.5	16.85	5.60	0.270	0.69	206.3	0.39	66.05	
10:10	117.7	0.40	-	16.87	5.60	0.270	0.68	207.2	0.22	66.05	
10:15	117.7	0.40	~4	16.87	5.60	0.270	0.68	208.6	0.19	66.06	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: B

Sample time at 10:20

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

Geosyntec Consultants, Inc.
7 Graphics Drive, Suite 106
Ewing, New Jersey 08628
Phone: 609-895-1400
Fax: 609-895-1401

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Well ID: GM-03RS
Pump Intake Depth [ft]: 124.6
Project Name: Swope Superfund
Sampling Program: MNA
Date: 10/6/2015
Recorded By: J. Evans
Sample ID: GM-3RS.20151006
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 75.97 **Time:** 13:53
Casing Volume [gal]:
Final Depth to Water [ft]: 75.95 **Time:** 15:40
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Sunny, ~80F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
14:15	124.6	0.50	-	16.11	5.23	0.074	0.79	200.8	19.6	76.14	
14:20	124.6	0.30	-	16.24	4.74	0.073	0.68	198.0	4.38	76.11	
14:25	124.6	0.30	~1	16.04	4.70	0.073	0.82	197.0	2.76	76.12	
14:30	124.6	0.30	-	16.09	4.73	0.073	0.81	196.5	2.55	76.13	
14:35	124.6	0.30	~2	15.98	4.78	0.073	0.81	195.7	2.40	76.13	
14:40	124.6	0.30	-	15.99	4.80	0.073	0.82	194.5	2.08	76.10	
14:45	124.6	0.30	~3	16.17	4.94	0.073	0.85	191.2	2.06	76.11	
14:50	124.6	0.30	-	16.14	4.90	0.072	0.80	192.6	1.85	76.12	
14:55	124.6	0.30	~4	16.02	4.88	0.072	0.75	195.7	1.63	76.11	
15:00	124.6	0.30	-	15.95	4.87	0.072	0.77	196.3	1.58	76.14	
15:05	124.6	0.30	~5	15.92	4.96	0.072	0.75	193.5	1.67	76.14	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Sample time at 15:10

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

Geosyntec Consultants, Inc.
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Well ID: GM-05S
Pump Intake Depth [ft]: 116.6
Project Name: Swope Superfund
Sampling Program: MNA
Date: 10/8/2015
Recorded By: M. Mraw
Sample ID: GM05S.20151008
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 57.90 **Time:** 10:45
Casing Volume [gal]:
Final Depth to Water [ft]: 57.92 **Time:** 11:50
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Sunny, 70s F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
11:00	116.6	0.40	-	15.95	5.48	0.109	6.10	215.8	1.32	57.90	
11:05	116.6	0.40	-	15.68	4.94	0.112	4.43	237.5	0.60	57.90	
11:10	116.6	0.40	-	15.77	4.88	0.112	4.46	238.8	0.39	57.90	
11:15	116.6	0.40	-	15.79	4.88	0.112	4.41	238.0	0.39	57.90	
11:20	116.6	0.40	-	15.75	4.92	0.113	4.30	237.0	0.42	57.90	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: A

Sample time at 11:25

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

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Well ID: GM-06S
Pump Intake Depth [ft]: 118.5
Project Name: Swope Superfund
Sampling Program: MNA
Date: 10/8/2015
Recorded By: M. Mraw
Sample ID: GM-06S.20151008
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 66.26 **Time:** 09:15
Casing Volume [gal]:
Final Depth to Water [ft]: 66.76 **Time:** 10:25
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Cloudy, 70s F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
09:20	118.5	0.25	-	14.97	9.94	0.220	9.68	140.4	5.42	66.76	clear
09:25	118.5	0.25	-	15.00	7.18	0.219	1.04	191.5	2.23	66.76	
09:30	118.5	0.25	-	14.98	6.45	0.218	0.59	202.0	1.51	66.76	
09:35	118.5	0.25	-	14.97	6.03	0.218	0.46	204.7	0.66	66.76	
09:40	118.5	0.25	-	14.97	5.83	0.218	0.43	205.3	0.61	66.76	
09:45	118.5	0.25	-	14.96	5.72	0.216	0.41	206.9	0.43	66.76	
09:50	118.5	0.25	-	14.94	5.68	0.216	0.40	207.4	0.52	66.76	
09:55	118.5	0.25	4.00	14.99	5.66	0.215	0.41	207.8	0.47	66.76	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: A

Sample time at 10:00

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

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Well ID: GM-07S
Pump Intake Depth [ft]: 119.7
Project Name: Swope Superfund
Sampling Program: MNA
Date: 10/7/2015
Recorded By: E. Jacesko, J. Evans
Sample ID: GM-7S.20151007
Duplicate ID: DUP-1.20151007

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 71.97 **Time:** 14:13
Casing Volume [gal]:
Final Depth to Water [ft]: 72.05 **Time:** 16:00
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Clear, ~80F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
14:30	119.7	0.20	-	16.03	4.82	0.375	8.14	189.6	0.24	72.11	
14:35	119.7	0.40	-	14.64	4.31	0.442	7.22	246.4	5.69	72.37	
14:40	119.7	0.40	-	14.63	4.31	0.449	6.47	258.5	6.57	72.42	
14:50	119.7	0.40	-	14.50	4.37	0.443	5.43	265.7	6.43	72.51	14:45 missed due to setting
14:55	119.7	0.40	-	14.51	4.42	0.438	4.92	265.8	6.46	72.47	up snap sampler gear
15:00	119.7	0.40	-	14.48	4.41	0.435	4.29	262.9	5.85	72.51	
15:05	119.7	0.40	-	14.50	4.37	0.434	4.08	263.3	6.15	72.53	
15:10	119.7	0.40	-	14.45	4.36	0.433	3.95	264.1	5.57	72.53	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: B

Sample time at 15:15

These meters were not used this morning so no mid day cal check done on them.

SITE NAME: SWOPE Superfund

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Well ID: GM-08S
Pump Intake Depth [ft]: 119.9
Project Name: Swope Superfund
Sampling Program: MNA
Date: 10/7/2015
Recorded By: M. Mraw
Sample ID: GM-08S.20151007
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 76.26 **Time:** 14:05
Casing Volume [gal]:
Final Depth to Water [ft]: 76.24 **Time:** 15:25
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Sunny, 70s F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
14:20	119.9	0.40	-	15.38	7.31	0.088	1.35	130.4	58.4	76.29	clear
14:25	119.9	0.40	-	15.24	6.75	0.084	0.78	105.6	16.4	76.29	clear
14:30	119.9	0.40	-	15.22	6.59	0.083	0.95	90.0	13.8	76.29	clear
14:35	119.9	0.40	-	15.18	6.50	0.083	1.04	77.7	12.8	76.29	clear
14:40	119.9	0.40	-	15.13	6.48	0.084	1.09	70.5	13.1	76.29	clear
14:45	119.9	0.40	5.00	15.17	6.40	0.085	1.07	60.1	11.6	76.29	clear
14:50	119.9	0.40	-	15.10	6.46	0.085	1.07	47.0	9.24	76.29	clear
14:55	119.9	0.40	-	15.14	6.43	0.086	1.04	39.0	8.36	76.29	clear
15:00	119.9	0.40	-	15.12	6.43	0.087	1.00	34.8	8.74	76.29	clear
15:05	119.9	0.40	8.00	15.10	6.41	0.087	1.01	30.5	8.52	76.29	clear

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: A

Sample time at 15:10

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

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Well ID: MW-01
Pump Intake Depth [ft]: 126.3
Project Name: Swope Superfund
Sampling Program: MNA
Date: 10/6/2015
Recorded By: J. Evans, E. Jacesko
Sample ID: MW-1.20151006
Duplicate ID: MS/MSD Collected for VOCs

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 75.19 **Time:** 09:51
Casing Volume [gal]:
Final Depth to Water [ft]: 75.18 **Time:** 11:00
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Sunny, ~78F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
10:15	126.3	0.30	-	15.08	5.80	0.150	1.46	236.3	1.00	75.19	
10:20	126.3	0.30	-	14.89	5.67	0.148	0.95	245.6	0.50	75.18	
10:25	126.3	0.30	-	14.89	5.69	0.145	1.13	2440.3	0.38	75.22	YSI shut off on its own prior
10:30	126.3	0.30	-	14.85	5.66	0.146	0.71	251.2	0.24	75.19	to 10:25
10:35	126.3	0.30	-	14.88	5.66	0.148	0.64	258.2	0.26	75.18	
10:40	126.3	0.30	-	14.85	5.69	0.149	0.69	251.0	0.16	75.18	YSI shut off again
10:45	126.3	0.30	-	14.90	5.67	0.150	0.61	256.9	0.19	75.18	
10:50	126.3	0.30	-	14.90	5.66	0.150	0.60	261.1	0.22	75.18	
10:55	126.3	0.30	~7	14.88	5.66	0.152	0.55	266.6	0.15	75.18	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: C

Sample time at 11:00

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

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Well ID: MW-02
Pump Intake Depth [ft]: 96.7
Project Name: Swope Superfund
Sampling Program: MNA
Date: 10/7/2015
Recorded By: J. Evans
Sample ID: MW-02.20151007
Duplicate ID: MS/D collected here

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 75.63 **Time:** 09:07
Casing Volume [gal]:
Final Depth to Water [ft]: 75.75 **Time:** 14:50
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather:

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
10:25	96.7	0.25	-	15.36	5.69	0.148	6.02	236.9	3.90	75.80	
10:30	96.7	0.30	-	15.09	5.32	0.163	3.80	253.5	2.79	75.85	
10:35	96.7	0.30	-	15.05	5.31	0.165	2.89	258.2	1.65	75.91	
10:40	96.7	0.25	-	15.24	5.36	0.165	2.27	262.9	1.63	75.96	
10:45	96.7	0.20	-	15.16	5.35	0.165	2.02	265.3	1.44	75.94	
10:50	96.7	0.20	-	15.25	5.36	0.165	1.73	267.7	1.61	75.97	
*11:00	96.7	0.20	~2.5	15.32	5.36	0.165	1.42	271.7	1.78	75.98	
11:05	96.7	0.20	-	15.42	5.36	0.166	0.88	273.5	1.69	75.97	
11:10	96.7	0.20	-	15.30	5.36	0.167	0.77	274.9	1.47	75.98	
11:15	96.7	0.20	-	15.29	5.37	0.167	0.74	276.9	1.48	75.98	
11:20	96.7	0.20	-	15.28	5.36	0.168	0.71	278.2	1.27	75.98	
11:25	96.7	0.20	-	missed parameter point 10/7/15 JE							
11:30	96.7	0.20	~4	15.33	5.37	0.173	0.76	240.7	1.47	75.98	
11:35	96.7	0.20	-	15.35	5.36	0.173	0.69	246.1	1.48	75.98	
11:40	96.7	0.20	-	15.41	5.38	0.175	0.65	245.2	1.32	75.98	
11:45	96.7	0.20	-	15.46	5.37	0.173	0.63	229.2	1.28	75.96	
11:50	96.7	0.20	~5	15.44	5.37	0.182	0.62	229.5	1.37	75.98	
11:55	96.7	0.20	-	15.47	5.37	0.184	0.61	227.9	1.16	75.98	
12:00	96.7	0.20	-	15.47	5.36	0.185	0.61	225.4	1.12	75.96	
12:05	96.7	0.20	~6	15.50	5.36	0.182	0.60	220.0	1.17	75.95	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: C

Sample time at 12:10; Well needed 2.5 hours to sample due to low flow rate needed to avoid drawdown. 10/7/15 JE

* 10 minute gap, assisted EJ with snap sampler 10/7/15 JE

SITE NAME: SWOPE Superfund

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Well ID: MW-04
Pump Intake Depth [ft]: 124.8
Project Name: Swope Superfund
Sampling Program: MNA
Date: 10/6/2015
Recorded By: E. Jacesko
Sample ID: MW-4.20151006
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 69.77 **Time:** 13:13
Casing Volume [gal]:
Final Depth to Water [ft]: 69.78 **Time:** 14:10
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Clear, ~80F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
13:40	124.8	0.30	-	16.05	5.65	0.115	5.04	215.8	0.71	69.71	
13:45	124.8	0.30	-	15.84	5.13	0.118	3.92	283.3	0.73	69.76	
13:50	124.8	0.30	-	15.80	5.10	0.115	3.92	294.3	1.34	69.78	
13:55	124.8	0.30	-	15.86	5.09	0.114	3.94	296.6	2.17	69.78	
14:00	124.8	0.30	-	15.85	5.09	0.114	3.99	299.3	2.01	69.75	
14:05	124.8	0.30	-	15.86	5.09	0.113	3.99	300.9	2.20	69.78	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: C

Sample time at 14:10

SITE NAME: SWOPE Superfund

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Well ID: MW-07
Pump Intake Depth [ft]: 102.9
Project Name: Swope Superfund
Sampling Program: MNA
Date: 10/6/2015
Recorded By: M. Mraw
Sample ID: MW-07.20151006
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 78.23 **Time:** 09:45
Casing Volume [gal]:
Final Depth to Water [ft]: 78.25 **Time:** 11:30
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Sunny, 70s F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
10:00	102.9	0.30	-	14.83	8.24	0.136	9.87	191.3	1.4	78.38	clear
10:05	102.9	0.30	-	14.75	5.17	0.133	5.66	224.3	0.6	78.38	
10:10	102.9	0.30	-	14.69	5.04	0.132	5.57	227.8	0.8	78.38	
10:15	102.9	0.30	-	14.66	5.01	0.131	5.47	230.1	1.4	78.38	
10:20	102.9	0.30	-	14.65	5.01	0.131	5.46	230.5	1.1	78.38	
10:25	102.9	0.30	-	14.65	5.00	0.131	5.49	232.8	1.7	78.38	
10:30	102.9	0.30	-	14.64	5.01	0.131	5.50	232.0	1.7	78.38	
10:35	102.9	0.30	4.00	14.64	5.01	0.130	5.51	231.9	1.7	78.38	clear

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: B

Sample time at 10:40

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

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Well ID: MW-09S
Pump Intake Depth [ft]: 124.9
Project Name: Swope Superfund
Sampling Program: MNA
Date: 10/5/2015
Recorded By: M. Mraw
Sample ID: MW-09S.20151005
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 78.03 **Time:** 14:58
Casing Volume [gal]:
Final Depth to Water [ft]: 78.03 **Time:** 16:30
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Sunny, 80s F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
15:00	124.9	0.30	-	16.01	9.93	0.275	6.00	48.9	48.2	78.03	
15:05	124.9	0.30	-	15.13	9.55	0.275	1.49	74.5	20.8	78.03	
15:10	124.9	0.30	-	15.04	9.04	0.264	1.00	86.0	16.1	78.03	
15:15	124.9	0.30	-	15.01	8.77	0.273	0.77	69.5	13.3	78.03	
15:20	124.9	0.30	-	14.96	8.39	0.286	0.63	40.8	11.3	78.03	
15:25	124.9	0.30	-	14.94	8.15	0.293	0.60	27.5	9.24	78.03	
15:30	124.9	0.30	4.00	15.67	7.87	0.310	1.99	33.4	10.4	78.03	YSI detached from flow-through cell.
15:35	124.9	0.30	-	15.09	7.71	0.311	0.90	30.7	9.56	78.03	
15:40	124.9	0.30	-	14.92	7.53	0.309	0.74	26.3	8.50	78.03	
15:45	124.9	0.30	-	14.81	7.40	0.311	0.74	23.7	8.38	78.03	
15:50	124.9	0.30	-	14.78	7.30	0.313	0.64	22.4	7.29	78.03	
15:55	124.9	0.30	-	14.82	7.25	0.314	0.65	18.0	7.22	78.03	
16:00	124.9	0.30	8.00	14.93	7.22	0.317	0.64	13.6	7.54	78.03	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Sample time at 16:05

