REMEDIAL ACTION PLAN ADDENDUM
AREA OF INTEREST 1

SUNOCO, INC. (R&M)
PHILADELPHIA REFINERY AND BELMONT TERMINAL
PHILADELPHIA, PENNSYLVANIA

Sunoco, Inc. (R&M)
3144 Passyunk Avenue
Philadelphia, Pennsylvania 19145

December 18, 2008
2574601

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1.0 INTRODUCTION AND BACKGROUND

Sunoco Inc. (R&M) (Sunoco) and the Pennsylvania Department of Environmental Protection (PADEP) entered into a Consent Order & Agreement (CO&A) in December 2003 with respect to remedial activities associated with Sunoco's Philadelphia Refinery (refinery). In accordance with the CO&A, a Current Conditions Report and Comprehensive Remedial Plan (CCR), dated June 30, 2004, was prepared by Sunoco. The CCR proposed Phase II site characterization and corrective action activities for the refinery, including preparation of Site Characterization Reports for eleven individual Areas of Interest (AOIs). The CCR presented a prioritization of all AOIs based on specific risk factors. AOI 1 was the first AOI to be characterized in the schedule.

AOI 1 includes the No.1 and No. 2 Tank Farms and the Belmont Terminal. The boundary of AOI 1 is depicted in Figures 1 and 2. Sunoco prepared a Site Characterization Work Plan (Work Plan) for AOI 1 and submitted the plan to the PADEP and United States Environmental Protection Agency (US EPA) on January 21, 2005. This Work Plan summarized proposed activities to be completed to characterize AOI 1 in accordance with the objectives of the CCR. Following implementation of the Work Plan, Sunoco submitted to PADEP and US EPA a Site Characterization Report (SCR) for AOI 1 dated June 30, 2005. Sunoco met with PADEP to discuss the findings of the SCR, and based on comments received by PADEP, two report revisions were prepared and submitted dated August 8, 2006 and October 4, 2007. Sunoco then prepared a Remedial Action Plan (RAP) for AOI 1 dated January 28, 2008. The RAP was prepared by Sunoco to provide information relating to proposed or ongoing remedial actions in AOI 1 based on the findings and recommendations of the AOI 1 SCR and comments received by PADEP.

This report serves to supplement the information presented in the January 28, 2008 RAP and includes additional information regarding Sunoco's remedial activities and objectives along the eastern boundary of AOI 1 (26th Street boundary).

1.1 Site History and Background

The Sunoco Philadelphia Refinery is located on approximately 672 acres in southwest Philadelphia. The facility has a long history of petroleum transportation, storage, and processing. The oldest portion of the facility started petroleum related activities in the 1860's, when Atlantic Refining Company established an oil distribution center. In the 1900's, crude oil processing began and through the century up to the present, a wide variety of hydrocarbon fuel products from gasoline to asphalt were manufactured. In addition to refining crude oil, various chemicals, such as acids and ammonia, were also produced at the facility for a time. Current operations at the refinery are limited to the production of fuels and basic petrochemicals for the chemical industry. The Point Breeze Processing Area portion of the facility was operating under a Consent

Order and Agreement since 1993. The 2003 CO&A replaced the 1993 CO&A and includes the Girard Point Processing Area, the West Yard, and the Schuylkill River Tank Farm.

AOI 1 comprises the northeast portion of the Point Breeze Process Area South Yard and includes the Belmont Terminal. Currently, AOI 1 is comprised of primarily light-end hydrocarbon aboveground tankage (No. 1 and 2 Tank Farms) and loading racks (the Belmont Terminal). The Belmont Terminal area is utilized for blending gasoline and additives as well as product distribution. There are numerous underground process lines in the terminal area of AOI 1. Appendix A of the AOI 1 SCR included a figure which described the current usage of AOI 1.

Sunoco has performed numerous historical investigations at AOI 1 and has installed remediation systems to prevent off-site migration of vapor, dissolved constituents of concern (COCs) in groundwater and light non-aqueous phase liquid (LNAPL) along the AOI border. Several of the investigations and remediation activities were completed pursuant to the 1993 and 2003 Consent Order and Agreements between PADEP and Sunoco.

1.2 Remedial Action Objectives

In accordance with the 2003 CO&A, Sunoco's corrective action goal for AOI 1 is to attain an Act 2 standard at the boundary of the refinery and the Belmont Terminal. Specifically at AOI 1, Sunoco intends to demonstrate attainment of a site-specific remediation standard using the pathway elimination option. To demonstrate attainment, Sunoco intends to perform additional groundwater monitoring at and beyond the AOI 1 border. The monitoring will be completed on a quarterly basis to evaluate whether LNAPL plumes at the border are stable and whether dissolved COCs in groundwater exhibit stable to decreasing trends based on the operation of current and future remediation systems. An exposure assessment will also be completed to identify potential off-site receptors.

Section 2.1 of this RAP Addendum includes a summary of performance monitoring activities that have been completed for the existing 26th Street Total Fluids Extraction System and a list of wells proposed for incorporation into quarterly monitoring to evaluate this system.

2.0 REMEDIAL ACTION PLAN

Detailed descriptions of the remediation systems currently operating in AOI 1 are provided in the AOI 1 RAP. With respect to the existing 26th Street Total Fluids Extraction System (northeastern boundary of AOI 1), the RAP included a discussion of performance monitoring activities being completed by Sunoco to evaluate the effectiveness of this remediation system. With respect the southeastern AOI border, the

RAP concluded that iSOC technology did not perform successfully in its original configuration with only a couple of distribution points. However, the test did show some increase in biodegradation and demonstrated that it had a limited radius of influence. Therefore, oxygen can not be ruled out as a viable technology in this area.

This RAP Addendum focuses on these two areas: the northeastern border of AOI 1 which includes the existing 26th Street Total Fluids Extraction System, and the southeastern border of AOI 1 previously referred to in the RAP as the S-43 and S-50 area. The following sections of this RAP Addendum provide detailed information relating to completed or planned corrective action activities for these areas.

2.1 Existing 26th Street Total Fluids Extraction System (26th Street North Area)

2.1.1 Remediation System Background

The 26th Street Sewer Area Total Fluids Recovery System is comprised of a network of 19 recovery wells along the northeastern border of the refinery, including five off-site extraction wells described below. The system was installed to prevent off-site LNAPL migration east of 26th Street in the area referred to as "26th Street North Area." The 26th Street North Area comprises the section of 26th Street from approximately S-89 through RW-400, north of the former railroad tracks. The 26th Street Total Fluids Recovery System includes recovery wells RW-400, S-180, S-181, S-182, S-183, S-184, S-185, S-186, S-187, S-188, S-189, S-190, S-191, and S-192 within the refinery confines, and recovery wells S-194, S-195, S-261, S-262, and S-263 on the CSX property across 26th Street. All wells are equipped with pneumatic total fluids pumps. The pumps feature a liquid level control inside each pump that will discharge independently in accordance with the rate of recharge into the well. Total fluids produced by each of the wells discharge to a benzene national emission standards for hazardous air pollutants (NESHAP) controlled sewer and is routed to the Point Breeze Area Wastewater Treatment Plant. Because of this configuration, designed to enhance NAPL capture along this perimeter, the volume of LNAPL recovered can not be quantified.

On behalf of Sunoco, a performance assessment of this system is being conducted by Stantec (formerly SECOR) to better determine the effectiveness of existing remediation system in this area. A multi-well pump test and capacity tests were completed on the system recovery wells. These field activities began in the fourth quarter of 2007 and results were included in previous remediation status reports submitted by Stantec. Data from the capacity test indicated that the wells were capable of producing 2 to 14 gallons per minute (gpm). Based on the findings from the above field investigations, additional observation wells were installed to gain a better understanding of the soil lithology in the

area of the pumping wells and additional capacity tests were completed. Results from these field activities are described in the following sections.

2.1.2 Remediation System Performance Monitoring

The total fluids recovery system was evaluated and monitored during August 2008 to determine if LNAPL and dissolved COCs in groundwater are exhibiting stable to decreasing trends and to determine if the remediation system is effective in preventing migration off-site. System effectiveness was evaluated by conducting a well-capacity test on extraction well S-185. Additional testing and analysis was performed to determine if LNAPL and dissolved petroleum constituent trends were stable or decreasing along the 26th Street boundary of AOI 1. Details of the assessment process are summarized below.

Observation Well Installation

Seven new observation wells were installed along the 26th Street boundary between existing wells S-189 and S-180. These wells are identified as S-271 through S-277. The purpose of installing the new wells was to collect and document geologic and hydrogeologic information in this area. Each well was constructed of 4-inch diameter PVC casing with a screened section from 15 to 35 feet below ground surface (bgs). A well location map and construction logs are included in Appendix A-1.

Aquifer Testing

A step-drawdown pumping test was performed to estimate the radius of influence for total fluids recovery wells and to verify well capacity for the pumped well. The pumping test was performed by discharging water from well S-185 and monitoring water levels in S-185 and nearby observation wells S-274 and S-275. Well discharge began at a rate of 0.6 gpm and progressed to a maximum of 3.0 gpm over a period of approximately 8.5 hours. Pumping rates and water level observations are summarized in Appendix A-2.

Results of the aquifer testing demonstrate that the radius of influence for well S-185 is at least 25 feet and that the maximum pumping capacity is 3 gpm with an observed drawdown of approximately 6.7 feet. The maximum observed drawdown in observation wells S-274 and S-275 was 0.22 feet and 0.26 feet, respectively.

Historic LNAPL and Dissolved Constituent Analysis

Historic data were analyzed to identify trends in dissolved petroleum constituent concentrations and LNAPL thickness and extent. The purpose of this analysis was to determine if stable or decreasing trends exist along the 26th Street boundary of AOI 1.

Trends in LNAPL extent were evaluated to determine if plume-scale expansion or migration is occurring. The relative stability of the LNAPL plume was analyzed by comparing historic maps covering the period of September 2002 through June 2008. Comparing maps from this period reveals that the lateral extent of LNAPL has not changed significantly over the past six years. Variations in the apparent thickness of LNAPL occur throughout the period but the footprint remains essentially unchanged. These results indicate that the LNAPL plume in AOI 1 has come to rest in a stable configuration and is not expanding. Historic LNAPL maps used for this analysis are included in Appendix A-3.

Trends in LNAPL thickness were analyzed to determine if the overall mass is changing with time. Well hydrographs of apparent LNAPL thickness and groundwater elevation versus time were constructed for select wells which are not part of the total fluids recovery system. The hydrographs illustrate that apparent LNAPL thickness is decreasing through time. These results indicate that the overall mass of LNAPL is decreasing along the 26th Street boundary of AOI 1. Well hydrographs are included in Appendix A-4.

Historic groundwater concentration data were reviewed to determine if concentration trends exist along the 26th Street boundary of AOI 1. Results indicate that the historic record is not extensive enough to determine reliable trends. An enhanced groundwater monitoring schedule is being proposed in an effort to determine if a trend can be identified in dissolved groundwater concentrations. This proposed groundwater monitoring schedule is discussed in the following section. A historic analytical table and map illustrating historic benzene concentrations in select wells is included in Appendix A-5.

2.1.3 Proposed Remedial Action Plan and Goals

In an effort to compile a database to further evaluate trends of dissolved hydrocarbon concentrations at the 26th Street North Area, Sunoco proposes to complete quarterly groundwater gauging and sampling of select observation wells. The sampling will be completed on a quarterly basis for a two year period after which the data will be analyzed to determine the long-term sampling plan for demonstrating attainment of a site-specific remediation standard.

Groundwater Gauging

All observation wells along the 26th Street North area will be gauged quarterly. Depth to LNAPL and depth to water measurements will be recorded. A complete gauging event of the 26th Street North Area wells will be completed prior to the quarterly sampling being

initiated. Data collected from the gauging event will be used to create a groundwater elevation contour map and a LNAPL apparent thickness map.

Groundwater Sampling

Sunoco proposes to conduct quarterly groundwater sampling of select wells, listed below, at the 26th Street North Area. The proposed well points to be included in the groundwater sampling event are highlighted in Appendix A-6. During the groundwater sampling, all wells will be purged of three well volumes prior to sampling. The wells will be purged utilizing a whale pump pumping at a rate of one gallon per minute or less and samples will be collected with a dedicated disposable bailer. Field parameters including, pH, specific conductivity, turbidity, DO and ORP will be collected during sampling. The samples will be analyzed for the following COCs: benzene, toluene, ethylbenzene, xylenes, cumene, naphthalene, 1,2,4-trimethyl benzene, 1,3,5-trimethyl benzene, 1,2-dichloroethane (EDC), methyl-tertiary-butyl-ether (MTBE), fluorene, anthracene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, benzo(g,h,i)perylene phenanthrene, pyrene, chrysene, 1,2-dibromoethane (EDB), and dissolved lead.

The following wells are proposed to be sampled during each quarterly monitoring event:

Within the refinery:

S-81	S-272
S-85	S-273
S-86	S-274
S-88	S-275
S-89	S-276
S-125	S-277
S-271	

On CSX Property (off-site):

S-98	S-193
S-99	S-196
S-100	S-197
S-101	S 264

2.2 26th Street South Area

2.2.1 Area Description

The area under investigation includes the southern portion of AOI-1, also known as the #2 Tank Farm or the 26th Street South Area. This area was referred to in the AOI 1 RAP as the S-43 and S-50 Area. The AOI 1 RAP discussed LNAPL and groundwater quality conditions with respect to this area and included a description of investigative work being completed by Sunoco to further evaluate conditions and remedial options. This RAP addendum includes a discussion of the findings of this investigation work. The RAP also included a detailed discussion regarding an iSOC technology pilot test that was completed in the area. The result of the iSOC pilot testing indicated that this technology was not effective using the testing configuration of only a couple of injection points.

Although wells within this area are gauged on a relatively frequent basis, historically, sampling of groundwater has been sporadic. Over the course of the sampling history of this area, it had been noted that there were relatively elevated occurrences of benzene within certain wells. Therefore, the purpose of the recent investigation activities conducted in the 26th Street South area has been to provide further definition of the extent of the LNAPL and dissolved phase COCs in groundwater, as well as to evaluate potential remedial options.

The following sections of this RAP Addendum discuss the work that was recently completed by Sunoco in the area and the findings of this work. The investigation work was completed by Aquaterra Technologies, Inc. (Aquaterra) and Integrated Science and Technology, Inc. (IST). A Site Plan showing this area is included as Appendix B-1. This plan illustrates the area of Aquaterra's and IST's investigation activities.

2.2.2 Summary of Investigation Activities

December 2007 Soil Boring and Well Installation

On 12 December 2007 through 20 December 2007, Aquaterra and IST provided oversight for the installation of four deep soil borings (S-261D, S-262D, S-263D, and S-264D) in the 26th Street South Area of the refinery. Borings were advanced and wells constructed by Parratt Wolff, Inc. (Parratt Wolff) of Syracuse, New York via hollow stem auger drilling techniques. Prior to installation of borings and wells, each location was cleared for utilities by Mobile Dredging and Pumping Company of Chester, Pennsylvania.

Soil borings were installed to depths ranging between 65 to 82 feet below grade. During installation, soil samples were collected every two feet via split spoons. The subsurface lithology was recorded for each sample and soils were field screened with a photoionization detector (PID) to determine the relative presence of volatile organic compounds (VOCs) in the subsurface.

Soil samples were containerized for submittal to NewFields Environmental Forensics Practice of Rockland, Massachusetts. All samples were submitted for analysis of polynuclear aromatic hydrocarbons (PAHs) via EPA Method 8270 Modified and total petroleum hydrocarbons (TPH) via EPA Method 8015 Modified. Some of the samples were also analyzed for PIANO VOCs via EPA Method 8260 Modified, which provides fingerprinting through identification of Paraffins, Isoparaffins, Aromatics, Naphthenes and Olefins.

Multiple acetate core tube samples (Shelby Tubes) were also collected from each boring. Acetate core tube samples were submitted to PTS Laboratories, Inc. of Santa Fe Springs, California for analysis of geotechnical parameters including moisture content, bulk density, grain density, total porosity, air filled porosity, total pore fluid saturations, effective permeability to water, and hydraulic conductivity.

Subsequent to boring installation, a monitoring well was installed adjacent to each boring location. Monitoring wells were labeled according to the soil boring adjacent to which they were installed. Wells S-261, S-262 and S-263 were all installed as 4" PVC wells to a total depth of 30 feet below grade. Well S-264 was installed as a 4" PVC well to a total depth of 81 feet below grade. Wells S-261 through S-263 were screened so that the top of water table would be intercepted. Well S-264 was screened from 71 to 81 feet below grade to intercept the deeper sand unit. This well was installed to replace a deep well formerly referred to as S-42D.

Upon completion, the location and elevation of each soil boring and monitoring well were surveyed by Langan Engineering and Environmental Services. Well locations are illustrated on the Site Plan in Appendix B-1. Soil boring and monitoring well logs are included as Appendix B-2. Information obtained from several of the deep borings was used to create geologic cross sections through the area. The geologic cross section key and associated cross sections are provided in Appendix B-3.

August 2008 Well Installation

Aquaterra installed two monitoring wells, S-267 and S-270, in the 26th Street South Area for the purpose of further groundwater characterization. The additional well locations

were chosen to assist in the determination of the extent of possible sources for the benzene concentrations historically observed in area wells.

Monitoring wells were installed by Parratt Wolff via hollow stem auger drilling techniques. Prior to installation of the wells, each location was cleared for utilities utilizing an air knife and vacuum truck to a depth of eight feet below grade.