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

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Well ID: MW-10S
Pump Intake Depth [ft]: 130.3
Project Name: Swope Superfund
Sampling Program: MNA
Date: 10/7/2015
Recorded By: M. Mraw
Sample ID: MW-10S.20151007
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 77.30 **Time:** 09:59
Casing Volume [gal]:
Final Depth to Water [ft]: 77.30 **Time:** 11:20
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Cloudy, 70s F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
10:10	130.3	0.40	-	14.27	5.23	0.366	6.17	203.5	0.45	77.31	
10:15	130.3	0.40	-	14.22	4.70	0.448	6.70	222.7	0.29	77.32	
10:20	130.3	0.40	-	14.19	4.67	0.451	6.65	228.5	0.23	77.32	clear
10:25	130.3	0.40	-	14.20	4.68	0.453	6.65	234.1	0.24	77.32	
10:30	130.3	0.40	-	14.18	4.70	0.452	6.65	238.2	0.25	77.32	
10:35	130.3	0.40	4.50	14.20	4.71	0.444	6.51	242.2	0.26	77.32	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: A

Sample time at 10:40

SITE NAME: SWOPE Superfund

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Well ID: MW-11S
Pump Intake Depth [ft]: 120
Project Name: Swope Superfund
Sampling Program: MNA
Date: 10/8/2015
Recorded By: J. Evans
Sample ID: MW-11S.20151008
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 76.38 **Time:** 11:46
Casing Volume [gal]:
Final Depth to Water [ft]: 76.15 **Time:** 16:05
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Sunny, ~80F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
14:20	120	0.30	-	18.34	5.92	0.063	7.95	236.9	13.7	76.19	
14:25	120	0.30	-	17.75	5.20	0.058	7.21	2262.8	9.94	76.19	
14:30	120	0.30	-	17.81	5.17	0.056	6.95	274.6	7.66	75.90	
14:35	120	0.30	~2	17.66	5.17	0.056	6.83	281.2	6.89	76.18	
14:40	120	0.30	-	17.61	5.16	0.056	6.74	285.8	6.23	76.18	
14:45	120	0.30	-	17.62	5.16	0.056	6.71	288.3	5.33	76.15	
14:50	120	0.30	~3	17.69	5.16	0.056	6.67	288.5	4.44	76.14	
14:55	120	0.30	-	17.51	5.16	0.056	6.73	288.0	5.60	76.14	
15:00	120	0.30	~4	17.47	5.17	0.056	6.66	287.0	4.90	76.15	
15:05	120	0.30	-	17.43	5.16	0.059	6.71	286.0	4.07	76.15	
15:10	120	0.30	-	16.90	5.16	0.058	6.73	284.2	4.09	76.16	
15:15	120	0.30	-	17.11	5.17	0.058	6.71	283.4	4.07	76.15	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: C

Sample time at 15:20

SITE NAME: SWOPE Superfund

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Well ID: GM-01S
Pump Intake Depth [ft]: 117.9
Project Name: Swope Superfund
Sampling Program: MNA
Date: 12/3/2015
Recorded By: A. Wilson
Sample ID: GM-01S.20151203
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 72.95 **Time:** 10:20
Casing Volume [gal]:
Final Depth to Water [ft]: 72.95 **Time:** 11:35
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Clear Skies, 50s F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
10:30	117.9	0.30	-	13.12	6.73	0.097	7.23	219.1	0.50	72.95	
10:35	117.9	0.30	-	13.73	5.49	0.073	4.97	235.7	0.14	72.95	
10:40	117.9	0.30	-	13.86	5.19	0.070	4.52	242.3	0.17	72.95	
10:45	117.9	0.30	-	13.83	5.10	0.069	3.61	248.0	0.17	72.95	
10:50	117.9	0.30	-	13.91	5.07	0.068	3.17	251.6	0.17	72.95	
10:55	117.9	0.30	-	14.00	5.06	0.069	2.97	253.5	0.19	72.95	
11:00	117.9	0.30	-	Missed. Brought controller to E. Jacesko							
11:05	117.9	0.30	-	13.96	5.06	0.069	2.44	260.5	0.18	72.95	
11:10	117.9	0.30	-	13.95	5.05	0.069	2.21	262.8	0.13	72.95	
11:15	117.9	0.30	-	14.10	5.05	0.069	1.90	265.4	0.15	72.95	
11:20	117.9	0.30	-	14.13	5.04	0.069	1.82	267.5	0.14	72.95	
11:25	117.9	0.30	-	14.13	5.04	0.069	1.59	269.8	0.13	72.95	
11:30	117.9	0.30	-	14.20	5.04	0.070	1.58	271.0	0.14	72.95	
11:35	117.9	0.30	-	14.15	5.04	0.070	1.48	272.4	0.13	72.95	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: C

Sample time at 11:40

SITE NAME: SWOPE Superfund

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Well ID: GM-02S
Pump Intake Depth [ft]: 117.7
Project Name: Swope Superfund
Sampling Program: MNA
Date: 12/3/2015
Recorded By: E. Jacesko
Sample ID: GM-02S.20151203
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 65.71 **Time:** 11:00
Casing Volume [gal]:
Final Depth to Water [ft]: 65.69 **Time:** 11:55
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Sunny, Windy ~40F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
11:15	117.7	0.40	-	16.33	6.88	0.223	4.14	260.5	3.14	65.68	
11:20	117.7	0.40	-	15.92	6.15	0.226	1.43	269.6	1.01	65.68	
11:25	117.7	0.40	-	15.87	6.09	0.225	1.30	272.0	0.76	65.68	
11:30	117.7	0.40	-	16.02	6.00	0.224	1.16	273.8	13.5	65.68	read turbidity twice
11:35	117.7	0.40	-	16.08	5.92	0.223	1.04	270.2	1.43	65.68	
11:40	117.7	0.40	-	15.86	5.89	0.222	1.00	267.8	3.07	65.69	
11:45	117.7	0.40	-	16.10	5.88	0.222	0.95	268.0	0.86	65.69	
11:50	117.7	0.40	-	16.02	5.83	0.221	0.92	267.0	0.90	65.69	
11:55	117.7	0.40	-	15.77	5.83	0.222	0.89	266.2	0.85	65.69	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: B

Sample time at 12:00

Bailed out manhole prior to opening well.

SITE NAME: SWOPE Superfund

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Well ID: GM-03RS
Pump Intake Depth [ft]: ~125
Project Name: Swope Superfund
Sampling Program: MNA
Date: 11/30/2015
Recorded By: A. Wilson
Sample ID: GM-03RS.20151130
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 75.95 **Time:** 13:52
Casing Volume [gal]:
Final Depth to Water [ft]: 76.10 **Time:** 14:45
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Overcast, 40s F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
14:05	125	0.30	-	13.74	5.00	0.093	2.92	171.1	4.34	76.10	
14:10	125	0.30	-	13.76	4.94	0.092	2.35	160.9	2.69	76.10	
14:15	125	0.30	-	13.83	4.94	0.092	1.94	136.3	2.55	76.10	
14:20	125	0.30	-	13.63	4.90	0.092	1.20	153.8	2.35	76.10	
14:25	125	0.30	-	13.72	4.91	0.092	1.10	151.5	1.89	76.10	
14:30	125	0.30	-	13.79	4.94	0.092	1.00	147.9	2.15	76.10	
14:35	125	0.30	-	13.80	4.91	0.092	0.92	145.9	1.91	76.10	
14:40	125	0.30	-	13.78	4.94	0.092	0.86	146.0	1.81	76.10	
14:45	125	0.30	-	13.71	4.94	0.092	0.82	146.8	1.75	76.10	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: B

Sample time at 14:50

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

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Well ID: GM-05S
Pump Intake Depth [ft]: ~116
Project Name: Swope Superfund
Sampling Program: MNA
Date: 12/1/2015
Recorded By: A. Wilson
Sample ID: GM-05S.20151201
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 57.55 **Time:** 10:25
Casing Volume [gal]:
Final Depth to Water [ft]: 57.50 **Time:** 11:15
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Rainy, 50s F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
10:35	116	0.30	-	15.12	9.68	0.057	6.01	251.0	0.04	57.50	
10:40	116	0.30	-	15.00	7.64	0.059	3.49	279.0	0.02	57.50	
10:45	116	0.30	-	15.00	6.43	0.059	3.25	282.0	0.05	57.50	
10:50	116	0.30	-	14.95	8.86	0.058	3.27	283.0	0.00	57.50	
10:55	116	0.30	-	14.94	5.53	0.058	3.28	283.5	0.00	57.50	
11:00	116	0.30	-	14.92	5.43	0.058	3.25	283.3	0.00	57.50	
11:05	116	0.30	-	14.96	5.39	0.059	3.25	283.1	0.00	57.50	
11:10	116	0.30	-	14.97	5.37	0.060	3.20	282.9	0.00	57.50	
11:15	116	0.30	-	14.96	5.36	0.060	3.20	282.6	0.00	57.50	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: B

Sample time at 11:20

SITE NAME: SWOPE Superfund

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Well ID: GM-06S
Pump Intake Depth [ft]: 118.5
Project Name: Swope Superfund
Sampling Program: MNA
Date: 12/1/2015
Recorded By: E. Jacesko
Sample ID: GM-06S.20151201
Duplicate ID: MS/D taken here

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 66.32 **Time:** 10:05
Casing Volume [gal]:
Final Depth to Water [ft]: 66.29 **Time:** 12:20
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Rain, ~50F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
10:35	118.5	0.35	-	14.62	5.67	0.228	1.66	241.2	0.41	66.33	
10:40	118.5	0.35	-	14.67	6.41	0.227	0.80	228.0	1.00	66.33	
10:45	118.5	0.35	-	14.66	5.40	0.227	0.77	227.3	1.01	66.33	
10:50	118.5	0.35	-	14.62	5.40	0.227	0.59	226.2	0.49	66.33	
10:55	118.5	0.35	-	14.64	5.40	0.226	0.55	226.0	0.51	66.33	
11:00	118.5	0.35	-	14.66	5.41	0.226	0.52	226.7	0.55	66.33	
11:05	118.5	0.35	-	14.66	5.41	0.224	0.50	227.0	0.73	66.33	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: C

Sample time at 11:10; Took 70 minutes to fill all sample bottles.

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

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Well ID: GM-07S
Pump Intake Depth [ft]: 119.7
Project Name: Swope Superfund
Sampling Program: MNA
Date: 12/2/2015
Recorded By: J. Evans
Sample ID: GM-7S.20151202
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 71.49 **Time:** 11:06
Casing Volume [gal]:
Final Depth to Water [ft]: 71.54 **Time:** 13:00
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Cloudy

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
11:25	119.7	0.40	-	13.69	4.53	0.368	1.51	308.3	6.55	72.00	clear, colorless
11:30	119.7	0.40	-	13.69	4.48	0.368	1.25	323.6	6.33	71.97	
11:35	119.7	0.40	-	13.68	4.49	0.366	1.21	333.3	6.36	71.97	
11:40	119.7	0.40	-	13.69	4.51	0.364	1.22	340.6	6.55	72.00	
11:45	119.7	0.40	-	13.69	4.53	0.360	1.30	346.8	6.19	72.15	
11:50	119.7	0.30	-	13.69	4.54	0.358	1.37	350.3	5.65	72.16	
11:55	119.7	0.30	-	13.69	4.55	0.357	1.40	354.1	5.71	72.15	
12:00	119.7	0.30	~5	13.69	4.55	0.357	1.44	357.4	5.90	72.13	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: C

Sample time at 12:05

SITE NAME: SWOPE Superfund

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Well ID: GM-08S
Pump Intake Depth [ft]: ~120
Project Name: Swope Superfund
Sampling Program: MNA
Date: 12/2/2015
Recorded By: E. Jacesko
Sample ID: GM-08S.20151202
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 75.95 **Time:** 14:45
Casing Volume [gal]:
Final Depth to Water [ft]: 75.95 **Time:** 15:20
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Rain, ~50F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
15:00	120	0.40	-	14.86	7.48	0.073	3.17	125.6	16.2	75.95	
15:05	120	0.40	-	14.57	6.25	0.078	1.21	55.6	13.3	75.97	
15:10	120	0.40	-	14.57	6.14	0.080	1.08	48.7	10.2	75.95	
15:15	120	0.40	-	14.55	6.10	0.079	1.04	44.0	9.27	76.00	
15:20	120	0.40	-	14.57	6.06	0.079	1.00	39.5	9.69	75.95	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: A

Sample time at 15:25

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

Geosyntec Consultants, Inc.
7 Graphics Drive, Suite 106
Ewing, New Jersey 08628
Phone: 609-895-1400
Fax: 609-895-1401

Geosyntec consultants
engineers | scientists | innovators

Well ID: MW-01
Pump Intake Depth [ft]: 126.3
Project Name: Swope Superfund
Sampling Program: MNA
Date: 12/2/2015
Recorded By: J. Evans
Sample ID: MW-1.20151203
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 75.14 **Time:** 13:01
Casing Volume [gal]:
Final Depth to Water [ft]: 75.24 **Time:** 14:38
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Sunny, ~40F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
13:15	126.3	0.25	-	13.32	8.43	0.115	10.73	167.3	0.47	75.16	clear, colorless
13:20	126.3	0.25	-	13.37	6.12	0.108	3.68	206.3	0.28	75.15	
13:25	126.3	0.25	-	13.48	5.92	0.108	2.99	208.9	0.34	75.15	
13:30	126.3	0.25	-	13.38	5.85	0.107	2.70	208.6	0.18	75.16	
13:35	126.3	0.25	-	13.45	5.80	0.107	2.44	208.7	0.20	75.16	
13:40	126.3	0.25	-	13.31	5.77	0.108	2.37	206.9	0.15	75.15	
13:45	126.3	0.25	-	13.55	5.76	0.109	2.21	204.9	0.14	75.16	
13:50	126.3	0.25	~3	13.77	5.75	0.110	2.18	204.6	0.14	75.15	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: A

Sample time at 13:55

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

Geosyntec Consultants, Inc.
7 Graphics Drive, Suite 106
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Well ID: MW-02
Pump Intake Depth [ft]: 96.7
Project Name: Swope Superfund
Sampling Program: MNA
Date: 12/2/2015
Recorded By: J. Evans
Sample ID: MW-2.20151203
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 75.59 **Time:** 10:28
Casing Volume [gal]:
Final Depth to Water [ft]: 75.66 **Time:** 12:38
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Sunny, ~35F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
10:40	96.7	0.30	-	13.95	5.31	0.194	3.41	174.8	1.65	75.78	clear, colorless
10:45	96.7	0.10	-	12.78	5.32	0.194	3.33	177.8	1.76	75.77	
10:50	96.7	0.10	-	12.76	5.32	0.193	3.30	178.8	1.33	75.75	
10:55	96.7	Kink in sampling tube slowed flow rate to .1 Lpm, had to cut off kinked section and readjust flow rate. 12/3/15 JE									
11:00	96.7	0.13	-	12.95	5.33	0.193	0.80	182.6	1.51	75.84	
11:05	96.7	0.13	-	12.73	5.33	0.193	0.84	185.2	0.67	75.82	
11:10	96.7	0.20	-	12.60	5.33	0.192	0.85	189.4	0.70	75.78	
11:15	96.7	0.20	-	13.12	5.34	0.194	0.76	191.1	0.38	75.77	
11:20	96.7	0.20	-	13.33	5.35	0.194	0.74	192.3	0.53	75.78	
11:25	96.7	0.20	~3	13.27	5.35	0.194	0.72	191.0	0.74	75.81	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: A

Sample time at 11:30

Had to get longer tube to connect sampling tube to flow-through cell. Flow-through cell had to be placed on ground due to wind. 12/3/15 JE

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

Geosyntec Consultants, Inc.
7 Graphics Drive, Suite 106
Ewing, New Jersey 08628
Phone: 609-895-1400
Fax: 609-895-1401

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Well ID: MW-04
Pump Intake Depth [ft]: 124.8
Project Name: Swope Superfund
Sampling Program: MNA
Date: 12/2/2015
Recorded By: J. Evans
Sample ID: MW-4.20151202
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 69.28 **Time:** 14:25
Casing Volume [gal]:
Final Depth to Water [ft]: 69.26 **Time:** 15:37
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Rainy

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
14:35	124.8	0.30	-	14.59	6.92	0.095	8.58	247.2	0.60	69.30	clear, colorless
14:40	124.8	0.30	-	14.52	5.79	0.095	5.68	263.6	0.68	69.31	
14:45	124.8	0.30	-	14.52	5.54	0.095	5.89	270.5	0.36	69.32	
14:50	124.8	0.30	-	14.50	5.45	0.095	5.48	276.0	0.21	69.31	
14:55	124.8	0.30	-	14.48	5.39	0.095	5.32	281.6	0.17	69.31	
15:00	124.8	0.30	-	14.48	5.37	0.095	5.11	285.4	0.23	69.32	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: C

Sample time at 15:05

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

Geosyntec Consultants, Inc.
7 Graphics Drive, Suite 106
Ewing, New Jersey 08628
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Fax: 609-895-1401

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Well ID: MW-07
Pump Intake Depth [ft]: 102.9
Project Name: Swope Superfund
Sampling Program: MNA
Date: 12/1/2015
Recorded By: J. Evans
Sample ID: MW-7.20151209
Duplicate ID: DUP-1.20151209

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 76.08 **Time:** 11:10
Casing Volume [gal]:
Final Depth to Water [ft]: 75.91 **Time:** 13:05
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Rainy

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
11:20	102.9	0.35	-	14.44	5.48	0.044	7.26	133.1	7.75	76.19	
11:25	102.9	0.35	-	14.44	5.22	0.044	7.39	135.0	2.35	76.20	
11:30	102.9	0.35	-	14.42	5.14	0.044	7.49	135.3	1.50	76.09	
11:35	102.9	0.35	-	14.40	5.09	0.044	7.53	135.9	1.22	76.19	
11:40	102.9	0.35	-	14.39	5.01	0.044	7.50	136.8	1.34	76.11	
11:45	102.9	0.35	-	14.39	5.04	0.044	7.50	137.6	1.22	76.21	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: A

Sample time at 11:50

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

Geosyntec Consultants, Inc.
7 Graphics Drive, Suite 106
Ewing, New Jersey 08628
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Well ID: MW-09S
Pump Intake Depth [ft]: 124.9
Project Name: Swope Superfund
Sampling Program: MNA
Date: 12/2/2015
Recorded By: A. Wilson
Sample ID: MW-09S.20151202
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 75.60 **Time:** 14:45
Casing Volume [gal]:
Final Depth to Water [ft]: 75.60 **Time:** 15:40
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Light Rain, 50s F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
14:55	124.9	0.30	-	14.55	10.11	0.159	8.55	195.8	15.1	75.60	
15:00	124.9	0.30	-	14.30	8.45	0.152	2.11	25.0	19.0	75.60	
15:05	124.9	0.30	-	14.30	7.68	0.148	1.48	-37.2	19.6	75.60	
15:10	124.9	0.30	-	14.28	7.13	0.148	1.30	-45.2	15.4	75.60	
15:15	124.9	0.30	-	14.28	6.83	0.151	1.17	-52.7	16.2	75.60	
15:20	124.9	0.30	-	14.27	6.64	0.144	1.10	-48.4	11.1	75.60	
15:25	124.9	0.30	-	14.28	6.51	0.143	1.04	-45.0	15.1	75.60	
15:30	124.9	0.30	-	14.27	6.42	0.142	0.99	-44.8	8.50	75.60	
15:35	124.9	0.30	-	14.28	6.35	0.143	0.94	-44.5	8.05	75.60	
15:40	124.9	0.30	-	14.29	6.32	0.144	0.91	-44.7	8.61	75.60	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: B

Sample time at 15:45

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

Geosyntec Consultants, Inc.
7 Graphics Drive, Suite 106
Ewing, New Jersey 08628
Phone: 609-895-1400
Fax: 609-895-1401

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Well ID: MW-10S
Pump Intake Depth [ft]: 130.3
Project Name: Swope Superfund
Sampling Program: MNA
Date: 12/2/2015
Recorded By: E. Jacesko
Sample ID: MW-10S.20151202
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]:
Initial Depth to Water [ft]: 77.01 **Time:** 11:09
Casing Volume [gal]:
Final Depth to Water [ft]: 77.00 **Time:** 12:00
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Overcast, ~50F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
11:30	130.3	0.20	-	13.55	5.17	0.277	5.94	238.6	0.62	77.01	
11:35	130.3	0.20	-	13.63	4.90	0.119	2.95	236.5	0.42	77.01	
11:40	130.3	0.20	-	13.61	4.85	0.116	2.62	238.0	0.24	77.01	
11:45	130.3	0.20	-	13.61	4.82	0.111	2.28	240.1	0.34	77.00	
11:50	130.3	0.20	-	13.64	4.81	0.110	2.14	240.8	0.19	76.99	
11:55	130.3	0.20	-	13.62	4.80	0.108	2.06	241.8	0.29	77.00	
12:00	130.3	0.20	-	13.62	4.79	0.108	2.00	241.7	0.23	77.00	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: A

Sample time at 12:05

SITE NAME: SWOPE Superfund

Monitoring Well Low-Flow Purging & Sampling Record

Geosyntec Consultants, Inc.
7 Graphics Drive, Suite 106
Ewing, New Jersey 08628
Phone: 609-895-1400
Fax: 609-895-1401

Geosyntec consultants
engineers | scientists | innovators

Well ID: MW-11S
Pump Intake Depth [ft]: 121.5
Project Name: Swope Superfund
Sampling Program: MNA
Date: 12/2/2015
Recorded By: A. Wilson
Sample ID: MW-11S.20151202
Duplicate ID: NA

Well Diameter [in]: 4
Total Depth of Well [ft]: 180
Initial Depth to Water [ft]: 75.80 **Time:** 11:21
Casing Volume [gal]:
Final Depth to Water [ft]: 75.80 **Time:** 12:20
Method of Purging: Low Flow Bladder Pump (dedicated to well)
Method of Sampling: Low Flow Bladder Pump (dedicated to well)
Weather: Overcast, 50s F

FIELD PARAMETERS

Stabilization Criteria:				± 3%	± 0.1 unit	± 3%	± 10%	± 10 mV	± 10%	<0.3 ft Δ	
Time	Pump intake depth	Pumping rate	Cumulative volume	Temperature	pH	Specific conductance	D.O	ORP	Turbidity	Water Level	Comments
	ft	L/min	gallons	°C	SU	mS /cm	mg /L	mV	NTU	ft	odor, color, sediment load, well condition, presence of product
11:30	121.5	0.30	-	15.45	8.00	0.060	11.19	226.1	11.6	75.80	
11:35	121.5	0.30	-	15.28	6.84	0.041	9.38	272.6	14.5	75.80	
11:40	121.5	0.30	-	15.29	5.93	0.040	8.13	285.9	15.4	75.80	
11:45	121.5	0.30	-	15.32	5.56	0.040	7.79	288.4	16.0	75.80	
11:50	121.5	0.30	-	15.33	5.36	0.040	7.62	291.4	14.6	75.80	
11:55	121.5	0.30	-	15.32	5.27	0.039	7.53	292.4	18.1	75.80	
12:00	121.5	0.30	-	15.30	5.22	0.039	7.51	293.8	21.1	75.80	
12:05	121.5	0.30	-	15.32	5.20	0.039	7.46	294.6	18.7	75.80	
12:10	121.5	0.30	-	15.32	5.17	0.038	7.50	296.0	19.5	75.80	
12:15	121.5	0.30	-	15.29	5.16	0.038	7.49	296.7	18.5	75.80	
12:20	121.5	0.30	-	15.33	5.16	0.038	7.49	297.1	18.4	75.80	

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Used YSI and turbidity meter: B

Sample time at 12:25

APPENDIX D

2015 Deep Aquifer Sampling Summary

Swope Superfund Site
2015 Q3 Deep Well Sampling Summary: Snap Sampler Equipment and Bottleware

Well ID	Wellhead assembly failure	Trigger mechanism failure	O-ring failure on bottle	Sediment interference	No issue	Comments
GM-1D	X		X	X		First sampling attempt (10/05/15): The Snap Sampler string became dislodged at the wellhead, allowing the string to fall down the well. The string was retrieved and reattached at the wellhead and the bottles were inspected and re-deployed on 10/9/15. Second sampling attempt (10/26/15): Fine calcareous sediment interference affected proper O-ring closure for all sample bottles (see attached photos). Two of seven full bottles were obtained by combining water from partially-filled bottles in the assembly. The first of the combined samples contained little to no sediment and addition of acid preservative (HCl) was without incident; Geosyntec collected the first sample for analysis. The second sample contained more sediment and effervesced with the addition of acid. Following reaction completion, the second sample bottle was topped off with additional sample water from other partially-filled bottles; EPA collected that sample for analysis. A duplicate sample was not collected. Due to the large amount of sediment in the well, the field team agreed not to deploy new sample bottle ware for the 2016 event at that time.
GM-2D		X				Despite trigger mechanism failure, all bottles snapped shut properly; samples obtained.
GM-3D					X	
GM-4D		X				First sampling attempt (10/07/15): The trigger mechanism (top-most cable and ball) failed, preventing all bottles on the string from snapping shut. Bottles were re-set and redeployed. Second sampling attempt (10/26/15): Successful, with EPA sampling bottles 1, 3, and 5, and Geosyntec sampling bottles 2 and 4, as planned.
GM-5D					X	
GM-6D					X	
GM-7D					X	
GM-8D			X			The O-ring did not seat properly on one bottle, possibly due to sediment interference, resulting in loss of about 1/8 of sample. Sample was topped off with acid preservative (HCl) and issue was noted.

Notes:
Wells listed above were sampled in October, 2015.
Wells GM-1D and GM-4D were split-sampled with EPA.
Unless otherwise noted, new bottles were deployed for the 2016 groundwater sampling event.

GEOSYNTEC CONSULTANTS
Photographic Record

Swope Superfund Site

2015 Q3 Deep Well Sampling Summary: Snap Sampler Equipment and Bottle Ware

Photograph 1 Date: 10/26/15 Well ID: GM-01D Fine calcareous sediment interference affected proper O-ring closure for all sample bottles at this well.	
Photograph 2 Date: 10/26/15 Well ID: GM-01D Note the bottle on the left, containing fine calcareous sediment, versus the bottle on the right, with little to no sediment. Both were collected simultaneously from the same Snap Sampler Assembly.	

APPENDIX E

Transducer Data Drift Correction Methodology

Appendix E: Transducer Data Drift Correction Methodology
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

The shallow well transducers were calibrated based on manual depth to water measurements collected during transducer check or transducer deployment events. The accuracy of the transducer readings was then checked based on manual depth to water measurements collected prior to the commencement of well purging and sampling activities at the start of each quarterly shallow well sampling event. The discrepancy between the sampling event manual depth to water measurement and the most temporally near transducer measurement is the transducer "drift" (Δ). According to the transducer manufacturer, all pressure sensors are susceptible to drift over time and the rate of drift varies based on a variety of equipment-specific and environmental factors and conditions.

A drift rate (r_{drift}) was calculated for each transducer for each hydraulic monitoring period as follows:

$$r_{drift} = \frac{\Delta}{t_f - t_0} \tag{1}$$

where:

- r_{drift} = Transducer drift rate [L/T];
- Δ = Total transducer drift (i.e., the discrepancy between a sampling event manual depth to water measurement and the most temporally near transducer measurement) [L];
- t_0 = Initial time (i.e., the time of commencement of transducer data logging; the start of a hydraulic monitoring period) [T]; and
- t_f = Final time (i.e., the time at which a sampling event manual depth to water measurement was collected; the end of a hydraulic monitoring period) [T].

The drift rates were used to correct the transducer datasets for drift as follows:

$$m_{corrected} = (m_{raw})(r_{drift})(t_i - t_o) \tag{2}$$

where:

- $m_{corrected}$ = A drift-corrected transducer measurement [L];
- m_{raw} = A raw (non-drift-corrected) transducer measurement [L];
- r_{drift} = Transducer drift rate [L/T];
- t_0 = Initial time (i.e., the start of the hydraulic monitoring period) [T]; and
- t_i = Transducer measurement time [T].

APPENDIX F

Transducer Moisture Intrusion Issues and Response Actions

Appendix F: Transducer Issues and Response Actions
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

Geosyntec originally planned to leave the pressure transducers in the fourteen (14) shallow wells between sampling events and then to make visits to the Site approximately 1 month prior to each shallow well sampling event to verify the continued operation of the transducers and to re-calibrate them as necessary ("transducer checks"). However, between August 2014 and June 2015 transducers deployed in some wells failed (i.e., stopped functioning) after being left in the wells for extended periods of time, and so after June 2015 the transducers were only deployed in the shallow wells approximately 1 month prior to a shallow well sampling event. In two instances, the failure of a transducer prevented the collection of 1 month of groundwater elevation data at a shallow well prior to a shallow well sampling event: the transducer in GM-02S failed prior to the Q1 2015 sampling event and the GM-06S transducer failed prior to the Q2 2015 sampling event.

Non-functioning transducers were submitted to the manufacturer for assessment and repair. In cases where a cause of transducer failure was identified by the manufacturer, moisture intrusion was identified as the cause. The route of moisture intrusion was most likely via the vent tube that allows the transducer to reference atmospheric pressure. A hydrophobic filter and tube of silica gel desiccant beads, which are intended to prevent moisture from reaching the transducer sensors via the vent tube, are installed at the mouth of the vent tube at the top of each well. The desiccant absorbs moisture to prevent it from reaching and damaging the transducer electrical components. However, the desiccant has a finite capacity to absorb moisture, and once that capacity is reached (i.e., the desiccant is "saturated") moisture is then able to reach the transducer electrical components via the vent tube unimpeded by the saturated desiccant. Moisture that is drawn into the vent tube can cause aberrant readings and sensor damage. The desiccant is a bright blue color when active and dry, but as moisture is absorbed the color of the desiccant will begin to fade, becoming a light pink. The desiccant beads can be replaced and until June 2015 (i.e., the Q2 2015 shallow well sampling event) Geosyntec replaced the desiccant beads as deemed necessary based on visual inspection of their color. However, after June 2015, in an effort to reduce the exposure of the transducers to moisture and the potential for moisture intrusion, Geosyntec began deploying the transducers only for the 1 month preceding each quarterly shallow well sampling event and began replacing the desiccant for all transducers prior to each deployment. No transducer failures occurred after June 2015, though aberrant readings which were likely due to moisture intrusion were identified in the transducer datasets for some wells.