The monitoring wells were installed to depths of 30 feet below grade, extending into the gravel materials. During installation, continuous split spoons were collected for both lithologic description and screening with a PID. Each well was completed with four-inch diameter schedule 40 PVC, with 20 feet of screen. Any soil cuttings generated during drilling activities were stockpiled adjacent to the well location for future disposal coordinated by Sunoco personnel. Wells were completed with approximately two feet of steel casing to protect the well from potential damage. Monitoring well logs are included in Appendix B-2.

Well locations are shown on the Site Plan in Appendix B-1.

Groundwater Sampling

In June 2008, all accessible wells within the 26th Street South Area were gauged and sampled. The gauging data from this event is presented in Appendix B-4. Wells within the area are illustrated on the Site Plan. Prior to sampling, depth to water measurements were collected for use in calculating groundwater elevations for generation of a gradient map provided as Figure 2 in Appendix B-1. Figure 2 illustrates groundwater flow generally to the southeast and east at an average gradient of approximately 0.01 feet per foot. There is a groundwater depression in the vicinity of wells S-44 and S-259.

Groundwater samples were collected from the wells between June 10 and 13, 2008. Sampling was performed following the three well volume sampling protocol detailed in Langan's Field Procedures for groundwater sampling. All purge water was treated through a carbon vessel for discharge to the surface. The samples were submitted to Lancaster Laboratories, Inc. (Lancaster) for analysis of benzene, toluene, ethylbenzene, total xylenes (BTEX) and methyl tertiary-butyl ether (MTBE) via EPA Method 8260B. Well S-117 was not found during the June sampling, but was subsequently identified and sampled on 6 August 2008.

Groundwater samples were collected from recently installed wells S-269 and S-270 on August 29, 2008. The samples were also submitted to Lancaster for analysis of BTEX

and MTBE via EPA Method 8260B. Laboratory analytical data and chains of custody are included as Appendix B-5.

Laboratory data indicated that total xylenes was not reported above its PADEP Act 2 Statewide Health Standard (SHS) Medium Specific Concentration (MSC). Ethylbenzene and toluene exceeded their respective SHS MSCs in only a few locations. MTBE and benzene exceeded their SHS MSCs in numerous wells across the study area. Laboratory data are summarized in the table provided in Appendix B-4.

Isoconcentration maps were generated for benzene and MTBE data to illustrate the location of the highest concentrations reported during the sampling event. These maps are included in Appendix B-6. Although not collected during the same event, the groundwater quality data from wells S-117, S-269 and S-270 were incorporated onto the isoconcentration maps. The highest benzene concentrations are in the area of wells S-210, S-226 and S-231, with other notable concentrations in wells to the west (S-208 and S-117) and north (S-209).

Aquifer Testing

Aquaterra conducted a 20-hour pumping test on well S-210 using a submersible frequency pump. Well S-210 was chosen as the pumping well based on the proximity of other wells available for influence monitoring as well as its high dissolved concentrations and potential as a recovery point. Prior to the constant rate test, a step-drawdown test was conducted to determine the maximum extraction rate that could be sustained. During the step test and the constant rate test, In-Situ, Inc. miniTROLL® data loggers (trolls) were placed in the pumping well (S-210) and surrounding observation wells (S-50, S-230, S-232, S-231, and S-226). In addition, manual water levels were collected from the pumping well and from the observation wells to confirm transducer readings.

Aquifer testing activities were conducted by Aquaterra at the site from August 18 through 21, 2008. Trolls were placed in two wells, S-231 and S-232, on August 18, 2008 to gather background data prior to any well pumping.

On August 20, 2008, the step drawdown test was conducted on S-210. The step intervals evaluated were approximately 2, 3, and 3.3 gpm. Four gpm was attempted, however, the pump would not sustain operation at that rate. Each rate was sustained for a minimum of one hour. Due to the proximity of observation well S-50, influence within the well was immediately observed and mirrored the pumping well as illustrated on the hydrographs included as Appendix B-7. Recharge in the well after the pump was shut down occurred within an hour.

Due to the quick recharge in the pumping well, the extended pumping test was also initiated on August 20, 2008. A 20-hour pumping test was initiated on well S-210 at a target rate of 3 gpm. A rate of approximately 3.3 gpm was maintained for the first 10.5 hours of the test. The drawdown in the well did not level off as quickly as anticipated, and due to the presence of LNAPL in the well (at least initially), and not wanting to prevent drying out the well and/or damaging the pump, the pumping rate was adjusted over the second half of the test (9.5 hours) so that a constant drawdown (3 feet above the pump intake) was maintained.

After a period of 20 hours, the pump was shut off and the aquifer was left to recharge. The pumping influence on surrounding observation wells is illustrated through hydrographs created for each well plotting change in groundwater elevation over time. As noted above, the influence in well S-50 mirrors the pumping well and was relatively instantaneous with a maximum drawdown on 0.625 feet. Influence on observation wells located further from the pumping well was less obvious. The raw data was plotted in the same fashion as that of S-50. Clear influence could be observed in wells S-231 (48 feet from pumping well), S-230 (65 feet from pumping well), and S-226 (82 feet from pumping well). The maximum drawdown in these wells from initiation of the step test was approximately 0.25 feet, 0.15 feet, and 0.13 feet, respectively. Well S-232 is located approximately 95 feet from the pumping well and appears to have had minor influence (0.07 feet).

The drawdown data from observation wells (and recharge data from well S-50) were analyzed using Aqtesolv to calculate transmissivities using the Theis analytical solution. Transmissivity values ranged between 177 square feet per day (ft^2/day) to 417 ft^2/day, with a geometric mean of 298 ft^2/day.

Note that the pumping well and surrounding observation wells are similarly screened mostly within gravel materials (some with slight extension into the overlying alluvial deposits). The pumping well and surrounding observation wells are illustrated on the lithologic cross sections included in Appendix B-3. Subsurface information from the deep borings installed in December 2007 was used to create an additional cross section included in Appendix B-3. A saturated aquifer thickness of 15 feet was utilized accounting for the top of water table in the test area and the bottom of the gravel materials at that location as indicated on the cross sections. Based on this, the average calculated hydraulic conductivity is approximately 19.9 feet per day (ft/day). This value is consistent with previous values calculated for gravel materials elsewhere onsite. Aquifer test documentation is included as Appendix B-7.

Upon completion of the test, an EISCO vacuum truck was utilized to extract the purge water from the holding tank for transport and discharge into a Sun-approved location within the facility.

2.2.3 Proposed Remedial Action Plan

In order to identify the appropriate remedial technologies applicable to the study area, the following site characteristics were considered:

- The main COC within the dissolved phase at the site is benzene, which is present in the subsurface at elevated concentrations in the area of wells S-210, S-226 and S-231.

- Product fingerprinting identified the existing LNAPL as Light End Feed Stock. LNAPL has inconsistently been observed at monitoring wells S-50 and S-210 at thicknesses of less than one foot.

- Investigation into possible sources for the elevated benzene indicated a vapor release Tank 121 run down line (which was corrected by installation of a gasket flange). There were no other potential releases identified in the area. Tank 121 is located north of well S-226.

- Wells exhibiting elevated concentrations are generally screened within gravel materials, with some slight extension of screen into the overlying alluvium and potentially some extension into the underlying clay.

- Shallow groundwater occurs in the area between approximately 17 and 21 feet below ground surface.

- Extent of adsorbed-phase petroleum hydrocarbon compound concentrations is not known but it can be assumed that adsorbed phase hydrocarbons are generally present within vadose zone due to smearing of LNAPL where present.

As discussed above, the corrective action goal for AOI 1 is attainment of site-specific remediation standards at the property boundary. Assessment to date indicates the mechanism of off-site migration along the AOI southern boundary is soluble phase migration (principally benzene) with groundwater flow, primarily within the high

permeability materials. Accordingly, to mitigate off-site impact, a cut-off barrier utilizing oxygen (O_2) injection is proposed as shown in Figure 3.

To create the barrier, an estimated 20 to 30 O_2 injection points will be placed 10 ft on center and alternating in depth between the middle and bottom of the high permeability materials. Oxygen gas will be injected into groundwater to increase the dissolved oxygen concentration and enhance aerobic biodegradation of contaminants, in pulsed intervals through the injection points at low flow rates. The low flow rates and pulsed injection intervals are intended to allow for maximum transfer of vapor-phase oxygen trough dispersion into saturated soils.

2.2.4 Discussion of Findings

As illustrated on the benzene isoconcentration map, the highest concentrations observed generally lie along a corridor extending from well S-208 to well S-231 near 26th Street. The wells with the highest concentrations in this area include: S210, S-226 and S-231.

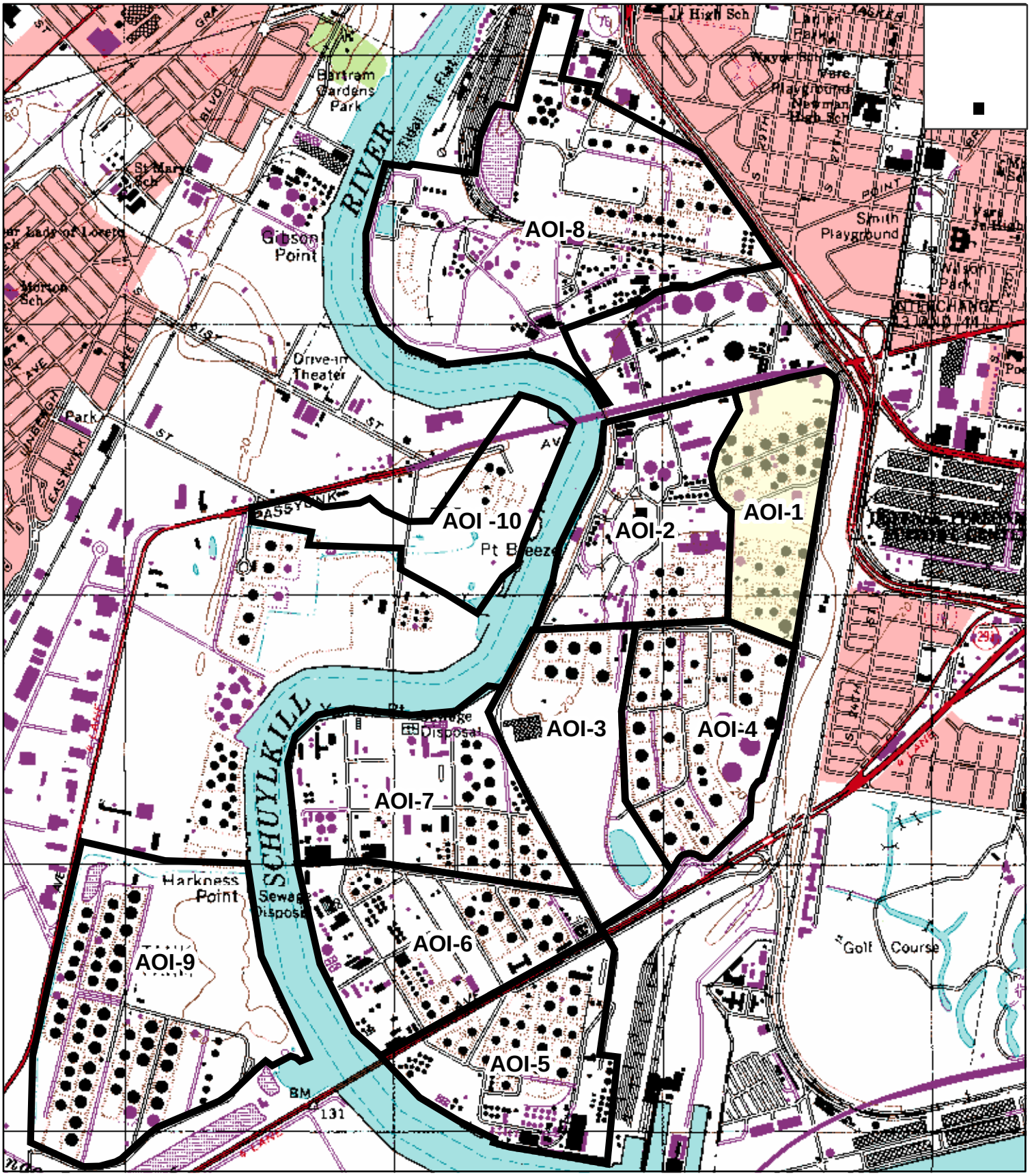
Wells installed within the deeper sand units beneath the site do not report the same elevated hydrocarbon concentrations as observed in the shallow water table aquifer beneath the study area.

Historic data is sporadic and definitive groundwater concentration trends can not be determined for most of the site wells. Therefore, Sunoco will increase the frequency of groundwater sampling activities and the number of wells which are sampled to bolster the database of information regarding groundwater quality in the 26th Street South area.

Additional subsurface activities are currently being conducted in the area of concern as part of an investigation related to the DSCP plume east of 26th Street. Although these activities are being performed as part of a separate investigation, the data provided may be useful in further assessment of subsurface conditions and the most viable remediation alternative. If the proposed activities do not return the anticipated information, Sunoco may install additional soil borings and/or monitoring wells subsequent to the investigation.

The remediation assessment indicates that although use of iSOC oxygen dispersion methods was not favorable, O_2 injection options are expected to reduce high benzene concentrations in the surficial aquifer. Based on that assessment, feasibility testing proposals are being solicited from multiple firms.

FIGURES



USGS Topographic Map, Philadelphia, PA. Quadrangle, USGS 1995

Sunoco, Inc. (R&M)

Philadelphia Refinery

3144 Passyunk Avenue
Philadelphia, PA. 19145

Figure 1: Site Boundary with AOI 1 Highlighted
AOI 1 Remedial Action Plan
Philadelphia Sunoco Philadelphia Refinery Pennsylvania

Job Number	Scale: 1" = 1600'	Date
2574601	0 800 1,600 Feet	June 21, 2005

Q:\Data6\2574601\ArcGIS\MapDocuments\AOI 1 Remedial Action Plan\Figure 1- AOI 1 Remedial Action Plan - Topo.mxd

Passyunk Ave Sewer

Shunk Street Sewer

Belmont Terminal

Tank Farm No.1

26th Street Sewer

Tank Farm No.2

Pollack Street Sewer

Legend

AOI-1: No.1 Tank Farm, No.2 Tank Farm, and Belmont Terminal Boundaries

Approximate Location of Sewer

N

W E

S

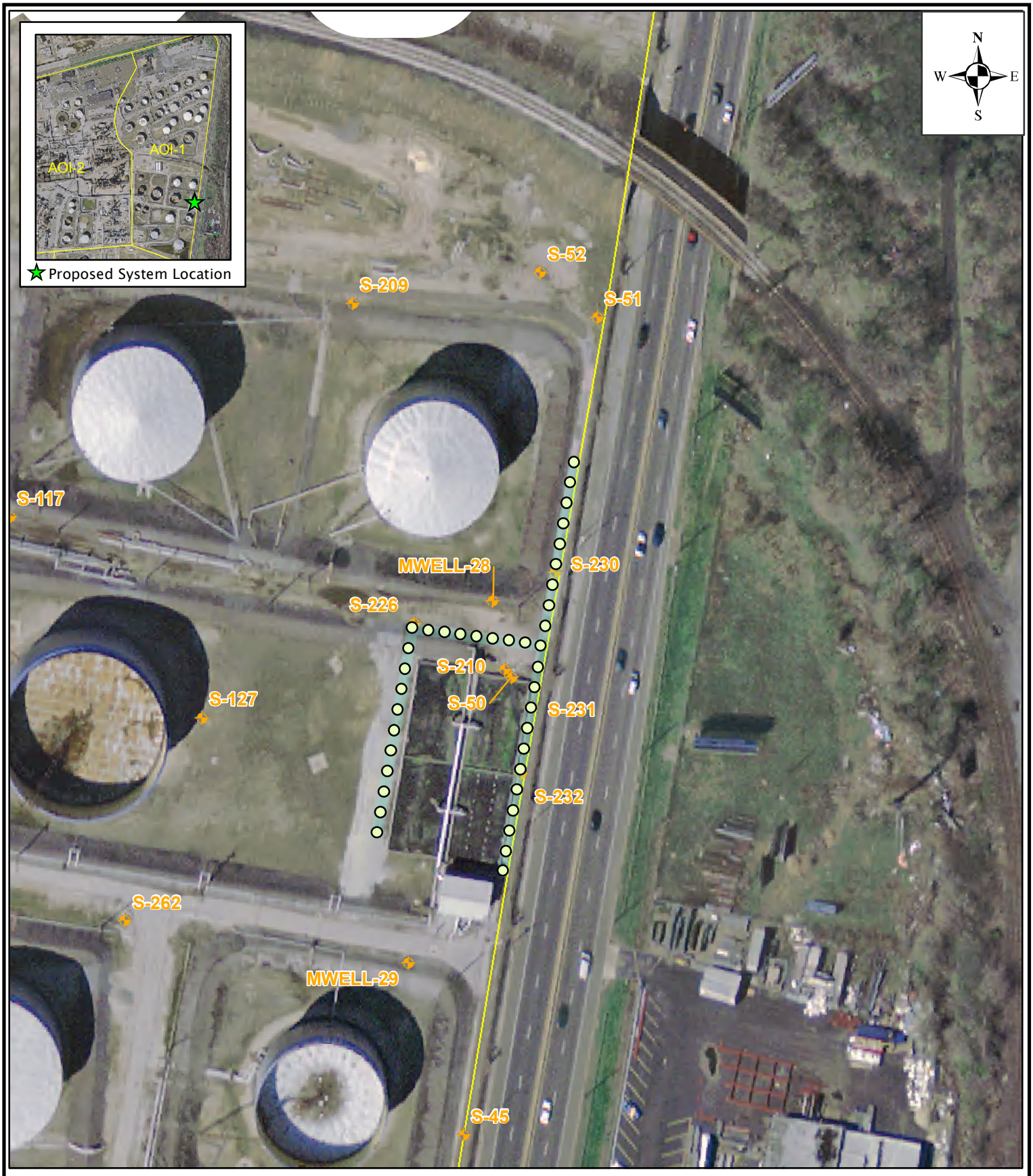
Figure 2: Site Plan
AOI 1 Remedial Action Plan
Sunoco Refinery
Philadelphia, Pennsylvania

Sunoco, Inc. (R&M)
Philadelphia Refinery
3144 Passyunk Avenue
Philadelphia, PA.
19145

0 125 250 Feet

SCALE: 1" = 125'
DATE: June 20, 2005
DRN. BY: JSC
CKD. BY: JH
JOB#: 2574601

O:\Data\2574601\ArcGIS\MapDocuments\AOI 1 Remedial Action Plan\Figure 2 - AOI 1 RAP Site Plan.mxd



Sunoco, Inc. (R&M)
Philadelphia Refinery
3144 Passyunk Avenue
Philadelphia, PA. 19145

Legend

- Proposed Oxygen Injection Location
- Existing Monitoring Well
- AOIs

Figure 3: Proposed O_2 Injection System AOI 1 Southern Boundary

Philadelphia Pennsylvania

Job Number	Scale: 1" = 100'	Date
2574601	0 50 100 Feet	Novebmer 25, 2008

Q:\Data6\2574601\ArcGIS\MapDocuments\AOI 1 Remedial Action Plan\Figure 1- AOI 1 Remedial Action Plan - Topo.mxd

APPENDIX A
26TH STREET NORTH AREA SUPPORT DOCUMENTATION

Appendix A1
Well Location Map and Construction Logs

Note: New Wells in AOI-1 and AOI-2 Well Classification Data Pending

Stantec
102 PICKERING WAY, SUITE 200
EXTON, PENNSYLVANIA
PHONE: (484) 875-3075 FAX: (484) 875-9286

FOR:
SUNOCO PHILADELPHIA REFINERY
PHILADELPHIA, PA

Philadelphia Refinery
26th Street Area

FIGURE:

JOB NUMBER:	DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:
	TFB			04/25/2008

PROJECT: **Philadelphia Refinery**
LOCATION: **Philadelphia, PA**
PROJECT NUMBER: **62SU.01095.05**

WELL / PROBEHOLE / BOREHOLE NO: **S-271** PAGE 1 OF 1

Stantec

DRILLING: STARTED **7/29/08** COMPLETED: **7/30/08**
INSTALLATION: STARTED **7/29/08** COMPLETED: **7/30/08**
DRILLING COMPANY: **Parratt Wolff**
DRILLING EQUIPMENT: **A-300**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

NORTHING (ft):
EASTING (ft):
LATITUDE:
LONGITUDE:
GROUND ELEV (ft):
TOC ELEV (ft):
INITIAL DTW (ft): **NE**
BOREHOLE DEPTH (ft): **35.0**
STATIC DTW (ft): **23** **7/29/08**
WELL DEPTH (ft): **35.0**
WELL CASING DIAMETER (in): **4**
BOREHOLE DIAMETER (in): **8**
LOGGED BY: **Frank Rooney**
CHECKED BY: **R Turner**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Well Construction
			Cleared Thursday, July 28, 2008							
1020			**SAND WITH FINE GRAVEL**; 10YR-5/6 yellowish brown; fine-grained; moist; subrounded			1.2	2 5 6 10	129 3253		
1030			**SAND WITH FINE TO COARSE GRAVEL**; 5YR-2.5-1 black; fine-grained; moist; subrounded			1.4	8 11 7 6	1334 100 151 5026		
1045			**SAND WITH FINE GRAVEL**; 5YR-5/3 dark reddish brown; fine-grained; moist; subrounded			1.2	12 15 14 10	- - 4448 1261		
1050			**SAND WITH FINE GRAVEL**; 5YR-3/1 dark gray; fine-grained; moist; subrounded			1.2	8 4 5 8	- 557 1750 1249		
1100			**SAND WITH MEDIUM TO COARSE GRAVEL SOME MICA**; 5YR-5/3 reddish brown; fine-grained; moist; subrounded			1.3	25 25 25 25	- - 3026 4937		
1120						1.3	4 5 5 10	- 4310 1858 3552		
1130						1.2	12 14 15 16	- 407 4029 4451		
1135						1.6	15 16 25 50/0.4	- 2119 3767 3668		
1140						1.3	7 19 23 24	- 1227 261 0		
1220						0.6	11 18 25 23	- - - 2847		
1230						1.5	15 18 23 25	- 614 812 3691		
1250			**SAND WITH COARSE GRAVEL**; 5YR-2.5/1 black; medium to coarse-grained; saturated; subrounded			1.7	7 8 13 15	3490 1850 3280 3385		
1310						1.7	14 22 25 18	3219 3660 3161 3436		
			SAND WITH COARSE GRAVEL; 5YR-5/3 reddish brown; medium to coarse-grained; saturated; subrounded			2	25 15 - -	651 601		
			Hole terminated at 35 feet.							

Neat Cement Grout
Bentonite Seal
Sand Filter Pack

GEO FORM 304 PHILADELPHIA REFINERY.GPJ SECOR INTL.GDT 9/23/08

PROJECT: **Philadelphia Refinery**
LOCATION: **Philadelphia, PA**
PROJECT NUMBER: **62SU.01095.05**

WELL / PROBEHOLE / BOREHOLE NO: **S-272** PAGE 1 OF 1

Stantec

DRILLING: STARTED **7/30/08** COMPLETED: **7/30/08**
INSTALLATION: STARTED **7/30/08** COMPLETED: **7/30/08**
DRILLING COMPANY: **Parratt Wolff**
DRILLING EQUIPMENT: **A-300**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

NORTHING (ft):
EASTING (ft):
LATITUDE:
LONGITUDE:
GROUND ELEV (ft):
TOC ELEV (ft):
INITIAL DTW (ft): **NE**
BOREHOLE DEPTH (ft): **35.0**
STATIC DTW (ft): **22 7/30/08**
WELL DEPTH (ft): **35.0**
WELL CASING DIAMETER (in): **4**
BOREHOLE DIAMETER (in): **8**
LOGGED BY: **Frank Rooney**
CHECKED BY: **R Turner**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Well Construction
			Cleared Thursday, July 28, 2008							
0930			**SAND**; 10YR-5/1 gray with brown; fine-grained; moist			1.8	14 10 10 15	0 4.6 0 0		
0950			**SAND WITH FINE GRAVEL**; 10YR-3/2 very dark grayish brown with; fine-grained; moist; subrounded			1.8	6 7 11 20	0 0 0 0		
1010			**CLAY WITH FINE GRAVEL**; 10YR-6/3 pale brown; fine-grained; moist; rounded			1.8	11 12 16 20	0 0 0 0		
1020			**SAND WITH FINE GRAVEL**; 5YR-4/2 dark reddish gray; medium-grained; moist; angular			1.4	20 30 36 20	- 0 0 0		
1045			**SAND WITH FINE GRAVEL**; 10YR-4/3 brown; medium-grained; moist			0.7	21 23 23 25	0 0 0 0		
1100			**SAND WITH COARSE GRAVEL**; 10YR-3/3 dark brown; fine-grained; moist			0.3	8 16 20 23	0 0 0 0		
1120			**SILT WITH SAND AND FINE GRAVEL**; 10YR-3/4 dark yellowish brown; fine-grained; moist; slight petroleum odor; rounded			1.6	10 26 36 35	- - 3697 3475		
1130			**SAND WITH FINE GRAVEL**; 2.5YR-3/2 dark red; fine to medium-grained; saturated; slight petroleum odor; subrounded			2.0	37 37 34 33	664 3804 3779 3692		
1140			**SAND WITH FINE GRAVEL**; 10R-3/3 dark red with dark reddish brown; fine to medium-grained; moist; slight petroleum odor; subrounded			1.8	16 20 32 37	- 149 1656 2167		
1145			**SAND WITH FINE GRAVEL**; 10R-3/3 dark red; fine to medium-grained; moist; slight petroleum odor; subrounded			1.8	24 32 34 40	- 1940 828 3670		
1200			**SAND WITH FINE TO MEDIUM GRAVEL**; 10R-2.5/1 black; fine to medium-grained; moist; strong petroleum odor			1.9	34 26 28 33	- 1059 3296 3253		
1210			**SAND WITH FINE TO COARSE GRAVEL**; 10R-3/1 dark reddish gray; fine to medium-grained; moist; slight petroleum odor; subangular			1.6	12 12 20 17	- 1177 3282 695		
1220			**SAND WITH LITTLE FINE GRAVEL**; 10YR-2/1 black to brown; moist; slight petroleum odor; subrounded			1.4	1 1 1 8	481 3605 3486 4445		
1230			Hole terminated at 35 feet.			2.0	1 1 - -	502 1836		

Neat Cement Grout
Bentonite Seal
Sand Filter Pack

GEO FORM 304 PHILADELPHIA REFINERY.GPJ SECOR INTL.GDT 9/23/08

PROJECT: **Philadelphia Refinery**
LOCATION: **Philadelphia, PA**
PROJECT NUMBER: **62SU.01095.05**

WELL / PROBEHOLE / BOREHOLE NO: **S-273** PAGE 1 OF 1

Stantec

DRILLING: STARTED **7/31/08** COMPLETED: **7/31/08**
INSTALLATION: STARTED **7/31/08** COMPLETED: **7/31/08**
DRILLING COMPANY: **Parratt Wolff**
DRILLING EQUIPMENT: **A-300**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

NORTHING (ft):
EASTING (ft):
LATITUDE:
LONGITUDE:
GROUND ELEV (ft):
TOC ELEV (ft):
INITIAL DTW (ft): **NE**
BOREHOLE DEPTH (ft): **35.0**
STATIC DTW (ft): **28 7/31/08**
WELL DEPTH (ft): **35.0**
WELL CASING DIAMETER (in): **4**
BOREHOLE DIAMETER (in): **8**
LOGGED BY: **Frank Rooney**
CHECKED BY: **R Turner**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)
			Cleared Thursday, July 28, 2008					
0850			**CLAY**; GLEY 1-5/5G greenish gray with reddish brown; moist			2.0	4 5 5 6	0 4.6 0 0
0900						2.0	4 8 10 10	0 0 0 0
0910			**CLAY**; GLEY 1-5/5G greenish gray with reddish brown; moist			2.0	9 9 11 11	0 0 0 0
0930			**CLAY**; 10YR-6/2 W/ 10YR-5/6 light brownish gray with yellowish brown; moist			1.3	4 7 9 9	- 0 0 0
0944			**CLAY**; 10YR-5/2 W/ 5YR-3/2 grayish brown with dark brown; moist			2.0	8 8 9 15	0 0 0 0
0950			**SAND WITH FINE TO COARSE GRAVEL** GLEY 1-5N greenish gray; fine to medium-grained; moist			2.0	15 27 22 24	0 0 0 0
1010			**SANDY CLAY**; 10YR-6/1 W/ 10R-6/8 gray with light red; moist			1.3	7 11 27 27	- - 1655 2557
1030			**SAND WITH FINE TO COARSE GRAVEL** 10R-4/4, GLEY 2-4/5 PB, 7/5 PB pale red with dark blueish gray; fine to medium-grained; moist; slight petroleum odor; subrounded			1.0	28 29 22 22	- - 3849 4218
1045						1.7	22 34 37 24	- 294 5340 5219
1115			**SAND WITH FINE TO COARSE GRAVEL** 10R-4/4, 7.5YR-5/8, 7.5YR-3/3 pale red; fine to medium-grained; moist; slight petroleum odor			1.4	15 22 25 36	- 0 165 4923
1150			Black; saturated; slight petroleum odor; subrounded			1.3	40 50/0.4 - -	- - 6889 6386
1200			**SAND WITH FINE TO COARSE GRAVEL** 7.5YR-3/2 dark brown to black; fine to medium-grained; moist; slight petroleum odor; subrounded			1.5	20 24 32 36	- 457 7058 8800
1210						1.0	17 18 24 26	- - 500 3208
1220			**SAND WITH FINE TO MEDIUM GRAVEL** 7.5YR-3/2 dark brown; fine to medium-grained; moist; subrounded			2.0	17 18 - -	- - 450
			Hole terminated at 35 feet.					

Well Construction: Neat Cement Grout; Bentonite Seal; Sand Filter Pack

GEO FORM 304 PHILADELPHIA REFINERY.GPJ SECOR INTL.GDT 9/23/08

PROJECT: **Philadelphia Refinery**
LOCATION: **Philadelphia, PA**
PROJECT NUMBER: **62SU.01095.05**

WELL / PROBEHOLE / BOREHOLE NO: **S-274** PAGE 1 OF 1

Stantec

DRILLING: STARTED **8/5/08** COMPLETED: **8/5/08**
INSTALLATION: STARTED **8/5/08** COMPLETED: **8/5/08**
DRILLING COMPANY: **Parratt Wolff**
DRILLING EQUIPMENT: **A-300**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

NORTHING (ft):
EASTING (ft):
LATITUDE:
LONGITUDE:
GROUND ELEV (ft):
TOC ELEV (ft):
INITIAL DTW (ft): **NE**
BOREHOLE DEPTH (ft): **35.0**
STATIC DTW (ft): **24 8/5/08**
WELL DEPTH (ft): **35.0**
WELL CASING DIAMETER (in): **4**
BOREHOLE DIAMETER (in): **8**
LOGGED BY: **Frank Rooney**
CHECKED BY: **R Turner**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Well Construction
			Cleared Thrusday, July 28, 2008							
0910			**CLAY**; GLEY 2-6/10B W/ 20% 10YR-5/8 blueish brown with yellowish brown; moist			1.7	5 6 7 8	- 194 0 0		
0920						1.4	4 5 5 7	- 0 1088 1092		
0935			**CLAY WITH FINE GRAVEL**; 2.5YR-7/1 light reddish gray; moist; slight petroleum odor; subrounded			2.0	22 22 31 42	1954 662 4175 0		
0950			**CLAY WITH SILT**; 10YR-7/1 W/ 40% 10YR-5/4 light gray with yellowish brown			1.5	13 12 12 13	- 0 0 0		
1000			**CLAY**; 10YR-4/2 dark grayish brown; moist			2.0	5 8 9 9	0 0 0 0		
1015						2.0	6 8 8 10	0 373 0 0		
1030			**SAND**; 10YR-6/2; fine to medium-grained; moist; slight petroleum odor							
1045			**SAND WITH FINE TO MEDIUM GRAVEL**; 10YR-3/4 dark yellowish brown; fine to medium-grained; moist; slight petroleum odor							
1055			**SANDY CLAY WITH FINE TO COARSE GRAVEL**; GLEY 2-6/5 PB blueish gray; moist; slight petroleum odor; subrounded							
1115			**CLAYEY SAND WITH FINE TO MEDIUM GRAVEL**; 2.5YR-2.5/4 & 5YR-2.5/1; fine to medium-grained; saturated; slight petroleum odor; subrounded							
1130			**CLAYEY SAND WITH FINE TO COARSE GRAVEL**; 10R-3/4 & 10YR-4/2 W/ 10% 10YR-8/2 dark red and dark gray; moist; slight petroleum odor; subrounded							
1145			**SAND WITH FINE TO COARSE GRAVEL**; black; saturated; slight petroleum odor; subrounded							
1200			**SAND WITH FINE TO COARSE GRAVEL**; 10R-3/4 & 10R-3/2 dark red; fine to medium-grained; saturated; slight petroleum odor							
1215			**SAND WITH FINE TO COARSE GRAVEL**; 10YR-3/3 dark brown; fine to medium-grained; saturated; slight petroleum odor							
			CLAYEY SAND; 10YR-6/1 W/ 10YR-5/6; fine-grained; moist; slight petroleum odor							
			Hole terminated at 35 feet.							