Upon analysis of the 2015 transducer data, erratic readings (i.e., very abrupt and significant groundwater elevation reading changes and readings that suddenly become substantially "out of step" with other nearby wells) and/or a cyclical smoothly oscillating pattern of measurements were identified in the datasets of some transducers. According the transducer manufacturer, erratic readings can be caused by moisture affecting the transducer sensors and oscillating readings can be caused by moisture intrusion affecting the transducer sensors and/or blocking the vent tube preventing the transducer from referencing atmospheric pressure (and thus the oscillating readings

reflect the changes in barometric pressure in addition to changes in the depth of submergence). The transducer datasets in which such aberrant readings were identified are as follows:

- Erratic readings and oscillating readings were identified in the MW-07 data and oscillating readings were identified in the MW-09S data collected ahead of the Q1 2015 shallow well sampling event;
- Erratic readings were identified in the GM-02S data collected ahead of the Q2 2015 shallow well sampling event; and
- Erratic readings were identified in the GM-02S data and oscillating readings were identified in the GM-06S data collected ahead of the Q4 2015 shallow well sampling event.

The occurrence of aberrant readings indicates that the transducer is not functioning properly. Therefore the above listed datasets were not included in the analysis of pre-sampling event shallow aquifer groundwater flow patterns.

APPENDIX G

Drift-Corrected Transducer Data Analysis Methodology

Appendix I: Description of Mann-Kendall Analysis
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

The following is a description of the Mann-Kendall analysis. The Mann-Kendall analysis is a rank based, non-parametric test used to detect trends in time series data. Given that the Mann-Kendall test is non-parametric, it does not require data to conform to any specific probability distribution, thus no distributional tests were performed.

The Mann-Kendall test calculates a statistic that represents the difference between the number of observations that are increasing or decreasing relative to earlier observations when arranged in a temporal order. The difference between one observation and an earlier observation is computed and assigned a value of 1 if the difference is positive, -1 if the difference is negative, and zero if there is no difference. The sum of these differences is the statistic S. If S is a sufficiently large, positive sum, the Mann-Kendall analysis indicates an increasing trend. Alternatively, if S is a sufficiently large, negative sum, then a decreasing trend is indicated.

In equation form the Mann-Kendall statistic (S) is represented by:

$$S = \sum_{k=1}^{n-1} \sum_{i=k+1}^{n} sign(x_i - x_k) \qquad (1)$$

where: $x_1, x_2, \ldots x_n$ represent n data points where x_i represents the data point at time i

$\text{sign}(x_i - x_k) = 1$ if $x_i - x_k > 0$

$\text{sign}(x_i - x_k) = 0$ if $x_i - x_k = 0$

$\text{sign}(x_i - x_k) = -1$ if $x_i - x_k < 0$

The Mann-Kendall test is based on the critical ranges of the S statistic, which are calculated under stationary conditions, i.e., no trend or S = 0. If the absolute value of the calculated test statistic S (i.e., the observed S statistic calculated from the sample) is larger than the S critical point, then there is strong evidence of a real increasing or decreasing trend.

When the sample size n becomes large, exact critical values for the S statistic are not readily available. Therefore, a normal approximation to S is used in which a standardized Z-statistic is calculated and then compared to the critical values of a standard normal distribution. The Z-statistic is computed as follows:

$$Z = (|S| - 1)/SD\ (S) \qquad (2)$$

The standard deviation of the observed S statistic is computed as:

$$SD(S) = \sqrt{\frac{1}{18}n(n-1)(2n+5) - \sum_{j=1}^{g} t_j(t_{j-1})(2t_j+5)} \quad (3)$$

where n is the sample size, g is the number of groups of ties in the data set (if any), and t_j is the number of ties in the jth group of ties.

Once the observed S test statistic is calculated from the data, the probability of observing a test statistic at least as extreme as the one actually observed is calculated. This probability is called the p-value and is computed from the S probability mass function (for n ≤ 10) or the standard normal probability distribution function (for n > 10). The confidence in the test statistic is then calculated as 1-p-value.

The following decision matrix was used to make conclusions based on the confidence of the S test statistic:

Mann-Kendall Statistic (S)	Confidence in Trend	Concentration Trend
S>0	>95%	Increasing
S>0	90% - 95%	Probably Increasing
S>0	<90%	No Trend
S≤0	<90% and COV≥1	No Trend
S≤0	<90% and COV<1	Stable
S<0	90% - 95%	Probably Decreasing
S<0	95%	Decreasing

Appendix I: Description of Mann-Kendall Analysis
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

Technical Notes:

1. Data sets that consisted of a large number of non-detect values, i.e., < 50% detection frequency, or data sets that consisted of < 4 observations, were not analyzed using the Mann-Kendall test.
2. For sample sizes of $n \leq 10$, exact p-values from the S distribution were obtained from Table A-12b (EPA, 2009). However, only a subset of the exact p-values from the S distribution are available, i.e., for certain combinations of S and n. If an exact p-value was not available, then the p-value is reported as a range, i.e., upper and lower limit to the p-value, for example, (0.07, 0.15), based on $|S| - 1$ and $|S| + 1$. For samples sizes of $n > 10$, the p-values were obtained from the standard normal distribution based on the standardized Z-statistic calculated as per Equation 2.
3. The coefficient of variation (COV) is defined as the ratio of the sample standard deviation (SD) to the sample mean (m), i.e., SD/m.

Some limitations to the Mann-Kendall test include:

1. A result that shows "No Trend" does not imply the absence of a trend. It simply means that the Mann-Kendall test could not discern either an upward or downward trend for the given data set.
2. Although the Mann-Kendall test can be used for samples sizes $n \geq 4$, it is recommended that there are at least 6 data points to conduct the test. For these smaller sample sizes, the effect of one fluctuation from the overall increasing/decreasing trend in a time series results in "No Trend".
3. The Mann-Kendall test does not account for the magnitude of the data. The Mann-Kendall uses a rank-based method for the calculation of the S statistic. As such, the greater the actual numbers, the less sensitive the test is to changes in the magnitude of numbers, resulting in misleading conclusions.

References:

(1) U.S. Environmental Protection Agency, (2009), Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance.

APPENDIX H

Analytical Data Packages and Data Validation Reports

APPENDIX I

Mann-Kendall Analysis Description

Appendix I: Description of Mann-Kendall Analysis
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

The following is a description of the Mann-Kendall analysis. The Mann-Kendall analysis is a rank based, non-parametric test used to detect trends in time series data. Given that the Mann-Kendall test is non-parametric, it does not require data to conform to any specific probability distribution, thus no distributional tests were performed.

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The Mann-Kendall test is based on the critical ranges of the S statistic, which are calculated under stationary conditions, i.e., no trend or S = 0. If the absolute value of the calculated test statistic S (i.e., the observed S statistic calculated from the sample) is larger than the S critical point, then there is strong evidence of a real increasing or decreasing trend.

When the sample size n becomes large, exact critical values for the S statistic are not readily available. Therefore, a normal approximation to S is used in which a standardized Z-statistic is calculated and then compared to the critical values of a standard normal distribution. The Z-statistic is computed as follows:

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where n is the sample size, g is the number of groups of ties in the data set (if any), and t_j is the number of ties in the jth group of ties.

Once the observed S test statistic is calculated from the data, the probability of observing a test statistic at least as extreme as the one actually observed is calculated. This probability is called the p-value and is computed from the S probability mass function (for n ≤ 10) or the standard normal probability distribution function (for n > 10). The confidence in the test statistic is then calculated as 1-p-value.

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Appendix I: Description of Mann-Kendall Analysis
Swope Oil and Chemical Company Superfund Site
Year 1 (2015) Annual MNA Report

Technical Notes:

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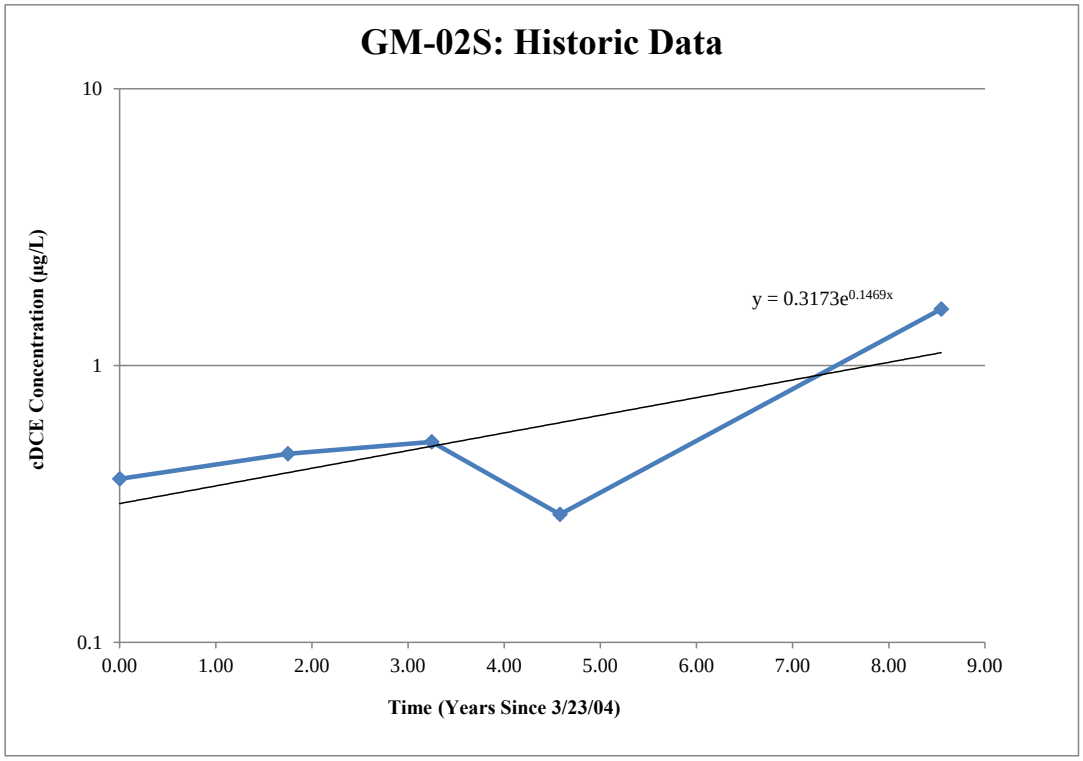
2. Although the Mann-Kendall test can be used for samples sizes $n \geq 4$, it is recommended that there are at least 6 data points to conduct the test. For these smaller sample sizes, the effect of one fluctuation from the overall increasing/decreasing trend in a time series results in "No Trend".
3. The Mann-Kendall test does not account for the magnitude of the data. The Mann-Kendall uses a rank-based method for the calculation of the S statistic. As such, the greater the actual numbers, the less sensitive the test is to changes in the magnitude of numbers, resulting in misleading conclusions.

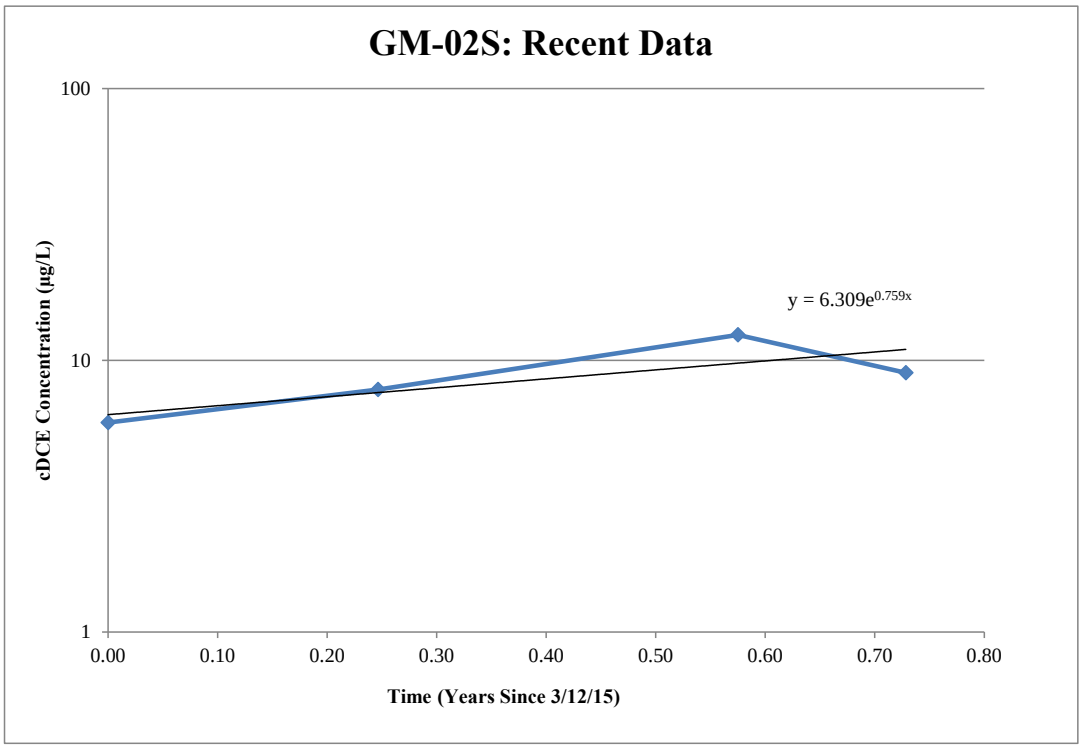
References:

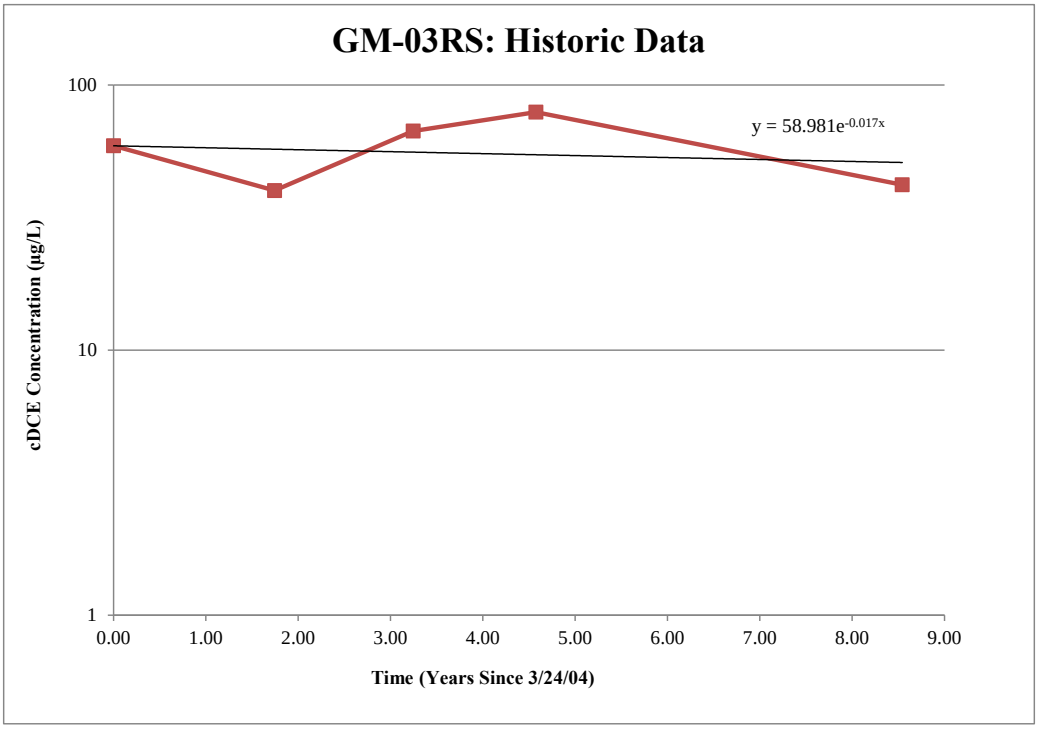
(1) U.S. Environmental Protection Agency, (2009), Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance.