Well Construction: Neat Cement Grout; Bentonite Seal; Sand Filter Pack

GEO FORM 304 PHILADELPHIA REFINERY.GPJ SECOR INTL.GDT 9/23/08

PROJECT: **Philadelphia Refinery**
LOCATION: **Philadelphia, PA**
PROJECT NUMBER: **62SU.01095.05**

WELL / PROBEHOLE / BOREHOLE NO: **S-275** PAGE 1 OF 1

Stantec

DRILLING: STARTED **8/5/08** COMPLETED: **8/6/08**
INSTALLATION: STARTED **8/5/08** COMPLETED: **8/6/08**
DRILLING COMPANY: **Parratt Wolff**
DRILLING EQUIPMENT: **A-300**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

NORTHING (ft):
EASTING (ft):
LATITUDE:
LONGITUDE:
GROUND ELEV (ft):
TOC ELEV (ft):
INITIAL DTW (ft): **NE**
BOREHOLE DEPTH (ft): **35.0**
STATIC DTW (ft): **23** **8/5/08**
WELL DEPTH (ft): **35.0**
WELL CASING DIAMETER (in): **4**
BOREHOLE DIAMETER (in): **8**
LOGGED BY: **Frank Rooney**
CHECKED BY: **R Turner**

Time & Depth (feet)	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Well Construction
	Cleared Thursday, July 28, 2008							
10	**CLAY**; GLEY 2-6/10B W/ 10YR-4/6 blueish gray with yellowish brown; moist			2.0 1.8	3 7 11 13 3 7 11 12	0 980 0 0 71 414 0 0	10	Neat Cement Grout
15	**SILTY CLAY WITH MICA**; 10YR-5/1 gray; moist **SILTY CLAY**; GLEY2-6/10 W/ 10YR-4/6, 10YR-6/1 blueish gray with gray; moist			2.0 1.5	9 10 14 17 5 6 6 9	0 0 0 0 - 81 0 0	15	Bentonite Seal
20	**SILTY CLAY**; 7.5YR-6/1 W/ 10YR-6/1 gray; moist **SILTY CLAY**; 10YR-6/1, 10% 5/6 gray; moist			2.0 1.6	12 13 10 8 8 8 12 20	0 0 0 0 - 0 0 0	20	
0800	**CLAY**; 7.5YR-5/2 grayish brown; moist			1.2	50/0.4	- -		
0815	**CLAY WITH SILT AND MICA**; 10YR-6/1 gray; moist **SAND WITH FINE GRAVEL**; 10YR-4/8 dark yellowish brown; fine to medium-grained; moist; subrounded			1.6	17 29 39 50	104 - 4264 2644		
0830 25	**SAND WITH FINE TO COARSE GRAVEL**, 10YR-4/6, 10R-3/6, GLEY2-8/5 PB dark yellowish brown and dark red; fine to medium-grained; moist; slight petroleum odor; subrounded			1.7	28 32 32 36	4430 - 540 3861	25	Sand Filter Pack
0845				1.9	36 37 43 50/0.4	2891 247 3036 4230		
0915	**SAND WITH FINE TO COARSE GRAVEL**, 10R-3/4, 10YR-3/2 dark red and very dark grayish brown; fine to medium-grained; moist; slight petroleum odor; subrounded			1.0	43 50/0.4 42 48	3573 - - 4861		
0940 30				0.5	50/0.4 - 42 50/0.4	4937 - - 4831	30	
0950	**SAND WITH FINE TO MEDIUM GRAVEL**, 10R-3/4, 10YR-3/2, 10YR-4/6 dark red and dark yellowish brown; fine to medium-grained; saturated; slight petroleum odor; subrounded			1.6	4 4 4 6	- 0 0 0		
1000 35	**SAND WITH FINE TO COARSE GRAVEL**, black; fine to medium-grained; moist; subrounded			2.0	7 5 - -	0 0	35	
	SILT; 10YR-5/8, 10YR-6/2 yellowish brown and light brownish gray							
	Hole terminated at 35 feet.							
40							40	
45							45	

GEO FORM 304 PHILADELPHIA REFINERY.GPJ SECOR INTL.GDT 9/23/08

PROJECT: **Philadelphia Refinery**
LOCATION: **Philadelphia, PA**
PROJECT NUMBER: **62SU.01095.05**

WELL / PROBEHOLE / BOREHOLE NO: **S-276** PAGE 1 OF 1

Stantec

DRILLING: STARTED **8/12/08** COMPLETED: **8/12/08**
INSTALLATION: STARTED **8/12/08** COMPLETED: **8/12/08**
DRILLING COMPANY: **Parratt Wolff**
DRILLING EQUIPMENT: **A-300**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

NORTHING (ft): EASTING (ft):
LATITUDE: LONGITUDE:
GROUND ELEV (ft): TOC ELEV (ft):
INITIAL DTW (ft): **NE** BOREHOLE DEPTH (ft): **35.0**
STATIC DTW (ft): **29 8/12/08** WELL DEPTH (ft): **35.0**
WELL CASING DIAMETER (in): **4** BOREHOLE DIAMETER (in): **8**
LOGGED BY: **Frank Rooney** CHECKED BY: **R Turner**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Well Construction
			Cleared Thursday, July 28, 2008							
10			**CLAY**; GLEY1-5/5 G, 10% 10YR-5/6 greenish gray with yellowish brown			1.8 2.0 2.0	2 2 3 9 3 5 6 10 10 12 15 16	- 120 0 0 0 0 0 0 0 0	10	Neat Cement Grout Bentonite Seal
15			**CLAY**; 10YR-6/1, 10% 10YR-5/6 gray with yellowish brown			1.5	2 3 3 4	- 0 0 0	15	
			CLAY SOME SILT; 5YR-6/1, 10YR-5/8 gray with yellowish brown			2.0	8 9 10 7	0 0 0 0		
20			**SAND WITH FINE GRAVEL**; 10YR-4/6, GLEY 1-5/5 GY dark yellowish brown and greenish black; fine to medium-grained; subangular			1.4	12 50/0.4	- 208 0 0	20	
			No recovery			0.0	- - 15 21 36 39	- - - - -		
25			**SAND WITH FINE GRAVEL FINE GRAVEL**; 10R-3/3, 5YR-8/11 dark red and white; moist; slight petroleum odor			1.2 1.5	45 36 35 46 11 26 31 45	- 8461 3945 - - 3318	25	Sand Filter Pack
			SAND WITH FINE GRAVEL FINE TO COARSE GRAVEL; 2.5YR-4/3, 10YR-5/6 reddish brown and yellowish brown; moist; slight petroleum odor			1.7	35 40 40 40	3942 - 230 4623 4965		
30			**SAND WITH FINE TO COARSE GRAVEL FINE TO COARSE GRAVEL**; 10YR-4/4 dark yellowish brown; moist; slight petroleum odor			0.5 1.2	50/.04 - - - 5 20	- - 4345 - 4064	30	
			SAND WITH FINE TO COARSE GRAVEL FINE TO COARSE GRAVEL; 10YR-2/2 very dark brown; saturated; slight petroleum odor			2.0 2.0	20 26 20 11 12 21 9 10	3886 4219 4329 4344 4821 4788 4960 1404		
35			**SAND WITH SILT AND FINE TO COARSE GRAVEL**; 10YR-4/2 dark grayish brown; fine-grained; moist; slight petroleum odor				- -	0	35	
			SILT WITH MICA; 10YR-4/3 brown; moist; slight petroleum odor							
40			Hole terminated at 35 feet.						40	
45									45	

GEO FORM 304 PHILADELPHIA REFINERY.GPJ SECOR INTL.GDT 9/23/08

PROJECT: **Philadelphia Refinery**
LOCATION: **Philadelphia, PA**
PROJECT NUMBER: **62SU.01095.05**

WELL / PROBEHOLE / BOREHOLE NO: **S-277** PAGE 1 OF 1

Stantec

DRILLING: STARTED **8/13/08** COMPLETED: **8/13/08**
INSTALLATION: STARTED **8/13/08** COMPLETED: **8/13/08**
DRILLING COMPANY: **Parratt Wolff**
DRILLING EQUIPMENT: **A-300**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

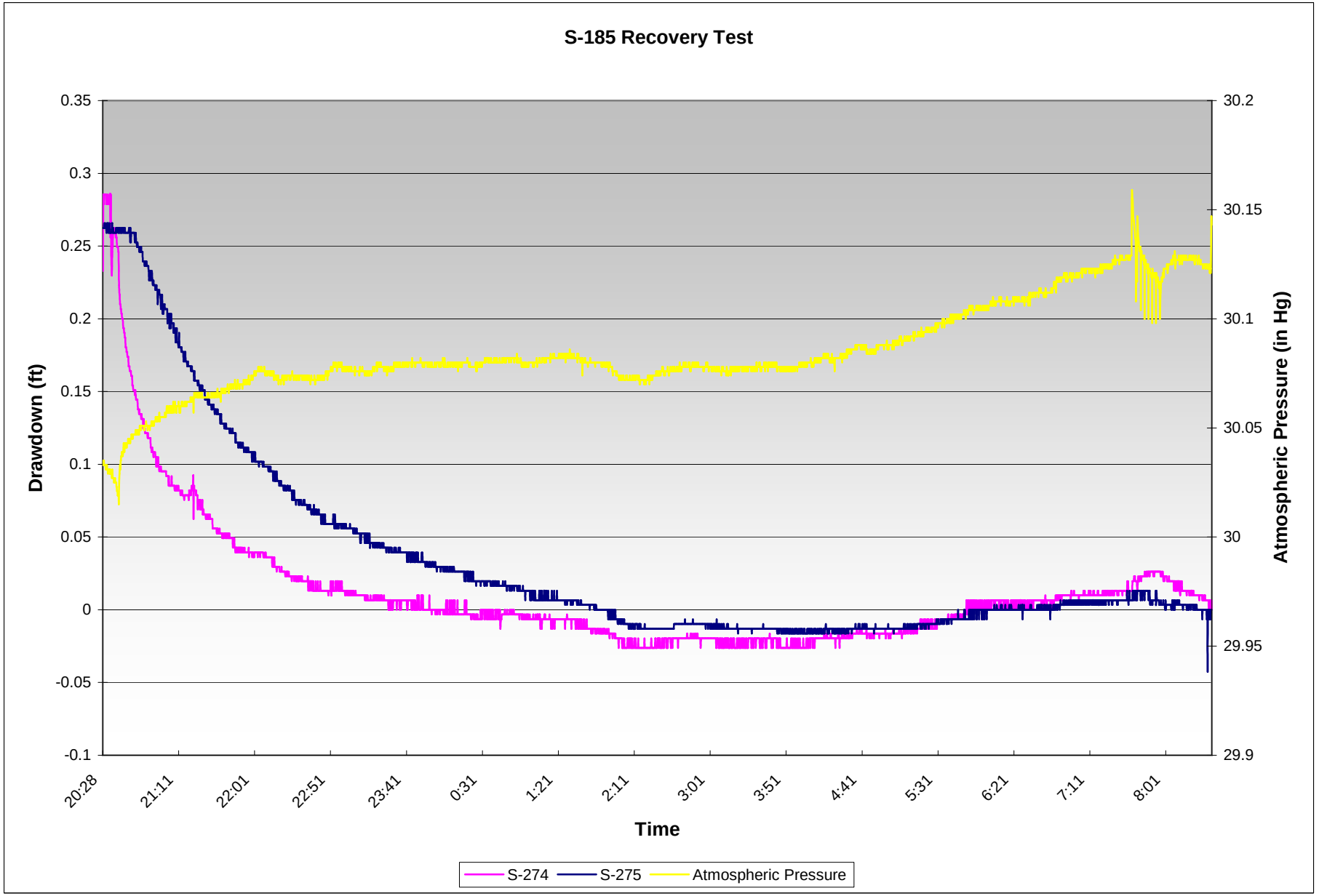
NORTHING (ft):
EASTING (ft):
LATITUDE:
LONGITUDE:
GROUND ELEV (ft):
TOC ELEV (ft):
INITIAL DTW (ft): **NE**
BOREHOLE DEPTH (ft): **35.0**
STATIC DTW (ft): **20** **8/13/08**
WELL DEPTH (ft): **35.0**
WELL CASING DIAMETER (in): **4**
BOREHOLE DIAMETER (in): **8**
LOGGED BY: **Frank Rooney**
CHECKED BY: **R Turner**

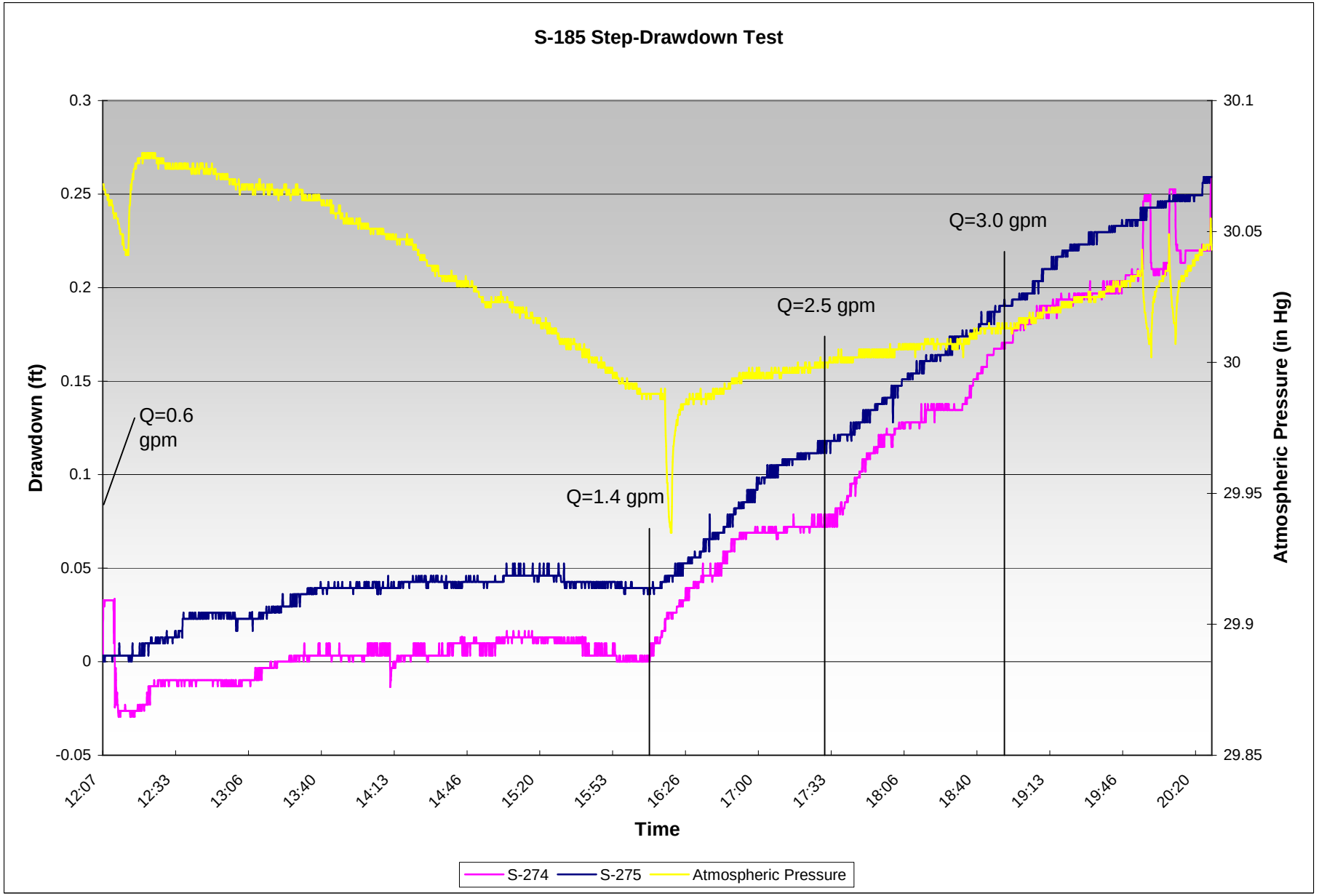
Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Well Construction
			Cleared Thursday, July 28, 2008.							
10			GLEY 1-5/5 G, 20% 10YR-5/6 greenish black with yellowish brown			1.8	5 4 6 9 8	0 0 0 0 -		
			CLAY WITH FINE GRAVEL; 10YR-5/6 W/ GLEY 1-5/5 G yellowish brown with greenish black			1.8	8 10 12 13 13	0 0 0 - -		
			GLEY 1-5/5 G W/ 20% 10YR-5/6 greenish black with yellowish brown			0.8	19 11 9 6 5	0 0 - 0 0		
15			**CLAY WITH COARSE GRAVEL**; 10YR-5/1, 10YR-4/6 gray with dark yellowish brown			0.9	5 9 14 11 36	0 0 0 0 -		
			SILTY SAND WITH MICA; 10YR-6/1 gray; fine-grained			2.0	11 36 39 25 14	0 0 0 - 0		
20			**SAND WITH FINE TO COARSE GRAVEL**; GLEY 2-6/5 PB, 10YR-5/6 blueish black and yellowish brown; fine to medium-grained; subrounded			1.3	14 21 27 26 36	0 0 0 - 355	20	
			SAND WITH FINE TO COARSE GRAVEL; GLEY 2-6/5 PB, 2.5 YR-3/3 blueish black and dark reddish brown; fine to medium-grained; saturated; slight petroleum odor			1.5	39 39 27 50 50/0.7	4311 4233 - 1910 4805		
25			**SAND WITH FINE TO COARSE GRAVEL**; 10R-3/4, 10YR-7/6 dark reddish and yellow; fine to medium-grained; moist; slight petroleum odor			1.8	- 50/0.4 - - -	2204 - 4361 4715 -		
						1.2	- - - - -	- 4593 4681 - -		
30			**SAND WITH FINE TO COARSE GRAVEL**; 10YR-4/3 brown; fine to medium-grained; moist; slight petroleum odor			1.3	- - - 22 46	- 7503 3891 4105 4233		
			SILT; 10YR-6/1, 10YR-4/3 gray and brown; moist; slight petroleum odor			0.9	47 33 13 10 8	4019 4121 3938 12 25		
35			Hole terminated at 35 feet.			1.7	10 4 6 - -	38 42		
						2.0				
						1.8				
40										
45										