APPENDIX J

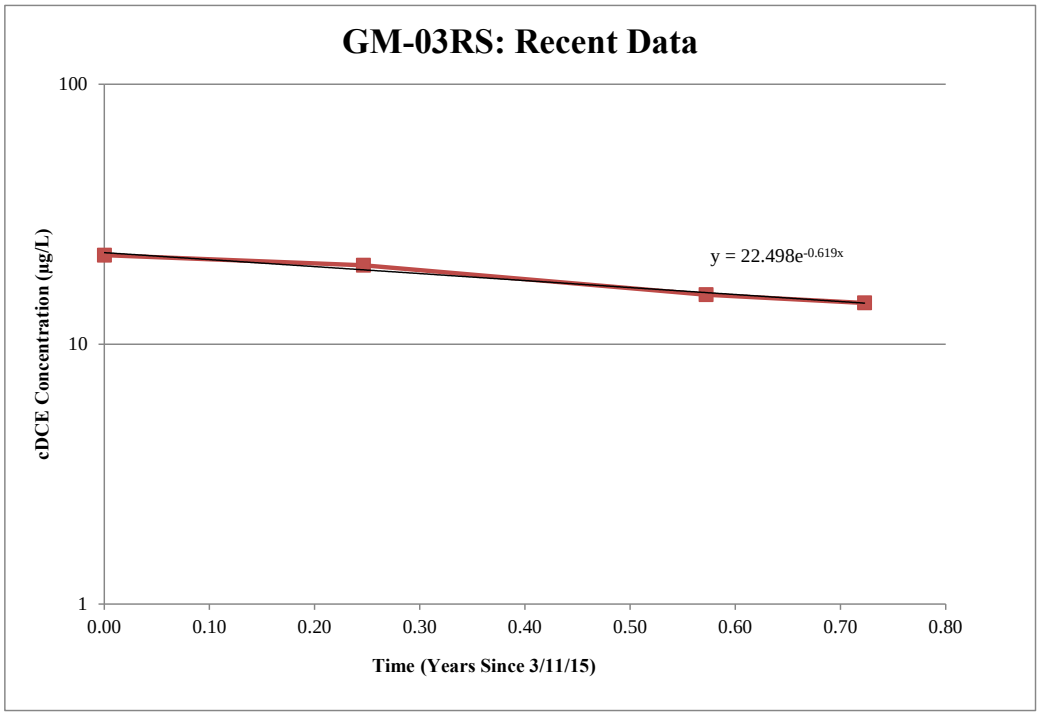
First-Order Natural Attenuation Rates Plots

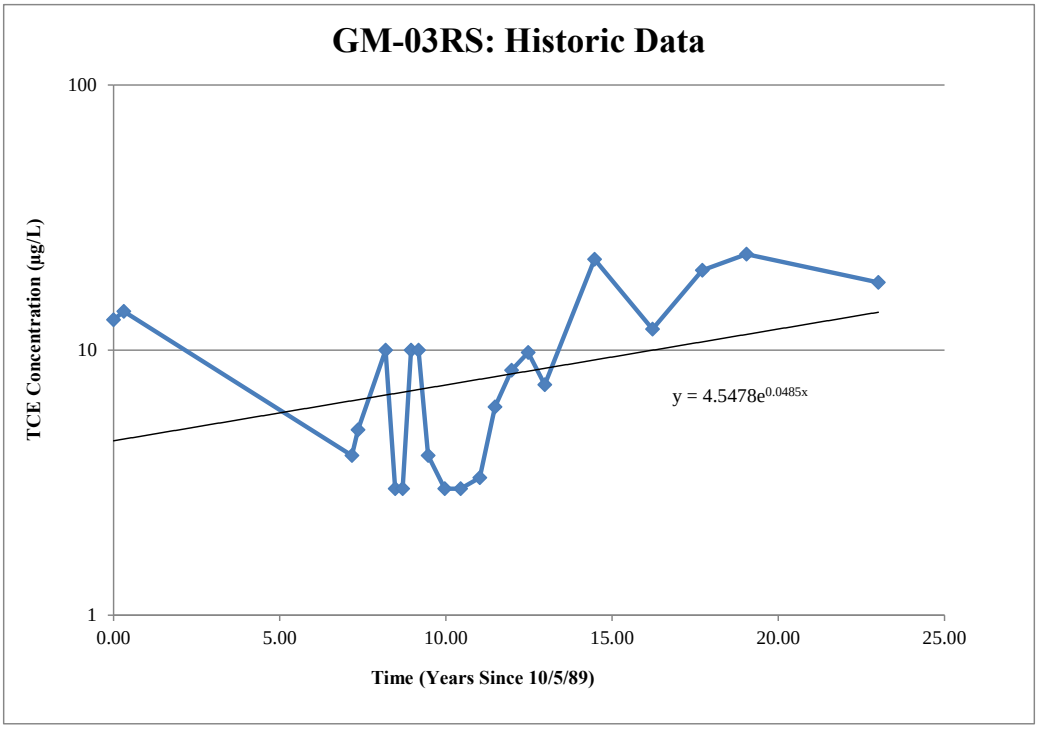

GM-02S: Historic Data
10
1
0.1
cDCE Concentration (µg/L)
y = 0.3173e^0.1469x
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
Time (Years Since 3/23/04)

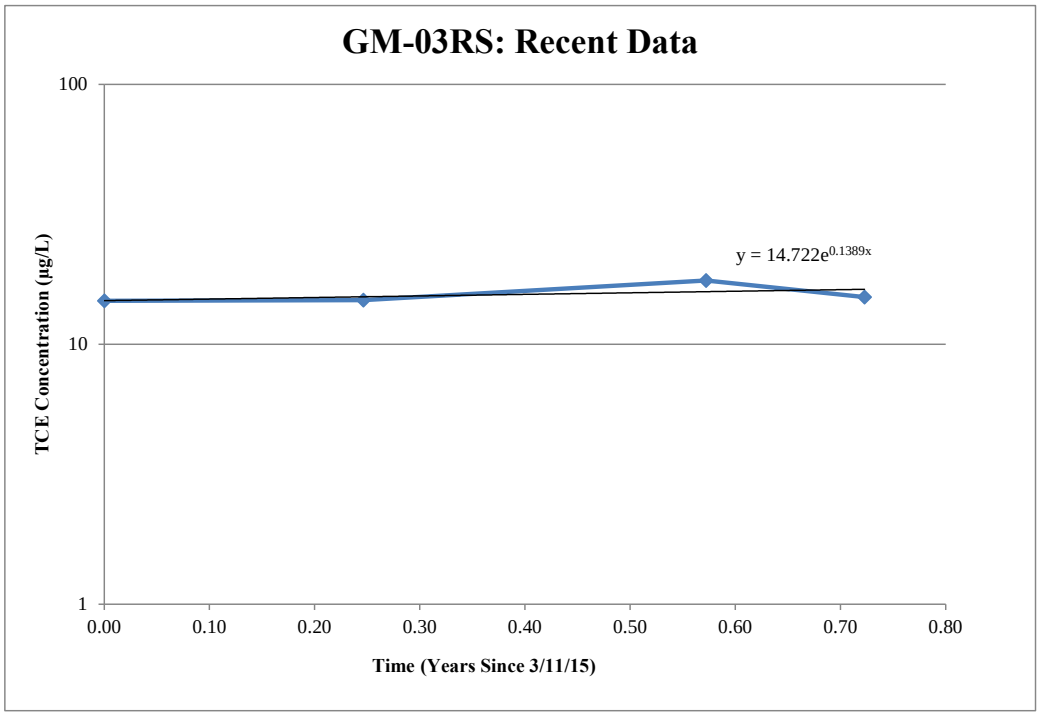

GM-02S: Recent Data
100
10
1
cDCE Concentration (µg/L)
y = 6.309e^0.759x
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
Time (Years Since 3/12/15)

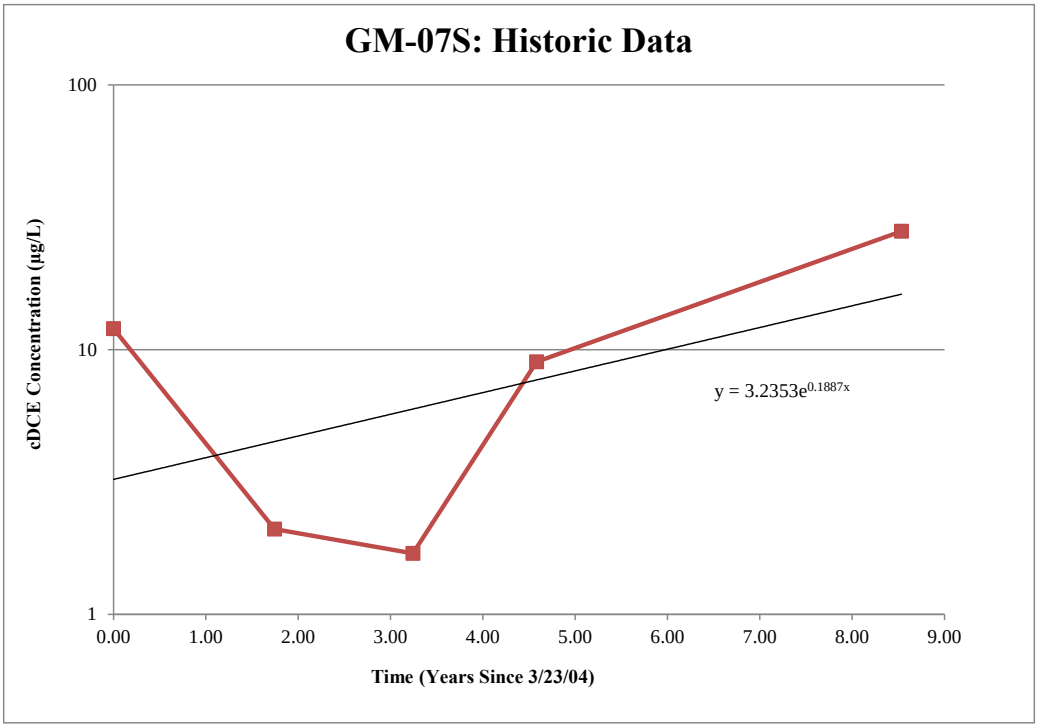

GM-03RS: Historic Data
100
10
1
cDCE Concentration (µg/L)
y = 58.981e-0.017x
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
Time (Years Since 3/24/04)

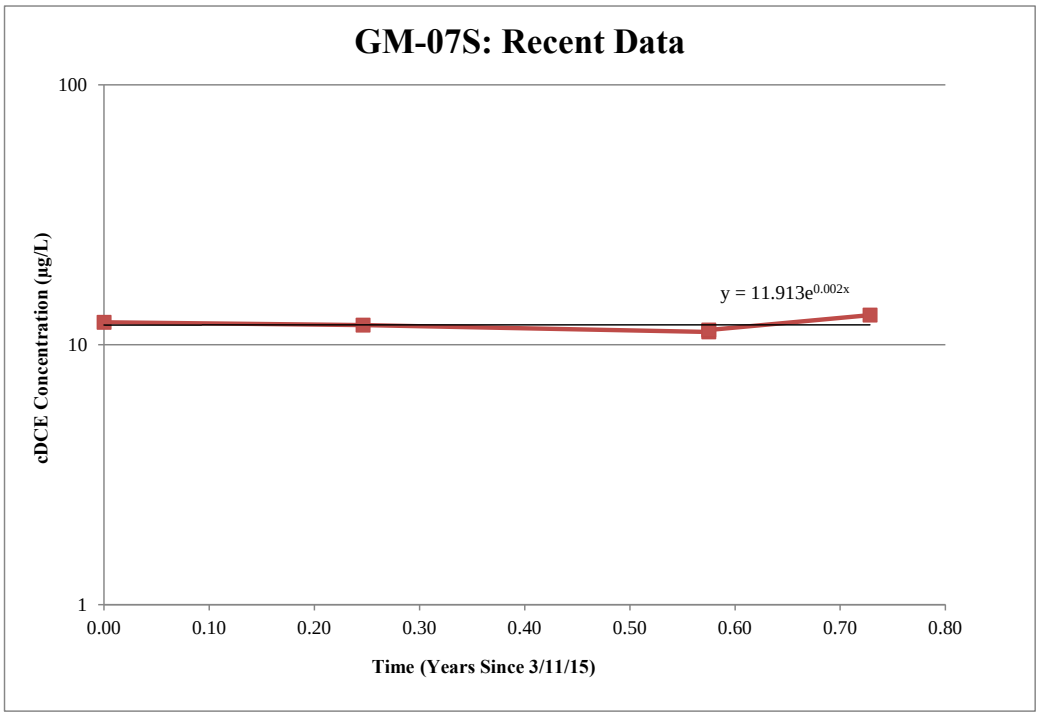
g

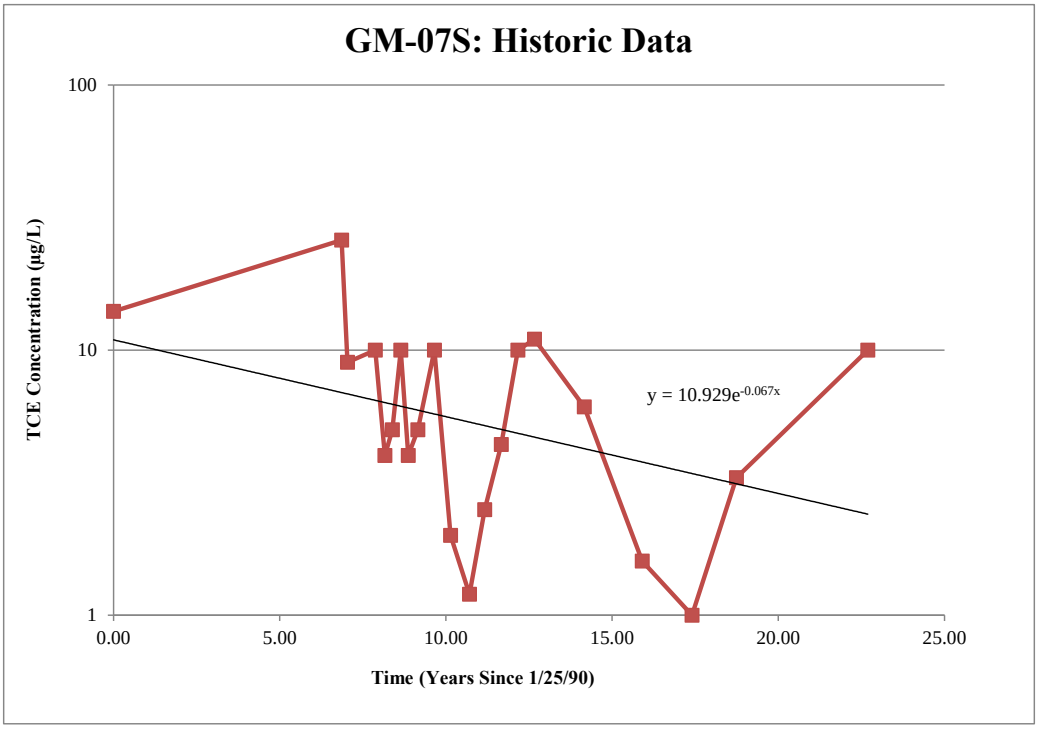

GM-03RS: Recent Data
100
10
1
cDCE Concentration (µg/L)
y = 22.498e-0.619x
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
Time (Years Since 3/11/15)