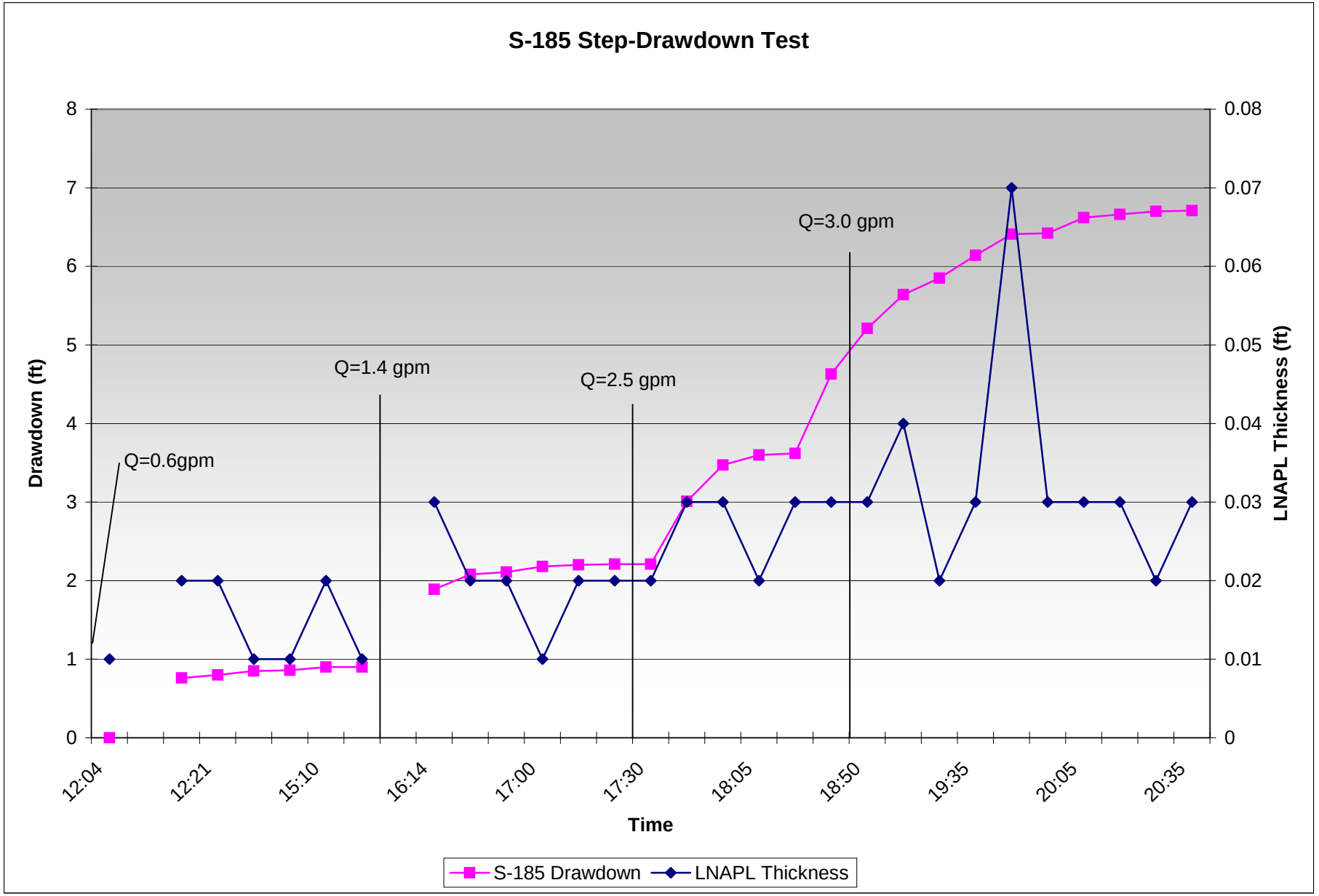
Well Construction: Neat Cement Grout; Bentonite Seal; Sand Filter Pack

GEO FORM 304 PHILADELPHIA REFINERY.GPJ SECOR INTL.GDT 9/23/08

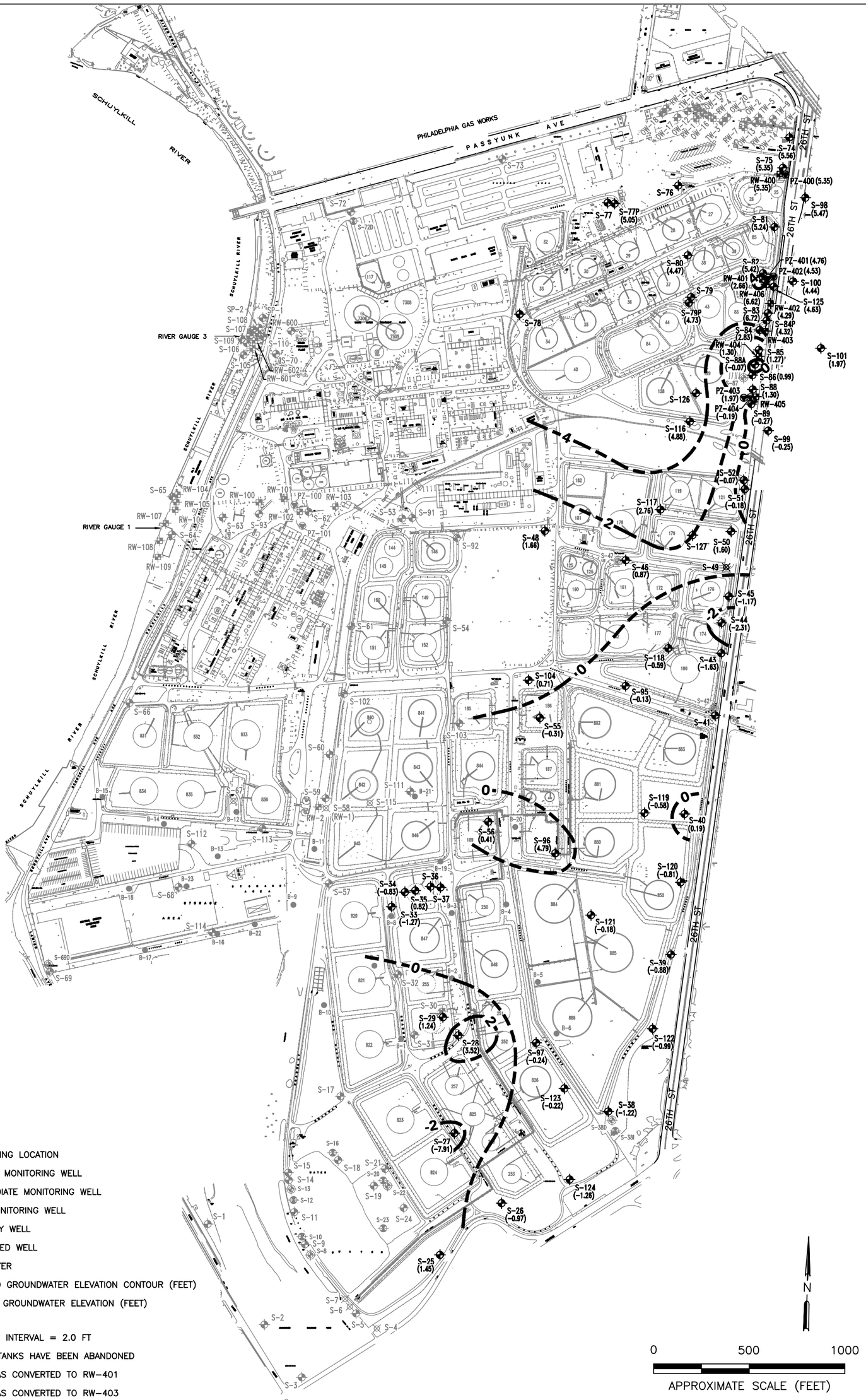
Appendix A2
Pumping Rates and Water Level Observations


S-185 Recovery Test
Drawdown (ft)
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.1
Atmospheric Pressure (in Hg)
30.2
30.15
30.1
30.05
30
29.95
29.9
20:28
21:11
22:01
22:51
23:41
0:31
1:21
2:11
3:01
3:51
4:41
5:31
6:21
7:11
8:01
Time
S-274
S-275
Atmospheric Pressure


S-185 Step-Drawdown Test
Drawdown (ft)
Atmospheric Pressure (in Hg)
Time
Q=0.6 gpm
Q=1.4 gpm
Q=2.5 gpm
Q=3.0 gpm
0.3
0.25
0.2
0.15
0.1
0.05
0
-0.05
30.1
30.05
30
29.95
29.9
29.85
12:07
12:33
13:06
13:40
14:13
14:46
15:20
15:53
16:26
17:00
17:33
18:06
18:40
19:13
19:46
20:20
S-274
S-275
Atmospheric Pressure


S-185 Step-Drawdown Test
Drawdown (ft)
LNAPL Thickness (ft)
Time
Q=0.6gpm
Q=1.4 gpm
Q=2.5 gpm
Q=3.0 gpm
0
1
2
3
4
5
6
7
8
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
12:04
12:21
15:10
16:14
17:00
17:30
18:05
18:50
19:35
20:05
20:35
S-185 Drawdown
LNAPL Thickness

Appendix A3
Historic LNAPL Maps



REFERENCE: HANDEX ENVIRONMENTAL RECOVERY, INC.; PROJECT 110535-12; DRAWINGNAME: PB_SY_05.DWG; TITLE: SOUTH YARD BASE MAP; DATE: 05/21/96

SECOR
International Incorporated
102 PICKERING WAY, SUITE 200
EXTON, PENNSYLVANIA 19341
(484) 876-3075/876-9286 (FAX)

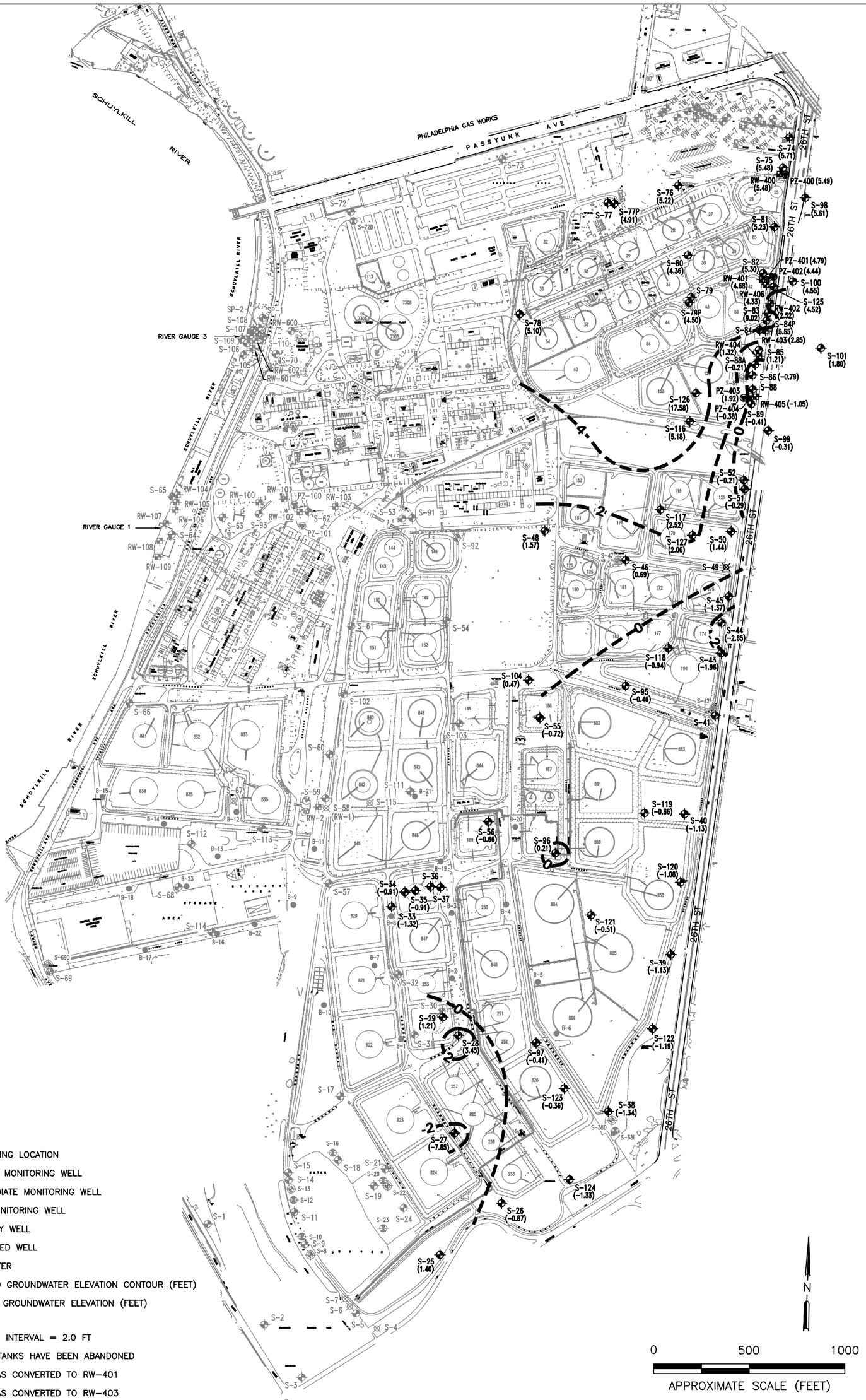
GROUNDWATER ELEVATION CONTOUR MAP
(SEPTEMBER 3, 2002)
26TH STREET AREA
SUNOCO PHILADELPHIA REFINERY
PHILADELPHIA, PENNSYLVANIA

FIGURE: **4-6**

JOB#: **62SU.01017.02.0006** APPR: DWN: **KPM** DATE: **01/08/03**

N:/SECOR-062

DWG: 62SU-1017-2-646(0902)



LEGEND

- CPT BORING LOCATION
- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- DEEP MONITORING WELL
- RECOVERY WELL
- ABANDONED WELL
- PIEZOMETER
- INFERRED GROUNDWATER ELEVATION CONTOUR (FEET)
- (1.45) RELATIVE GROUNDWATER ELEVATION (FEET)

NOTE

CONTOUR INTERVAL = 2.0 FT

DOTTED TANKS HAVE BEEN ABANDONED

S-94 WAS CONVERTED TO RW-401

S-90 WAS CONVERTED TO RW-403

REFERENCE: HANDEX ENVIRONMENTAL RECOVERY, INC.; PROJECT 110535-12; DRAWINGNAME: PB_SY_05.DWG; TITLE: SOUTH YARD BASE MAP; DATE: 05/21/96

SECOR
International Incorporated
102 PICKERING WAY, SUITE 200
EXTON, PENNSYLVANIA 19341
(484) 876-3075/876-9286 (FAX)

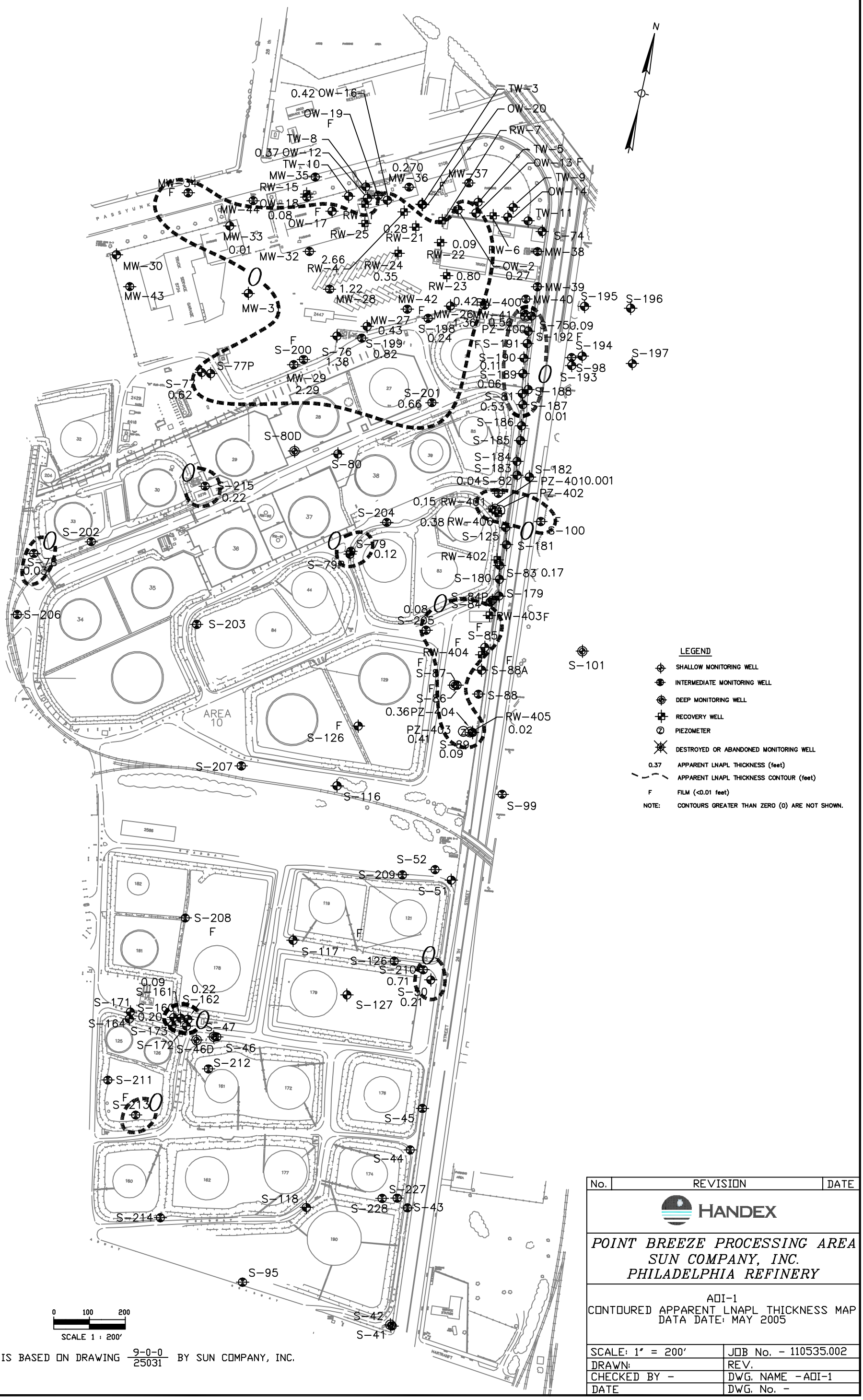
GROUNDWATER ELEVATION CONTOUR MAP
(OCTOBER 22, 2002)
26TH STREET AREA
SUNOCO PHILADELPHIA REFINERY
PHILADELPHIA, PENNSYLVANIA

FIGURE: **4-7**

JOB#: **62SU.01017.02.0006** APPR: DWN: **KPM** DATE: **01/08/03**

N:/SECOR-062

DWG: 62SU-1017-2-647(1002).DWG



THIS DRAWING IS BASED ON DRAWING $\frac{9\text{-}0\text{-}0}{25031}$ BY SUN COMPANY, INC.

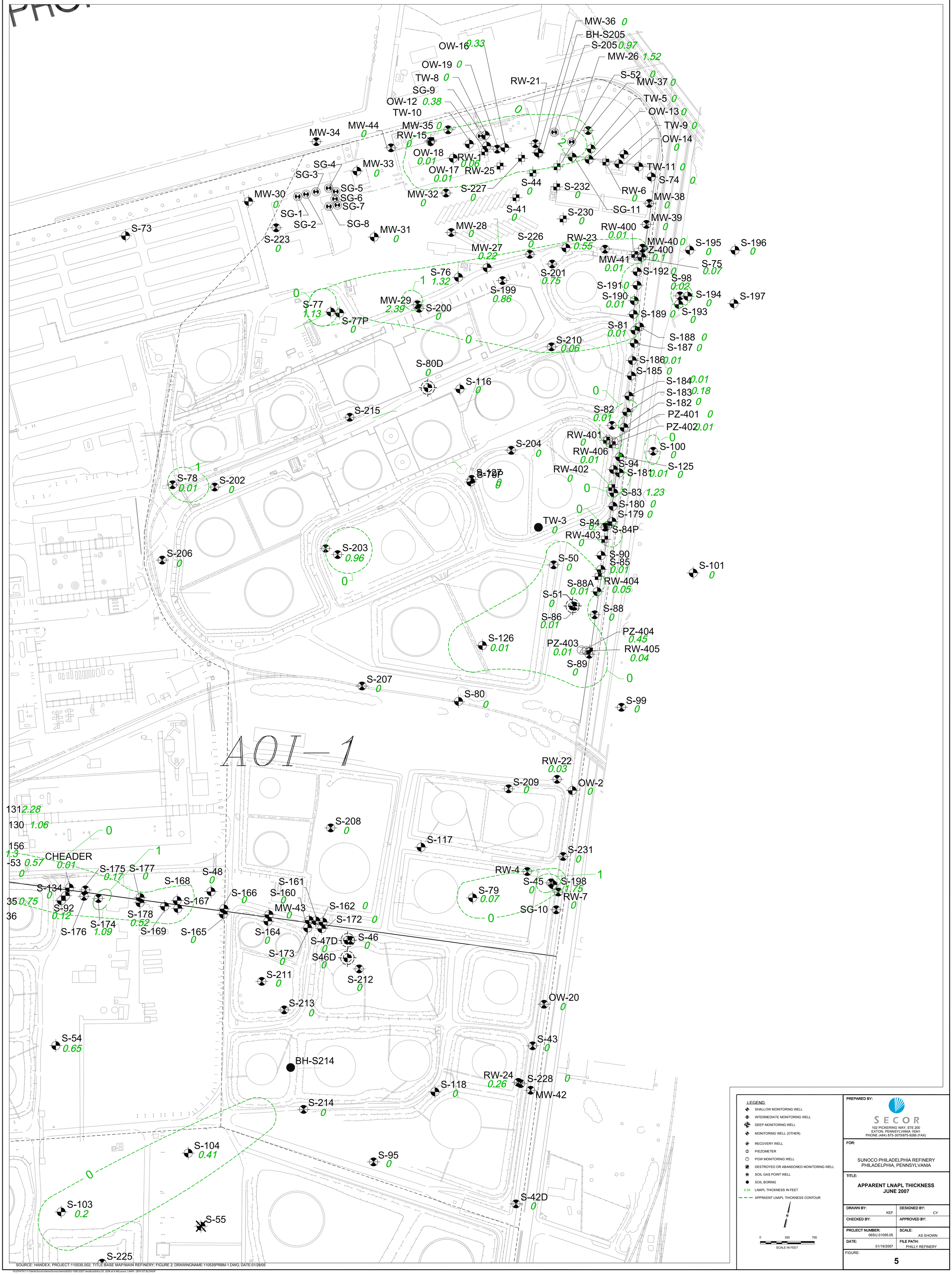
No.	REVISION	DATE

HANDEX

POINT BREEZE PROCESSING AREA
SUN COMPANY, INC.
PHILADELPHIA REFINERY

AOI-1
CONTOURED APPARENT LNAPL THICKNESS MAP
DATA DATE: MAY 2005

SCALE: 1" = 200'	JOB No. - 110535.002
DRAWN:	REV.
CHECKED BY -	DWG. NAME - AOI-1
DATE	DWG. No. -



SOURCE: HANDEX; PROJECT:110535.002; TITLE:BASE MAP/MAIN REFINERY; FIGURE 2; DRAWINGNAME:110535PRBM-1.DWG; DATE:01/28/05

FILEPATH:I:\1-Clients\Sunoco\temp\Sunoco\temp\62SU-1095-2Q07.dwg\tbudd\Aug 25, 2008 at 8:48\Layout: LNAPL- 26TH ST BLOWUP

LEGEND

- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- DEEP MONITORING WELL
- MONITORING WELL (OTHER)
- RECOVERY WELL
- PIEZOMETER
- PGW MONITORING WELL
- DESTROYED OR ABANDONED MONITORING WELL
- SOIL GAS POINT WELL
- SOIL BORING
- 0.34 LNAPL THICKNESS IN FEET
- APPRAENT LNAPL THICKNESS CONTOUR

N

0 350 700

SCALE IN FEET

PREPARED BY:

SECOR

102 PICKERING WAY, STE 200
EXTON, PENNSYLVANIA 19341
PHONE (484) 875-3075/875-9286 (FAX)

FOR:

SUNOCO PHILADELPHIA REFINERY
PHILADELPHIA, PENNSYLVANIA

TITLE:

APPARENT LNAPL THICKNESS
JUNE 2007

DRAWN BY:	DESIGNED BY:
KEF	CY
CHECKED BY:	APPROVED BY:
PROJECT NUMBER: 06SU.01095.05	SCALE: AS SHOWN
DATE: 01/19/2007	FILE PATH: PHILLY REFINERY

FIGURE:

5

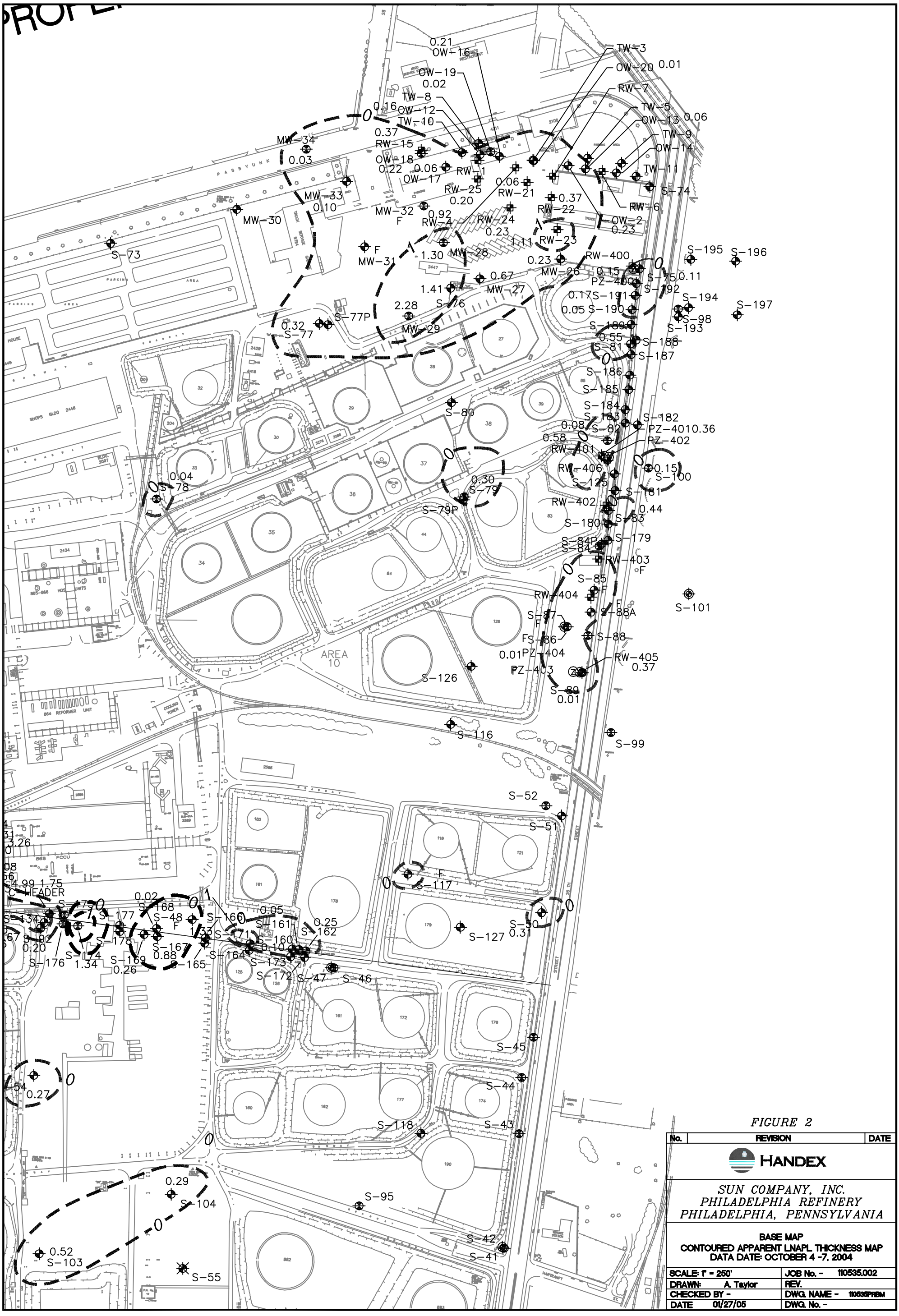


FIGURE 2

No.	REVISION	DATE

HANDEX

SUN COMPANY, INC.
PHILADELPHIA REFINERY
PHILADELPHIA, PENNSYLVANIA

BASE MAP
CONTOURED APPARENT LNAPL THICKNESS MAP
DATA DATE: OCTOBER 4 -7, 2004

SCALE: 1" = 250'	JOB No. - 110535.002
DRAWN: A. Taylor	REV.
CHECKED BY -	DWG. NAME - 110535PREM
DATE 01/27/05	DWG. No. -

AOI-8

AOI-1

AOI-2

AOI-4

Note: New Wells in AOI-1 and AOI-2 Well Classification Data Pending

Source: Base Map Provided by Langan Engineering & Environmental Services

Legend

- Deep Monitoring Well
- Intermediate Monitoring Well
- Shallow Monitoring Well
- Other Monitoring Well
- Piezometer
- Deep Recovery Well
- Intermediate Recovery Well
- Shallow Recovery Well
- Other Recovery Well
- Damaged Well
- Abandoned
- Staff Gauge
- AOIs
- LNAPL Thickness Contour (Ft)

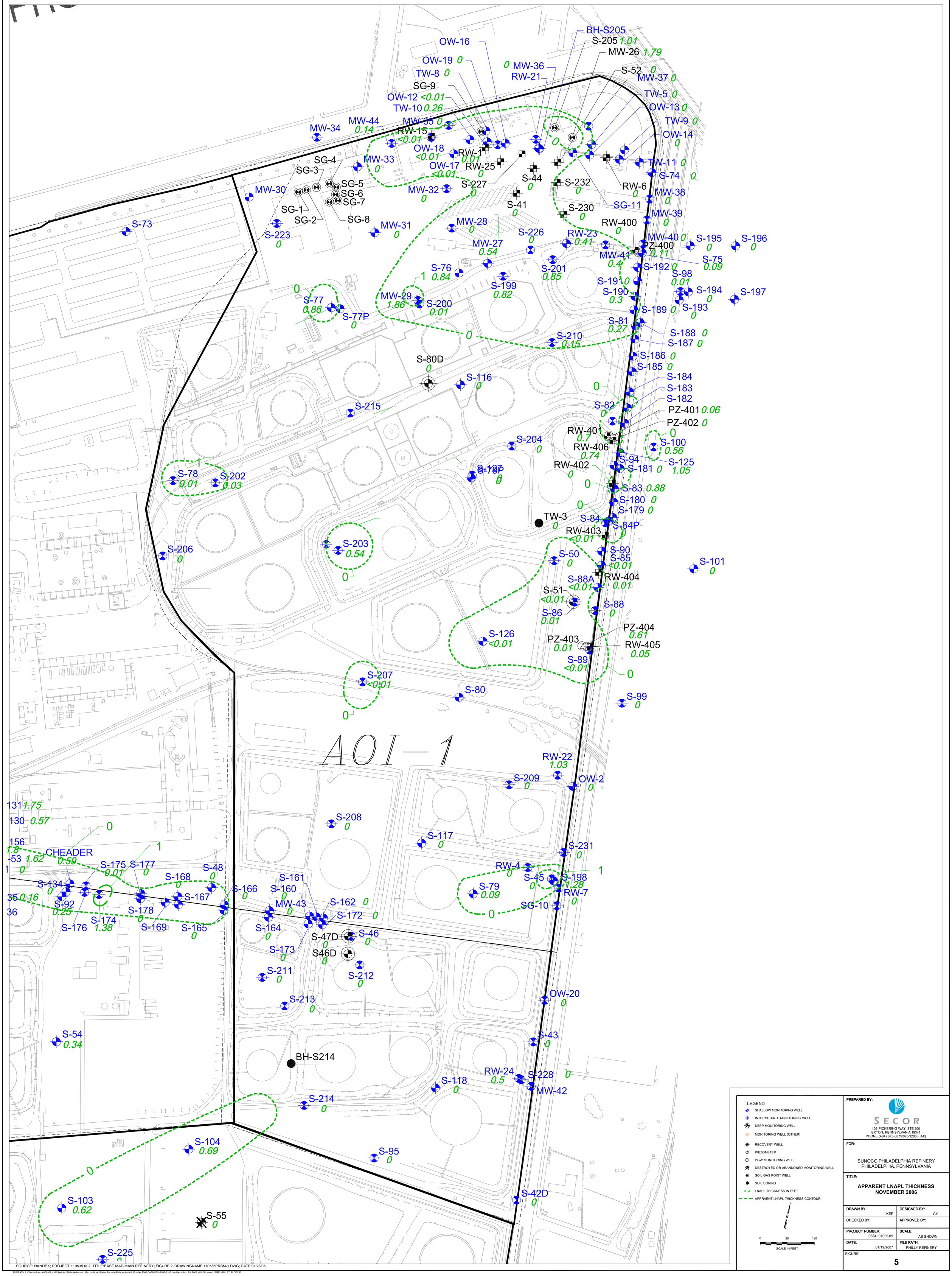
Approximate Extent of Apparent LNAPL Thickness

Figure 5

Sunoco, Inc. (R&M)
Philadelphia Refinery
3144 Passyunk Avenue
Philadelphia, PA.
19145

0 75 150 300 Ft
1 inch equals 150 feet

SCALE: 1" = 150' (when plotted at 24"x36")
DATE: January 15, 2008
DRN. BY: TB/RE
CKD. BY: CM
JOB#: 2074601



SOURCE: HANDEX; PROJECT:110535.002; TITLE:BASE MAP/MAIN REFINERY; FIGURE 2; DRAWINGNAME:110535PRBM-1.DWG; DATE:01/28/05

FILEPATH:P:\Clients\Sunoco\O&M for NE Refining\Philadelphia and Marcus Hook\Status Reports\Philadelphia\4th Quarter 2006\CAD\62SU-1095-1106.dwg tbuddAug 25, 2008 at 8:24 Layout: LNAPL-26th ST. BLOWUP

LEGEND

- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- DEEP MONITORING WELL
- MONITORING WELL (OTHER)
- RECOVERY WELL
- PIEZOMETER
- PGW MONITORING WELL
- DESTROYED OR ABANDONED MONITORING WELL
- SOIL GAS POINT WELL
- SOIL BORING
- 0.34 LNAPL THICKNESS IN FEET
- APPRAENT LNAPL THICKNESS CONTOUR

N

0 80 160

SCALE IN FEET

PREPARED BY:

SECOR

102 PICKERING WAY, STE 200
EXTON, PENNSYLVANIA 19341
PHONE (484) 875-3075/875-9286 (FAX)

FOR:

SUNOCO PHILADELPHIA REFINERY
PHILADELPHIA, PENNSYLVANIA

TITLE:

APPARENT LNAPL THICKNESS
NOVEMBER 2006

DRAWN BY: KEF	DESIGNED BY: CY
CHECKED BY:	APPROVED BY:
PROJECT NUMBER: 06SU.01095.05	SCALE: AS SHOWN
DATE: 01/19/2007	FILE PATH: PHILLY REFINERY

FIGURE:

5

SOURCE: HANDEX; PROJECT:110535.002; TITLE:BASE MAP/MAIN REFINERY; FIGURE 2; DRAWINGNAME:110535PRBM-1.DWG; DATE:01/28/05

PREPARED BY:

SECOR
102 PICKERING WAY, STE 200
EXTON, PENNSYLVANIA 19341
PHONE (484) 875-3075/875-9286 (FAX)

FOR:

SUNOCO PHILADELPHIA REFINERY
PHILADELPHIA, PENNSYLVANIA

TITLE:

APPARENT LNAPL THICKNESS
MAY 2006

DRAWN BY: KEF	DESIGNED BY: CY
CHECKED BY:	APPROVED BY:
PROJECT NUMBER: 06SU.01095.05	SCALE: AS SHOWN
DATE: 07/16/2006	FILE PATH: O&M PHILLEY AND MH

FIGURE:

K-3

FILEPATH:I:\1-Clients\Sunoco\O&M Philly and MH\110535PRBM-1 (MAY 06 - LNAPL).dwg|tbudd|Aug 25, 2008 at 8:39|Layout: 06 LNAPL 26TH ST. BLOWUP

AOI-1

AOI-2

Note: New Wells in AOI-1 and AOI-2 Well Classification Data Pending
Source: Basemap Provided by Langan Engineering and Environmental Services

Note: Select groundwater elevation data are considered anomalous and are not used for contouring.