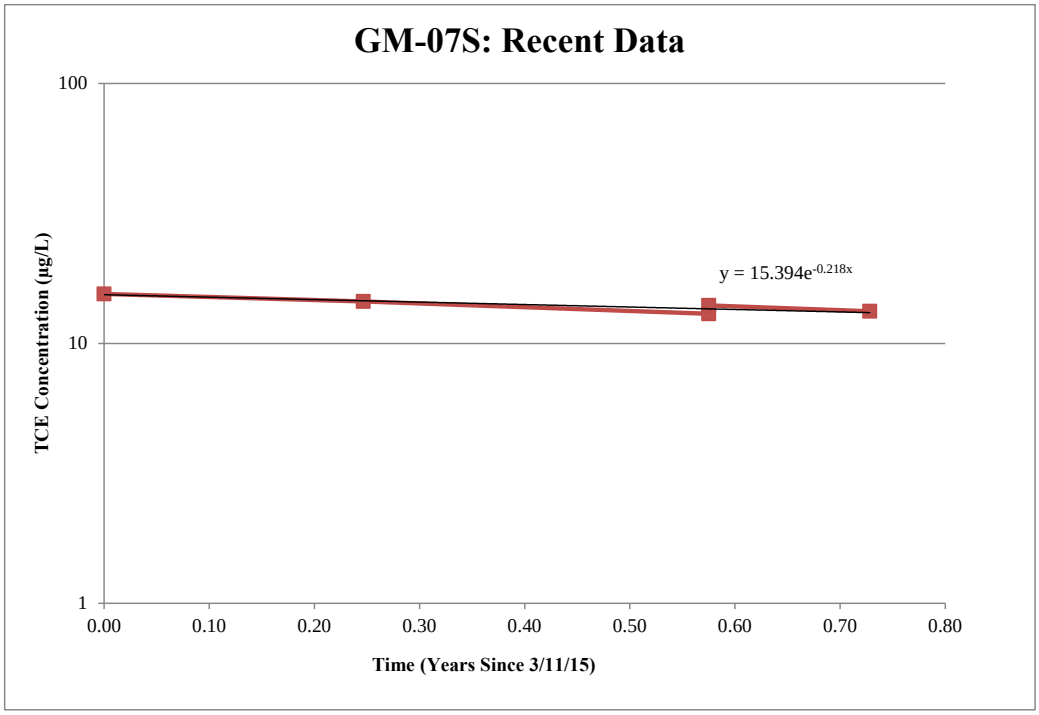

GM-03RS: Historic Data
100
10
1
TCE Concentration (µg/L)
y = 4.5478e^0.0485x
0.00
5.00
10.00
15.00
20.00
25.00
Time (Years Since 10/5/89)

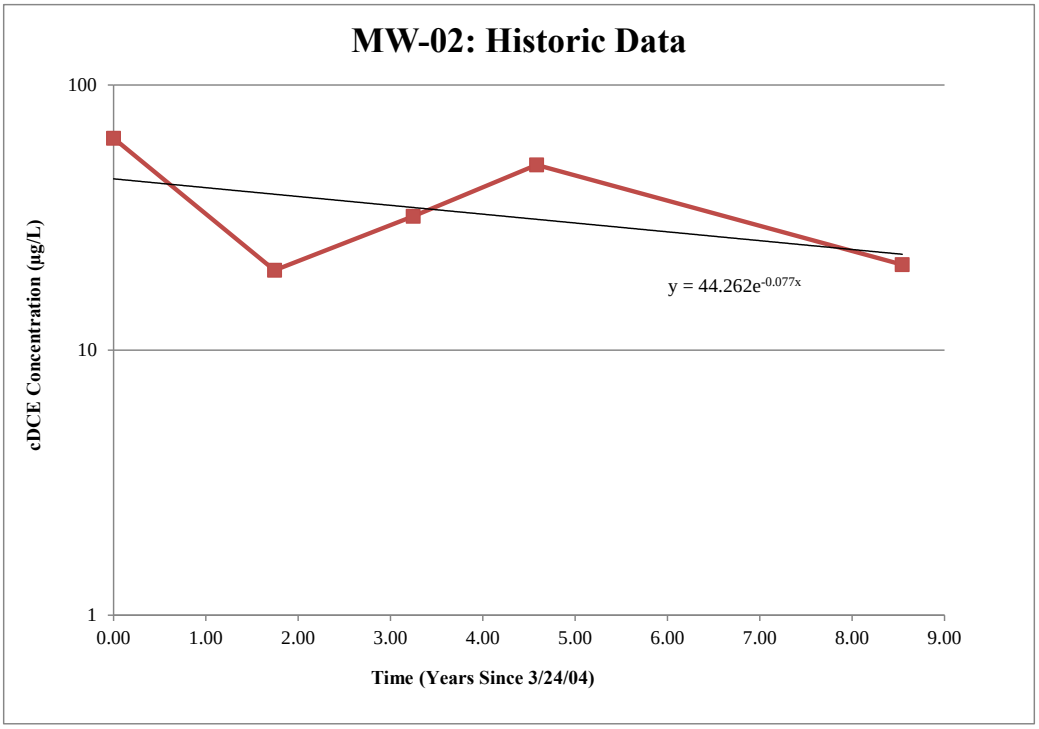

GM-03RS: Recent Data
100
10
1
TCE Concentration (µg/L)
y = 14.722e^0.1389x
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
Time (Years Since 3/11/15)

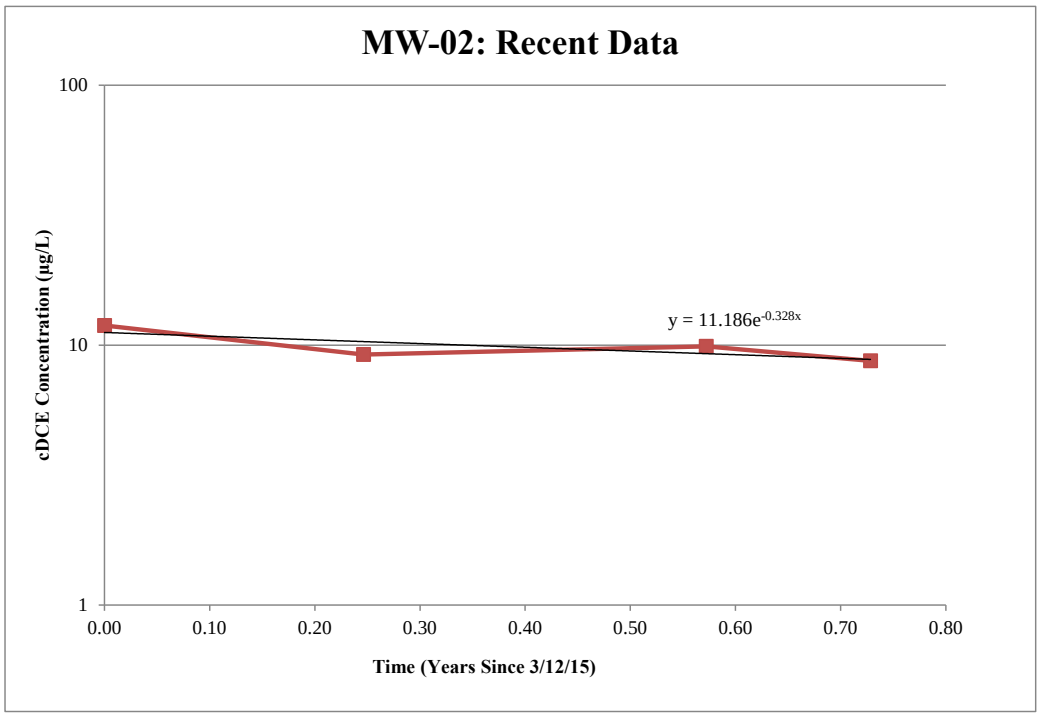

GM-07S: Historic Data
100
10
1
cDCE Concentration (µg/L)
y = 3.2353e^0.1887x
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
Time (Years Since 3/23/04)

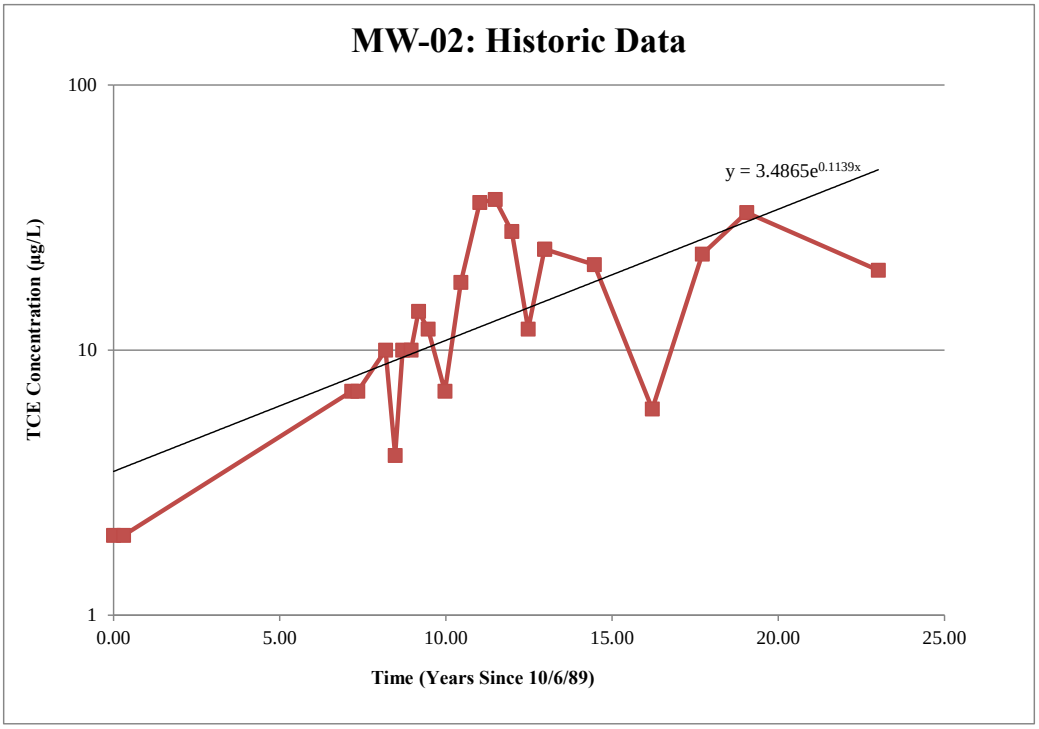

GM-07S: Recent Data
100
10
1
cDCE Concentration (µg/L)
y = 11.913e^0.002x
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
Time (Years Since 3/11/15)

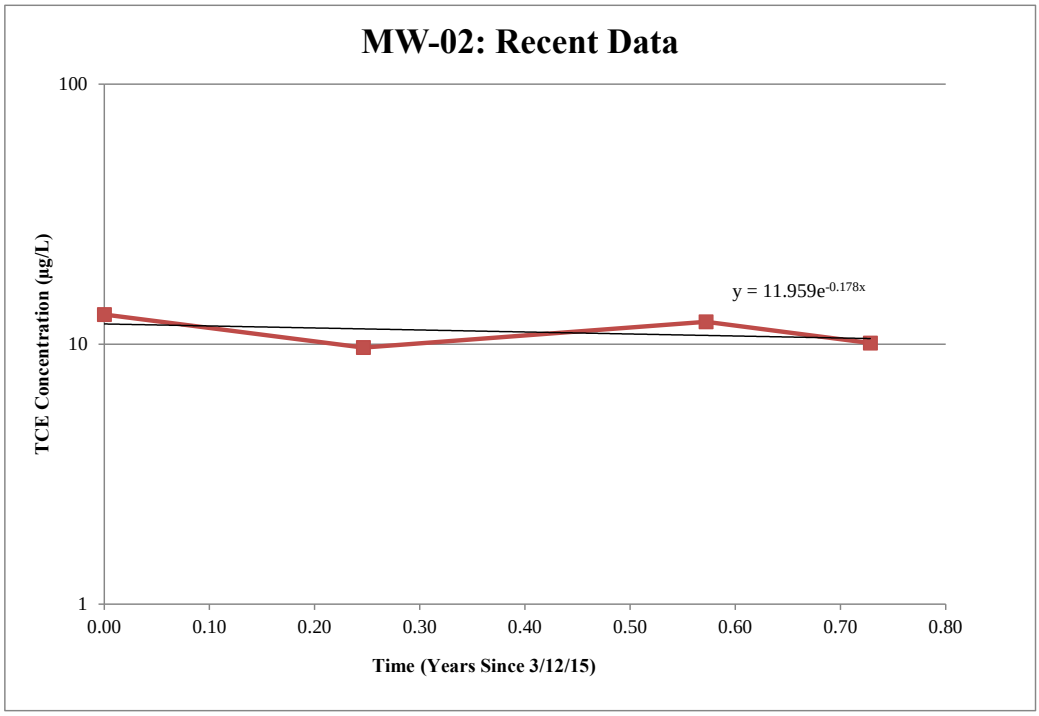

GM-07S: Historic Data
100
10
1
TCE Concentration (µg/L)
y = 10.929e-0.067x
0.00
5.00
10.00
15.00
20.00
25.00
Time (Years Since 1/25/90)