N
W E
S

Legend

- Deep Monitoring Well
- Intermediate Monitoring Well
- Shallow Monitoring Well
- Other Monitoring Well
- Piezometer
- Deep Recovery Well
- Intermediate Recovery Well
- Shallow Recovery Well
- Other Recovery Well
- Damaged Well
- Abandoned
- Staff Gauge
- AOIs
- Extent of Apparent LNAPL Contour (FT MSL)

APPROXIMATE EXTENT OF APPARENT LNAPL THICKNESS
JUNE 2008

FIGURE 5

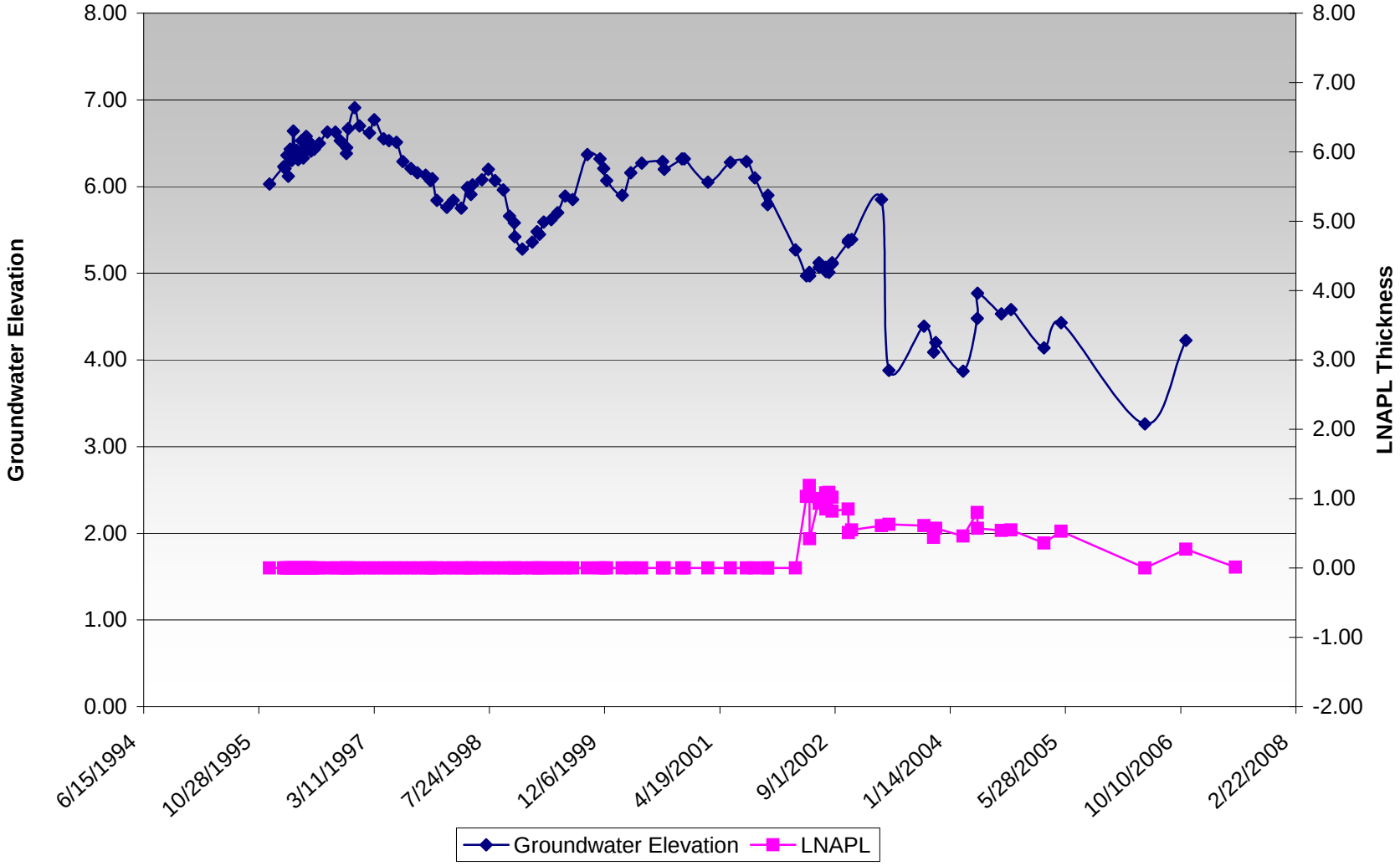
Sunoco, Inc. (R&M)
Philadelphia Refinery
3144 Passyunk Avenue
Philadelphia, PA.
19145

0 60 120 240 Feet

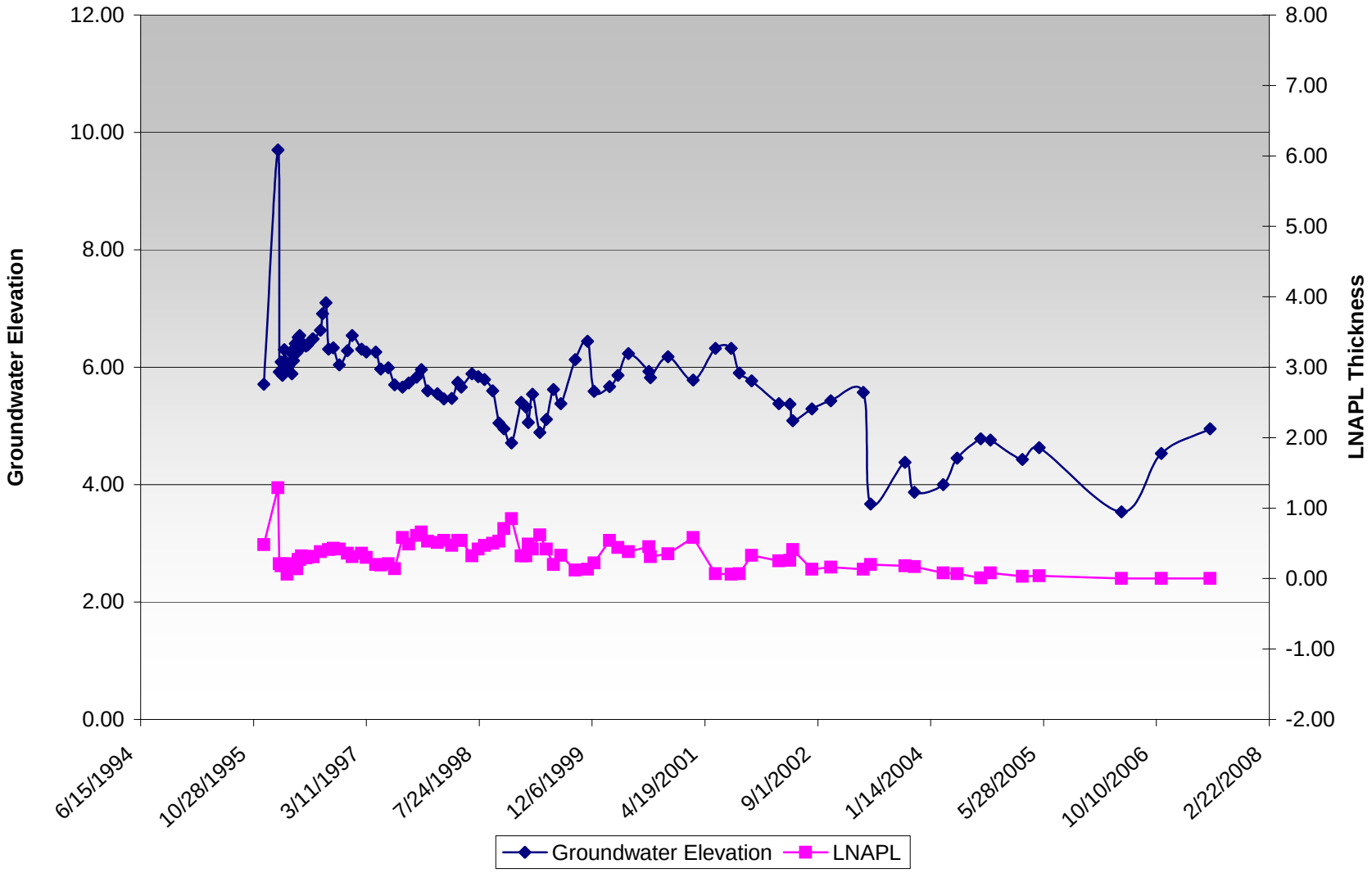
SCALE: 1" = 120'
DATE: JULY 16, 2008
DRN. BY: TFB
CKD. BY:
JOB#

Appendix A4
Well Hydrographs

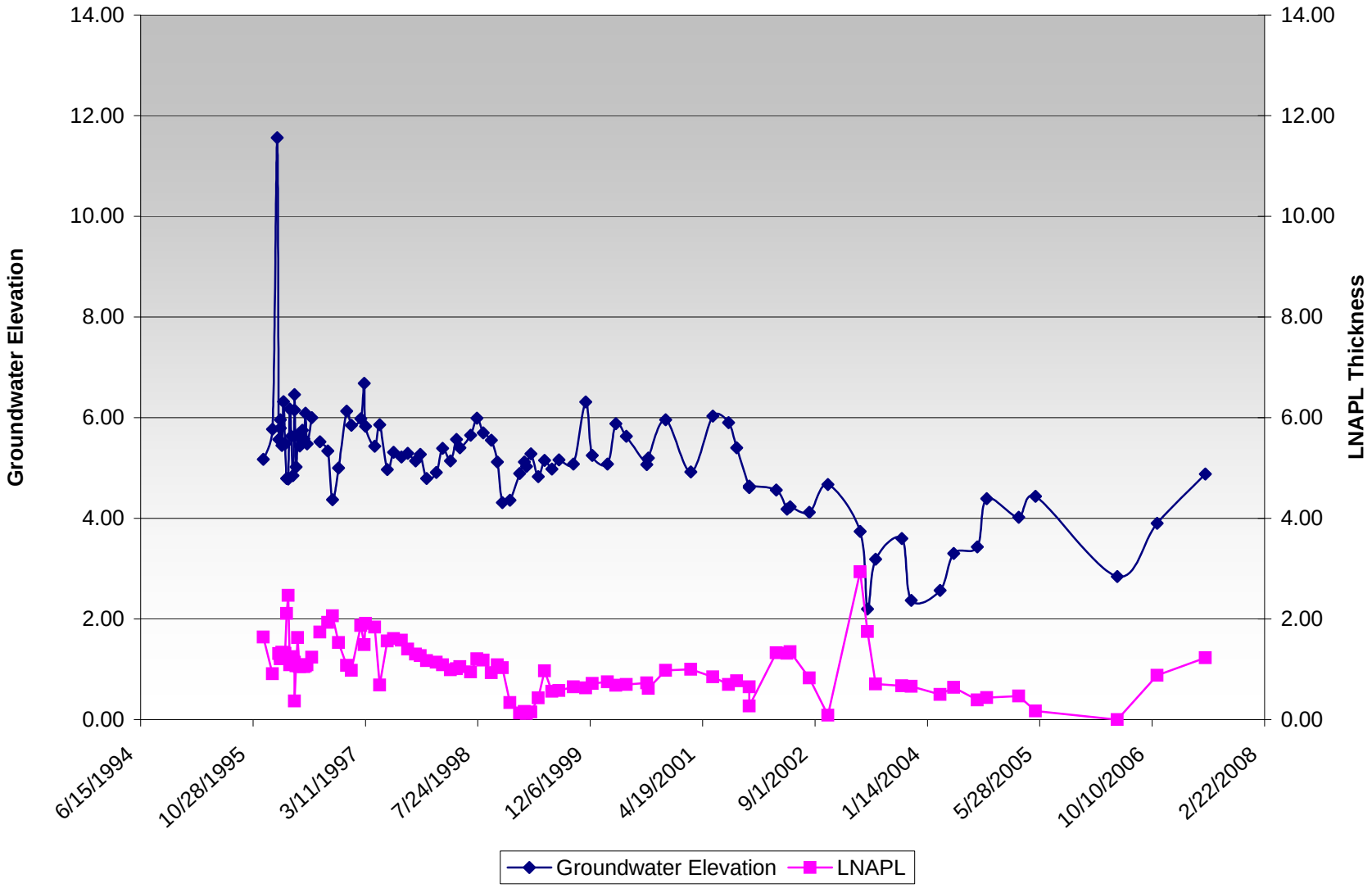
S-81


Groundwater Elevation
LNAPL Thickness
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
-1.00
-2.00
6/15/1994
10/28/1995
3/11/1997
7/24/1998
12/6/1999
4/19/2001
9/1/2002
1/14/2004
5/28/2005
10/10/2006
2/22/2008
Groundwater Elevation
LNAPL

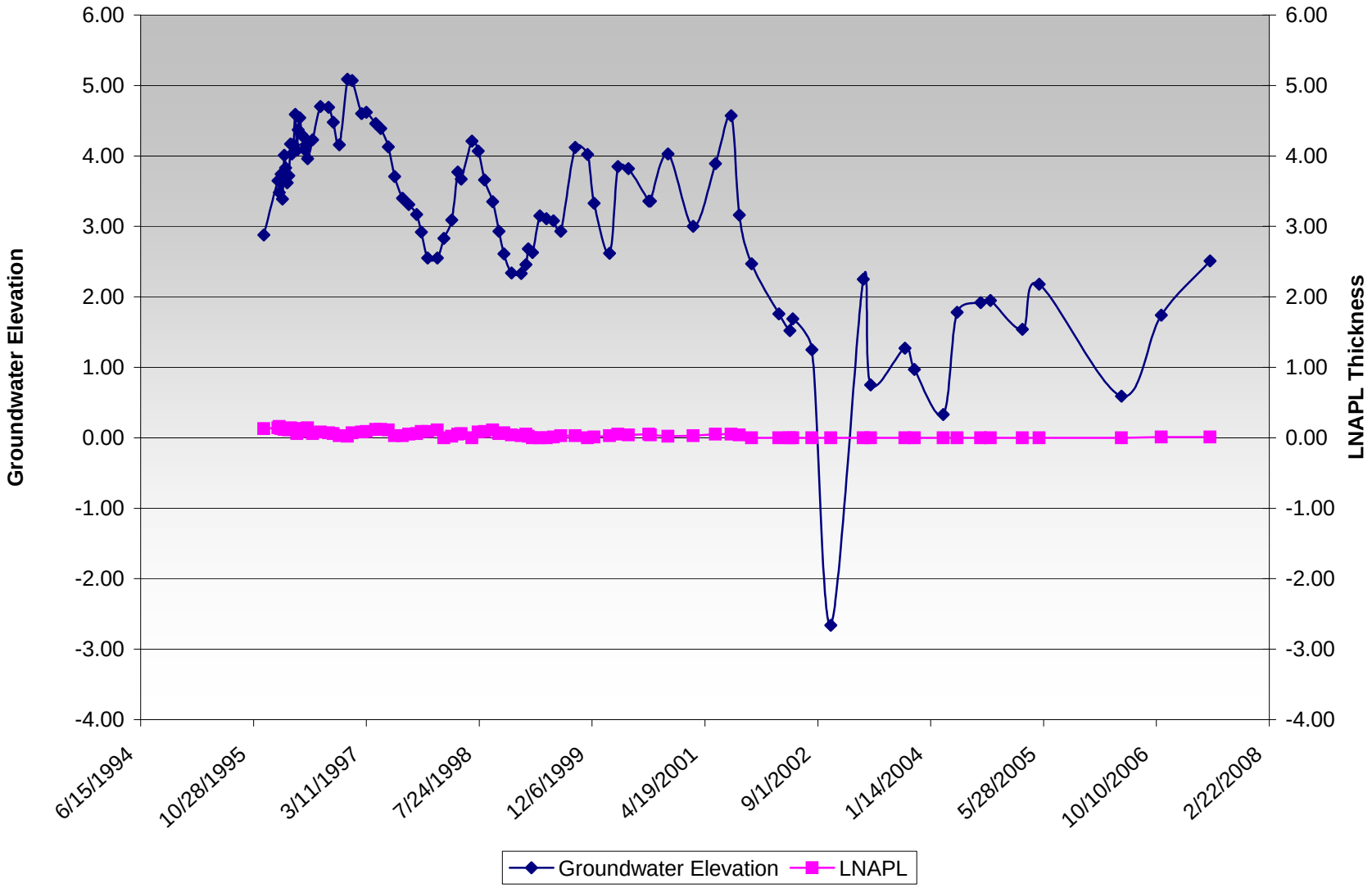
S-82


Groundwater Elevation
LNAPL Thickness
12.00
10.00
8.00
6.00
4.00
2.00
0.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
-1.00
-2.00
6/15/1994
10/28/1995
3/11/1997
7/24/1998
12/6/1999
4/19/2001
9/1/2002
1/14/2004
5/28/2005
10/10/2006
2/22/2008
Groundwater Elevation
LNAPL