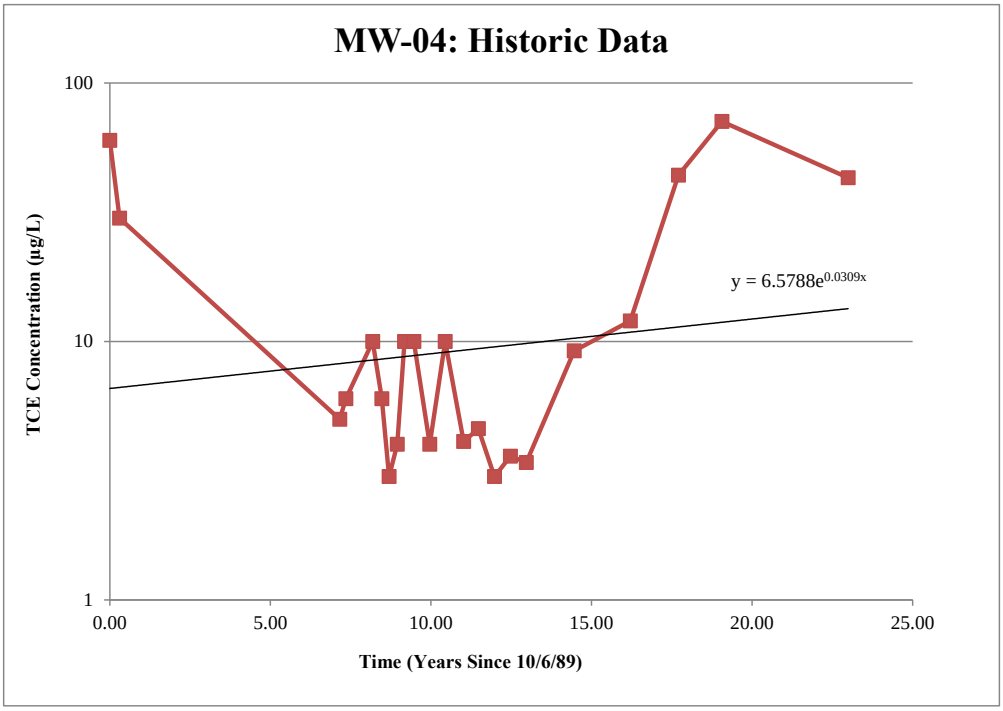

GM-07S: Recent Data
100
10
1
TCE Concentration (µg/L)
y = 15.394e-0.218x
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
Time (Years Since 3/11/15)

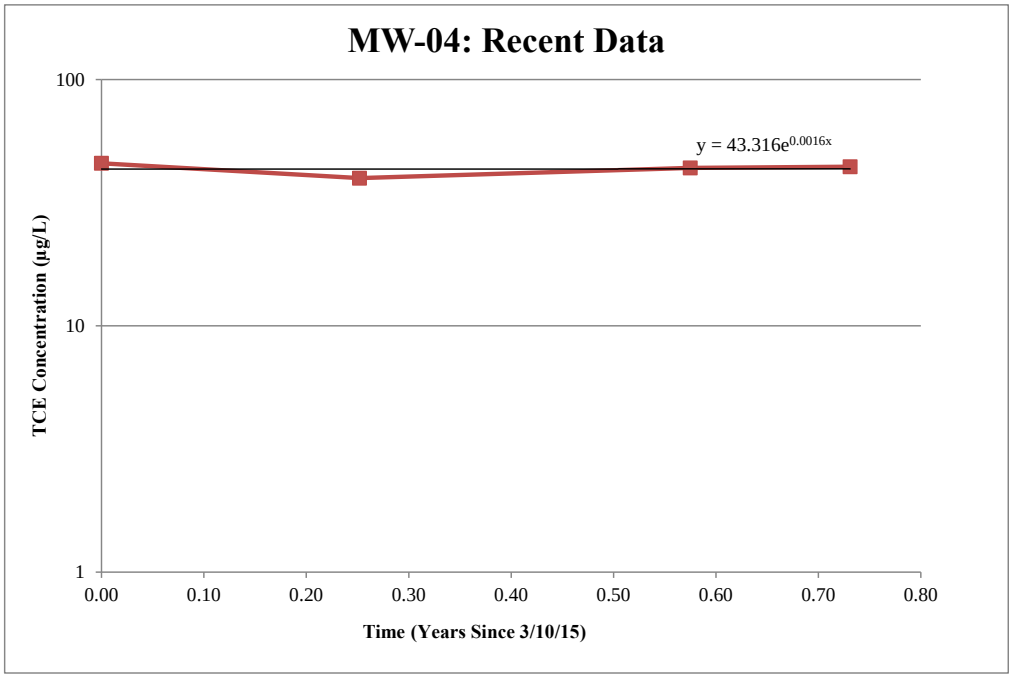

MW-02: Historic Data
100
10
1
cDCE Concentration (µg/L)
y = 44.262e-0.077x
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
Time (Years Since 3/24/04)

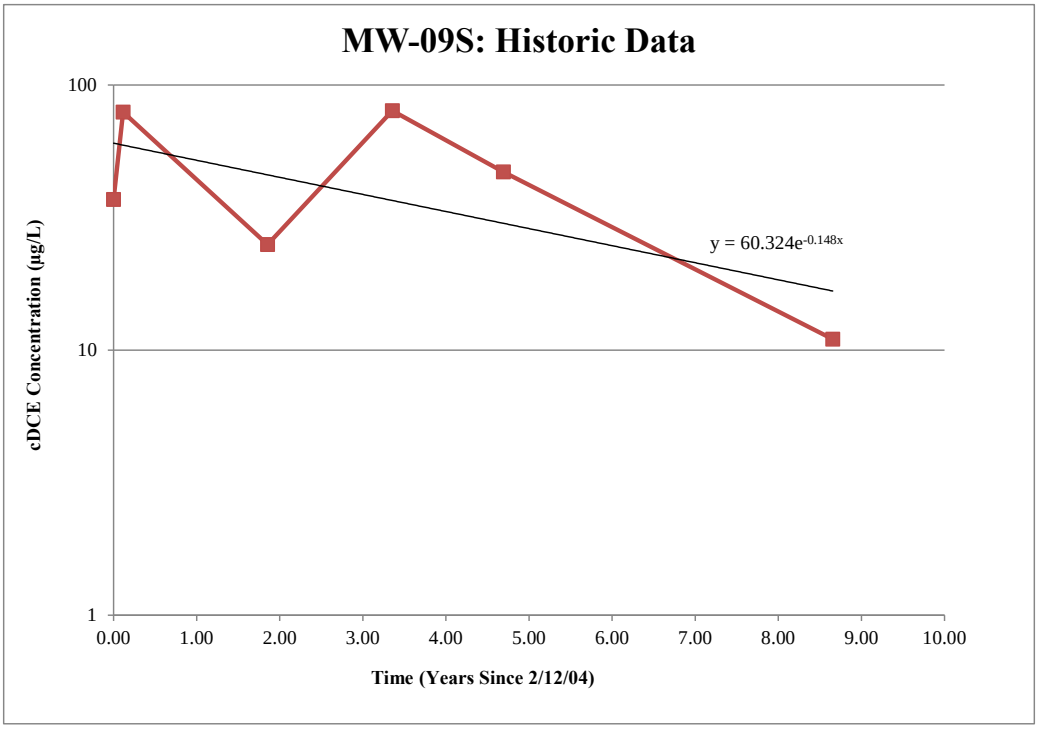

MW-02: Recent Data
100
10
1
cDCE Concentration (µg/L)
y = 11.186e-0.328x
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
Time (Years Since 3/12/15)

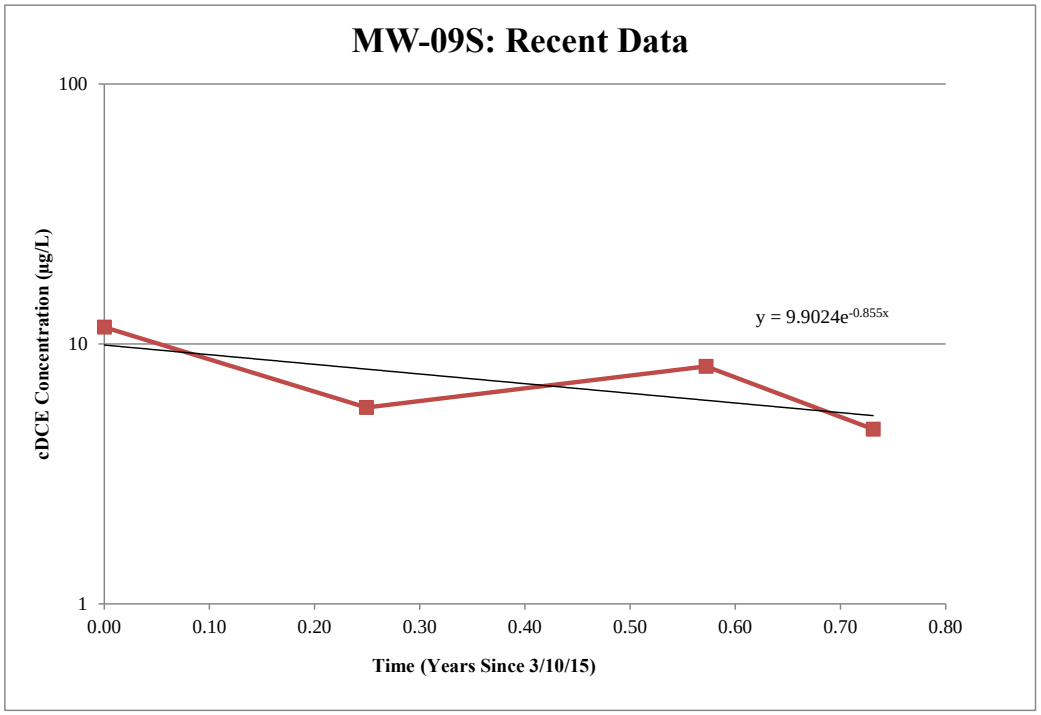

MW-02: Historic Data
100
10
1
TCE Concentration (µg/L)
y = 3.4865e^0.1139x
0.00
5.00
10.00
15.00
20.00
25.00
Time (Years Since 10/6/89)

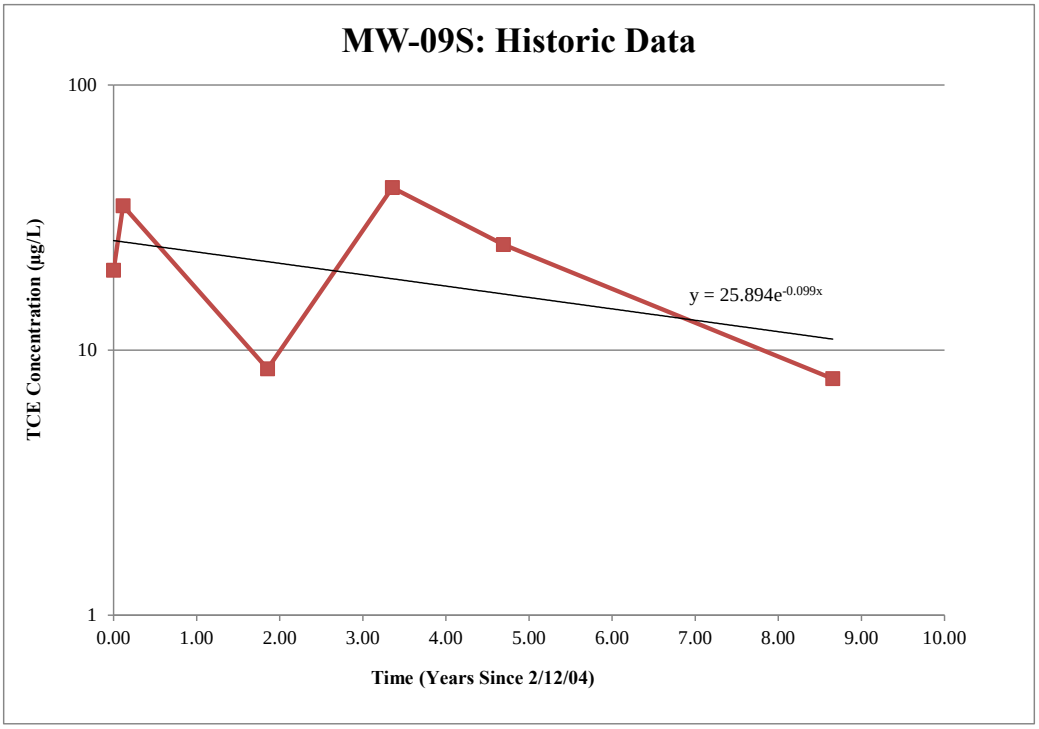

MW-02: Recent Data
100
10
1
TCE Concentration (µg/L)
y = 11.959e^-0.178x
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
Time (Years Since 3/12/15)

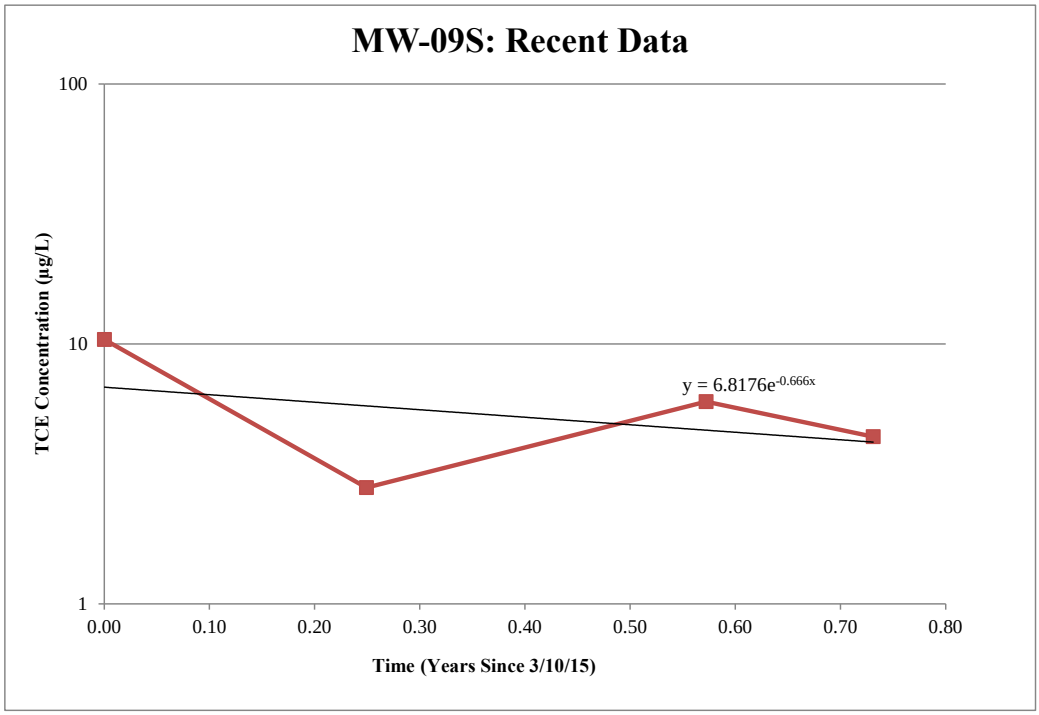

MW-04: Historic Data
100
10
1
TCE Concentration (µg/L)
y = 6.5788e^0.0309x
0.00
5.00
10.00
15.00
20.00
25.00
Time (Years Since 10/6/89)

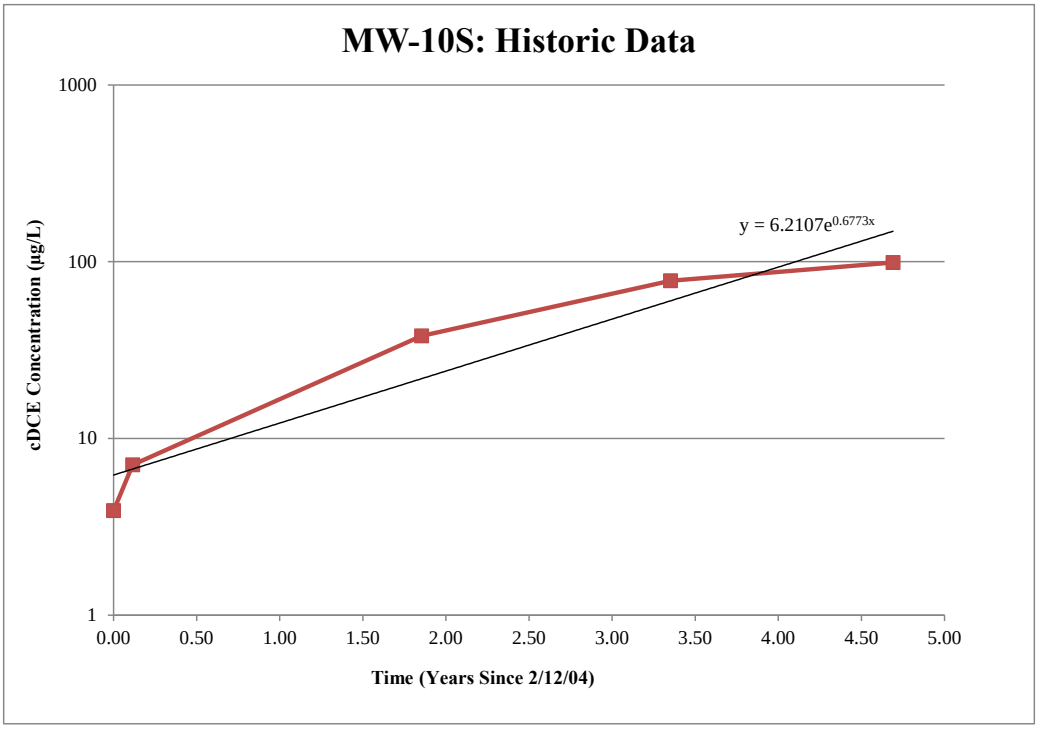

MW-04: Recent Data
100
10
1
TCE Concentration (µg/L)
y = 43.316e^0.0016x
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
Time (Years Since 3/10/15)

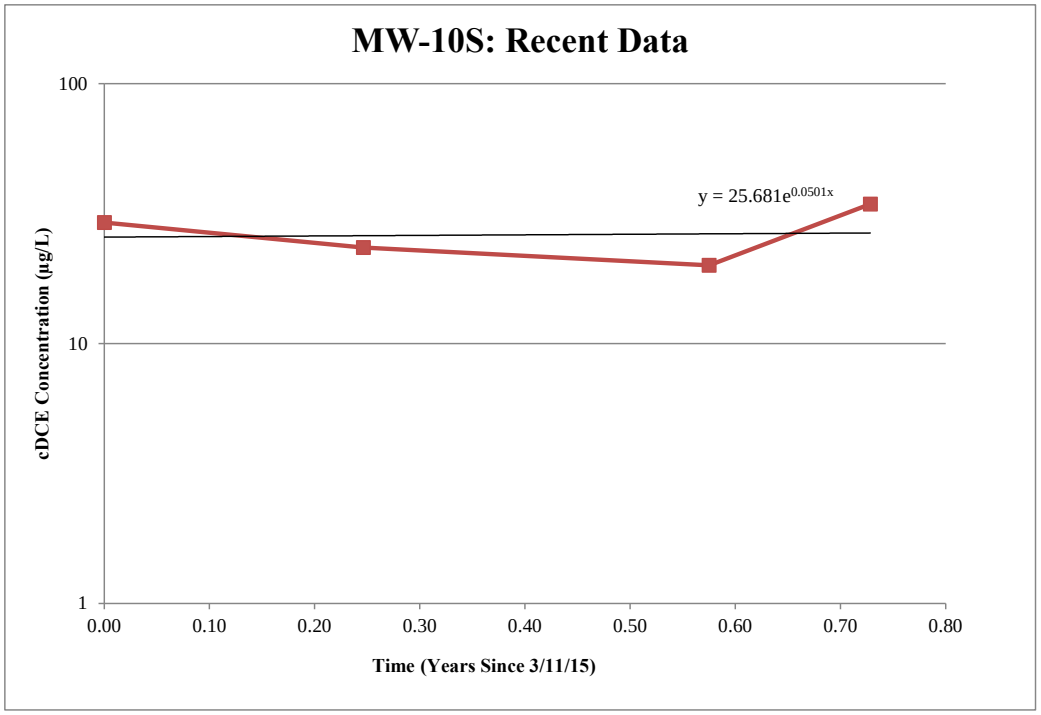

MW-09S: Historic Data
100
10
1
cDCE Concentration (µg/L)
y = 60.324e-0.148x
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
Time (Years Since 2/12/04)

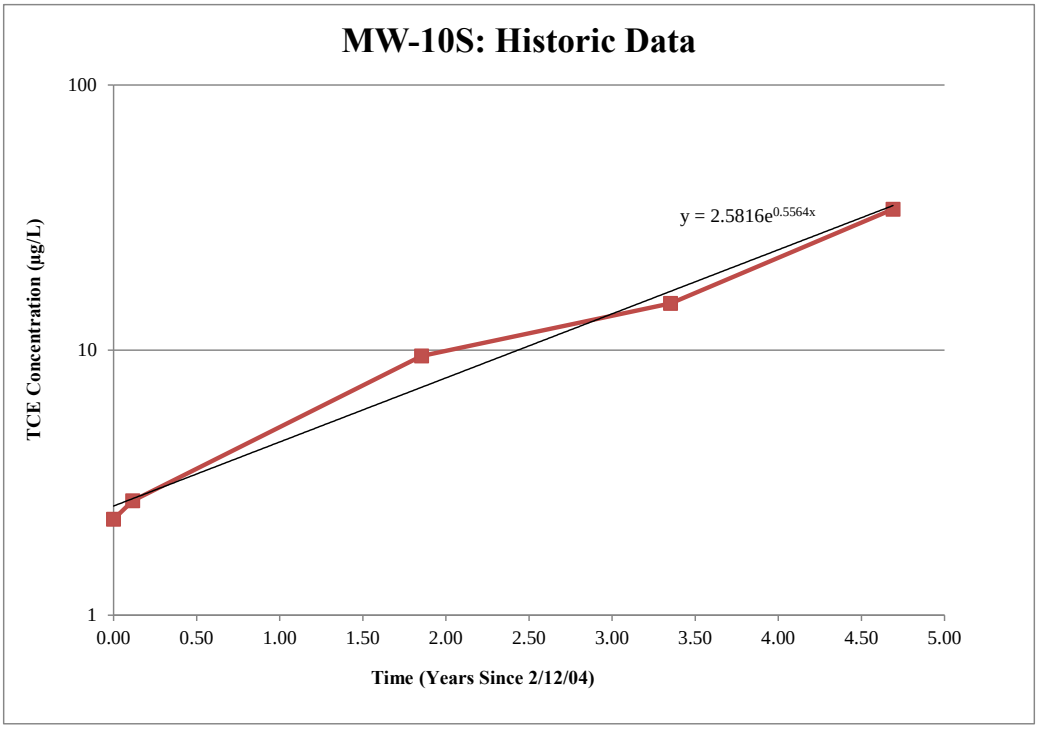

MW-09S: Recent Data
100
10
1
cDCE Concentration (µg/L)
y = 9.9024e-0.855x
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
Time (Years Since 3/10/15)

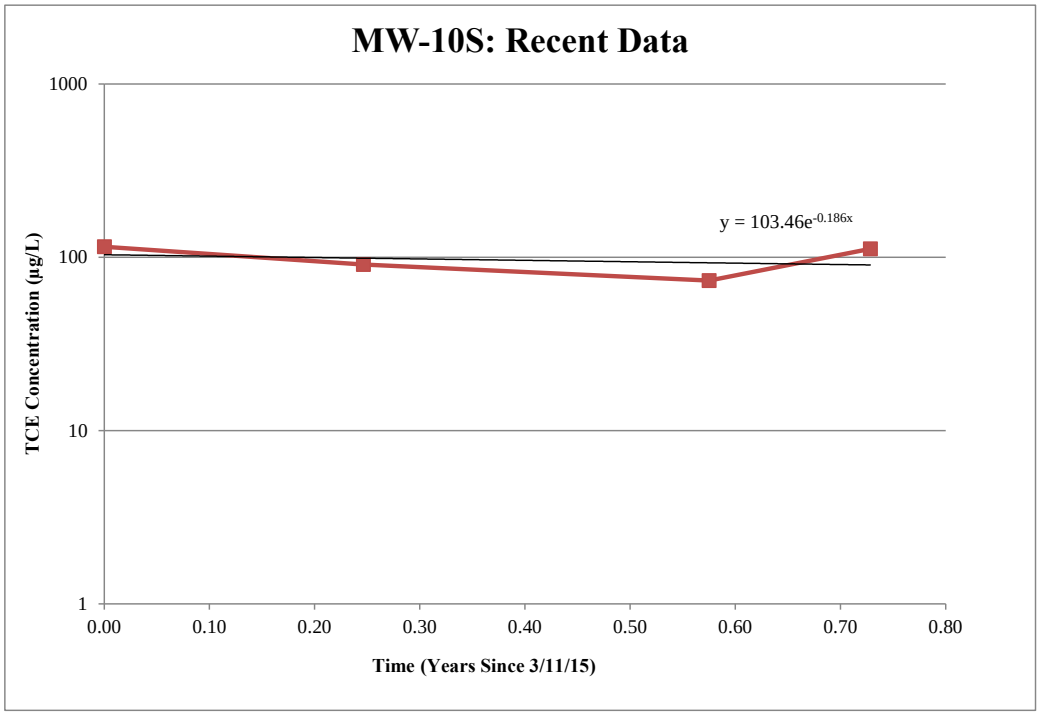

MW-09S: Historic Data
100
10
1
TCE Concentration (µg/L)
y = 25.894e-0.099x
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
Time (Years Since 2/12/04)

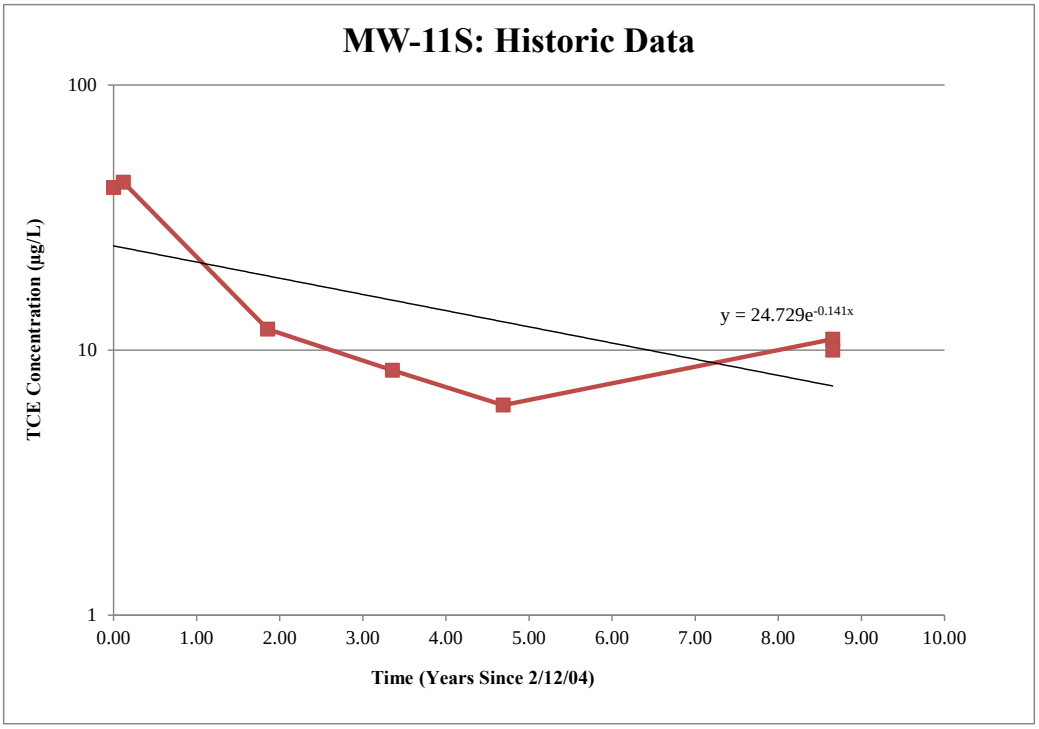

MW-09S: Recent Data
100
10
1
TCE Concentration (µg/L)
y = 6.8176e-0.666x
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
Time (Years Since 3/10/15)

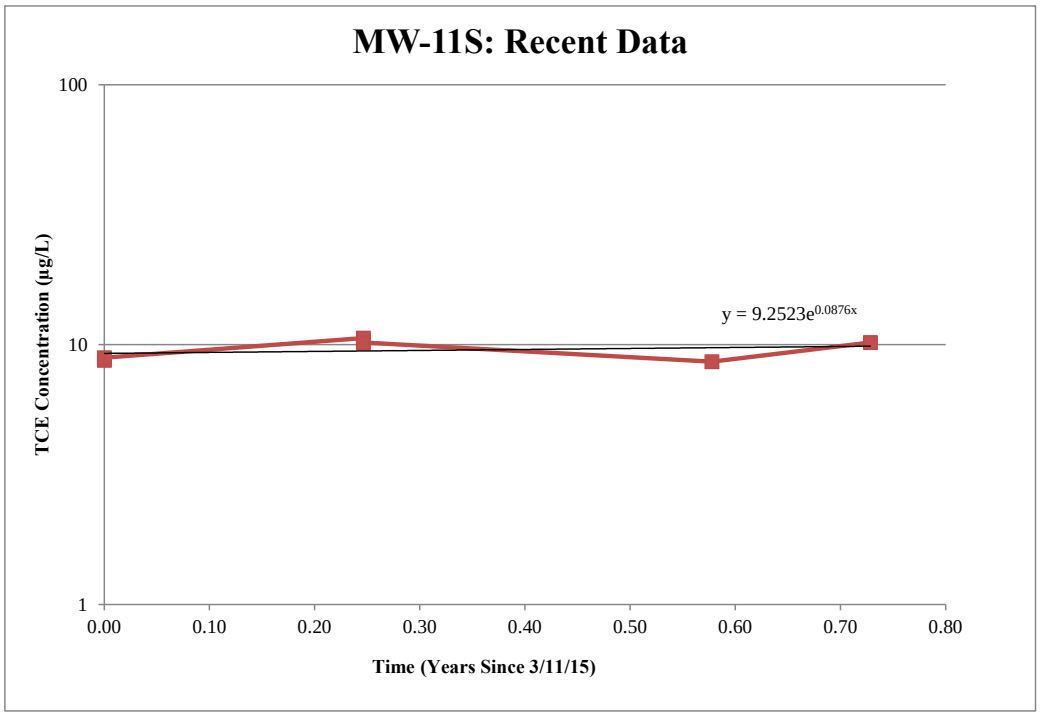

MW-10S: Historic Data
1000
100
10
1
cDCE Concentration (µg/L)
y = 6.2107e^0.6773x
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
Time (Years Since 2/12/04)


MW-10S: Recent Data
100
10
1
cDCE Concentration (µg/L)
y = 25.681e^0.0501x
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
Time (Years Since 3/11/15)


MW-10S: Historic Data
100
10
1
TCE Concentration (µg/L)
y = 2.5816e^0.5564x
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
Time (Years Since 2/12/04)


MW-10S: Recent Data
1000
100
10
1
TCE Concentration (µg/L)
y = 103.46e^-0.186x
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
Time (Years Since 3/11/15)


MW-11S: Historic Data
100
10
1
TCE Concentration (µg/L)
y = 24.729e-0.141x
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
Time (Years Since 2/12/04)


MW-11S: Recent Data
100
10
1
TCE Concentration (µg/L)
y = 9.2523e0.0876x
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
Time (Years Since 3/11/15)