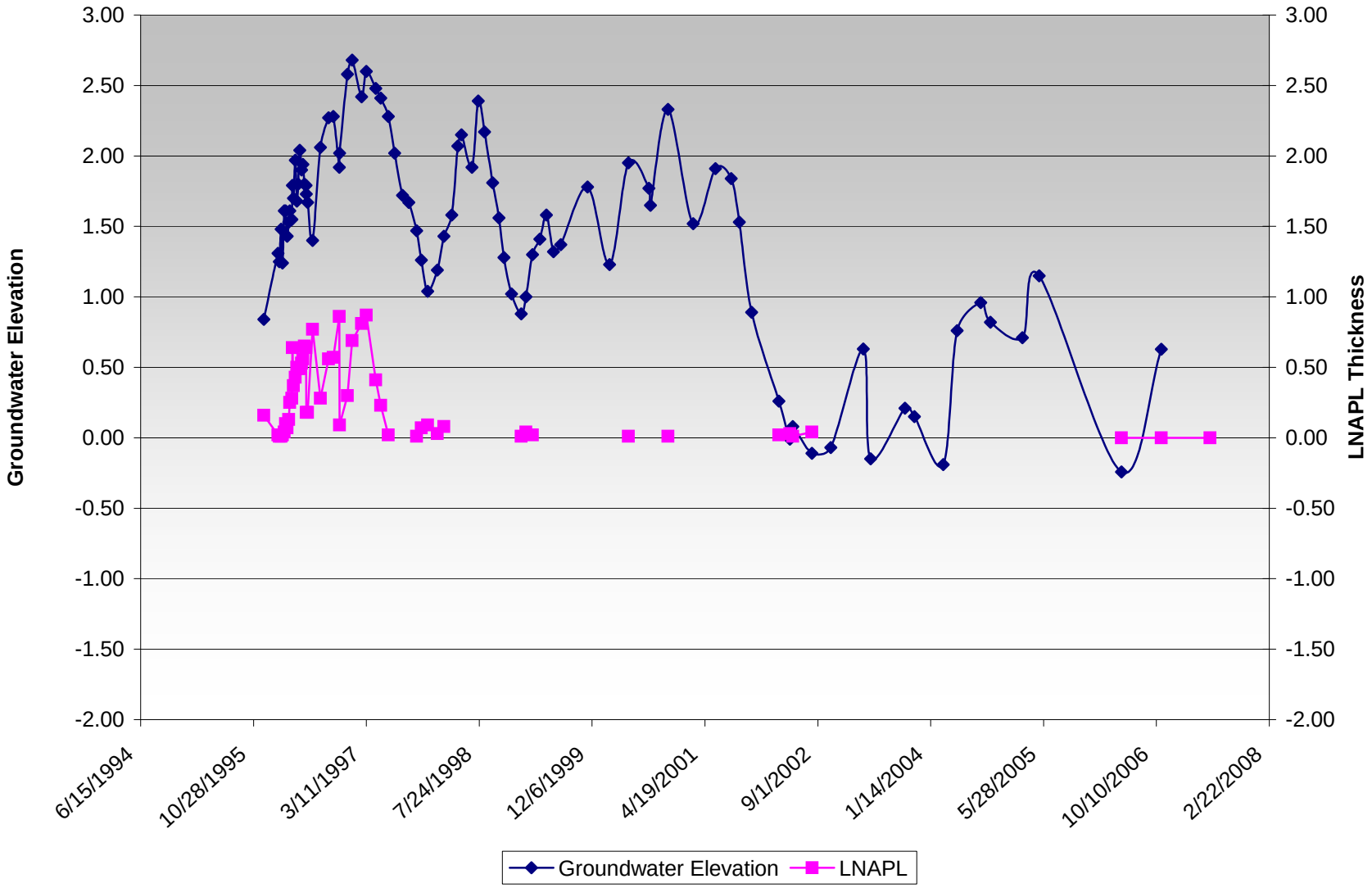
S-83


Groundwater Elevation
LNAPL Thickness
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
6/15/1994
10/28/1995
3/11/1997
7/24/1998
12/6/1999
4/19/2001
9/1/2002
1/14/2004
5/28/2005
10/10/2006
2/22/2008
Groundwater Elevation
LNAPL

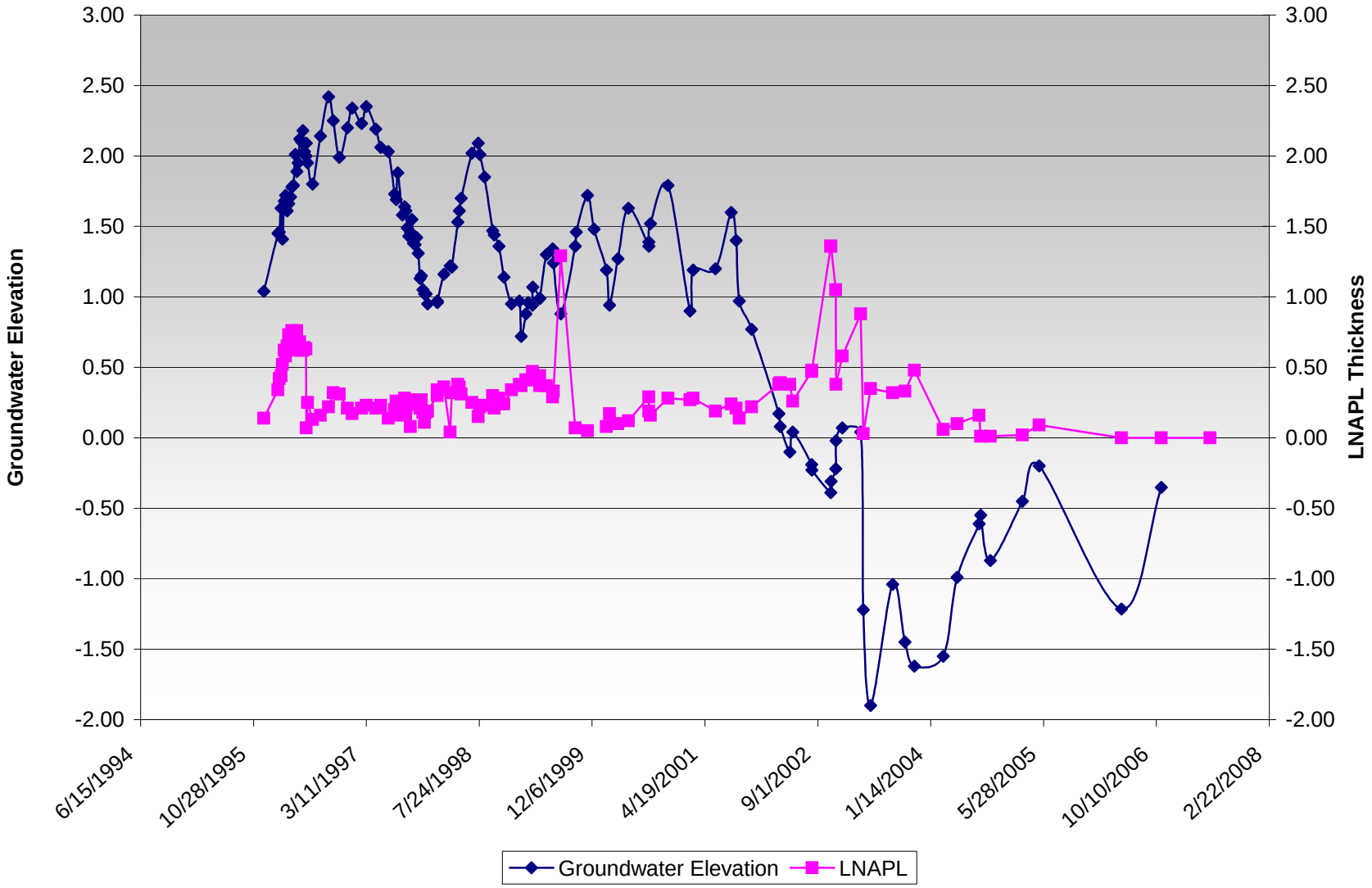
S-85


Groundwater Elevation
LNAPL Thickness
6.00
5.00
4.00
3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
-4.00
6/15/1994
10/28/1995
3/11/1997
7/24/1998
12/6/1999
4/19/2001
9/1/2002
1/14/2004
5/28/2005
10/10/2006
2/22/2008
Groundwater Elevation
LNAPL

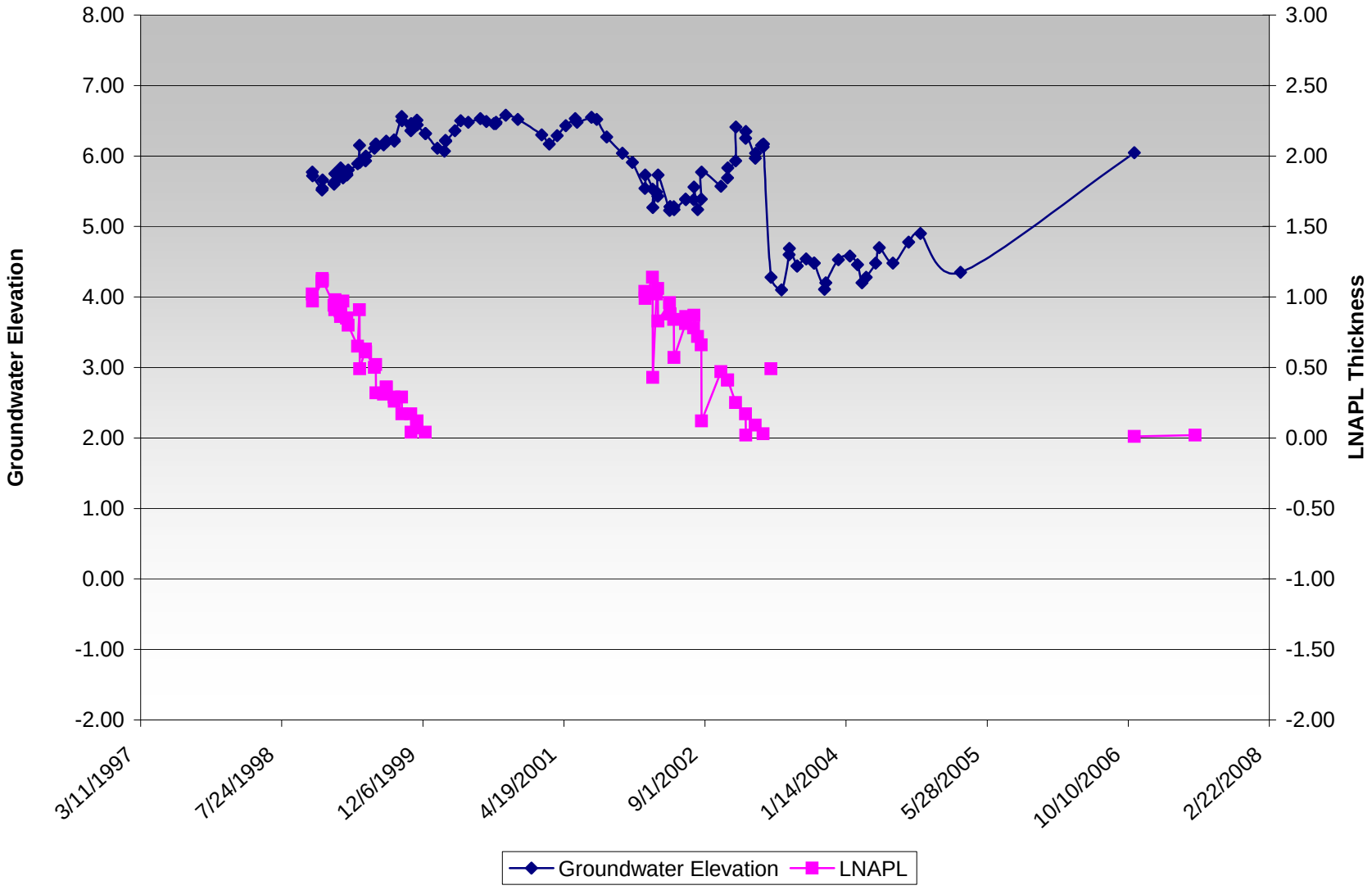
S-88A


Groundwater Elevation
LNAPL Thickness
3.00
2.50
2.00
1.50
1.00
0.50
0.00
-0.50
-1.00
-1.50
-2.00
6/15/1994
10/28/1995
3/11/1997
7/24/1998
12/6/1999
4/19/2001
9/1/2002
1/14/2004
5/28/2005
10/10/2006
2/22/2008
Groundwater Elevation
LNAPL

S-89


Groundwater Elevation
LNAPL Thickness
3.00
2.50
2.00
1.50
1.00
0.50
0.00
-0.50
-1.00
-1.50
-2.00
6/15/1994
10/28/1995
3/11/1997
7/24/1998
12/6/1999
4/19/2001
9/1/2002
1/14/2004
5/28/2005
10/10/2006
2/22/2008
Groundwater Elevation
LNAPL

S-98


Groundwater Elevation
LNAPL Thickness
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
-1.00
-2.00
3.00
2.50
2.00
1.50
1.00
0.50
0.00
-0.50
-1.00
-1.50
-2.00
3/11/1997
7/24/1998
12/6/1999
4/19/2001
9/1/2002
1/14/2004
5/28/2005
10/10/2006
2/22/2008
Groundwater Elevation
LNAPL

Appendix A5
Historic Analytical Table and Map Illustrating Historic Benzene Concentrations in Select Wells

Well Number	Date Collected	Benzene (ug/l)	Toluene (ug/l)	Ethylbenzene (ug/l)	Total Xylenes (ug/l)	Total BTEX	MTBE (ug/l)	Cumene (ug/l)	Naphthalene (ug/l)	1,2-Dibromoethane (ug/l)	1,2-Dichloroethane (ug/l)	Chrysene (ug/l)	Fluorene (ug/l)	Phenanthrene (ug/l)	Pyrene (ug/l)	Dissolved Lead (mg/l)
		5	**1,000**	**700**	**10,000**	**---**	**20**	**2,300**	**100**	**0.05**	**5**	**1.9**	**1,900**	**1,100**	**130**	**0.005**
		500	**100,000**	**70,000**	**180,000**	**---**	**200**	**50,000**	**30,000**	**5**	**50**	**1.9**	**1,900**	**1,100**	**130**	**5**
MW-37 Belmont	12/18/07	***15,000***	300	37	130	15,467	NA	97	63 J	ND (0.0094)	ND (10)	ND (1.0)	2.0 J	3.0 J	2.0 J	0.000051 J
MW-43 Belmont	12/05/06	***2,300***	63	**1,300**	740	4,403	13 J	140	**7,500**	ND (0.0097)	ND (5.0)	***88.0***	170	320	***190***	0.00016 J
	12/19/07	***2,600***	88	**2,400**	1,300	6,388	NA	150	**9,700**	ND (0.0096)	ND (25)	***8.0***	65	79	24	ND (0.000047)
S-41	10/19/04	**70**	5.5	ND (1.8)	ND (3.2)	75.5	***490***	63	ND (3.6)	ND (0.0020)	ND (1.5)	ND (0.14)	ND (10)	ND (10)	ND (10)	ND (0.0050)
S-42 D	10/19/04	ND (1.0)	ND (5.0)	ND (5.0)	ND (10)	ND	ND (5.0)	ND (5.0)	ND (5.0)	ND (0.020)	ND (5.0)	ND (0.14)	ND (10)	ND (10)	ND (10)	ND (0.0050)
S-43	1993	***12,000***	190	**1,300**	1,000	14,490	NA	NA	NA	NA	NA	BDL	NA	NA	NA	NA
	1994	***17,000***	**1,700**	250 J	1,680	20,630	NA	NA	NA	NA	NA	ND (10)	NA	NA	NA	NA
	12/28/95	***12,000***	**1,200**	170	860	14,230	NA	NA	NA	NA	NA	BDL	NA	NA	NA	NA
	1996	***2,100***	110	120	110	2,440	NA	NA	NA	NA	NA	ND (1)	NA	NA	NA	NA
	11/19/97	***13,000***	210	**1,200**	1,000	15,410	NA	NA	NA	NA	NA	ND (1)	NA	NA	NA	NA
	11/12/98	***6,700***	94 J	**720**	470	7,984	NA	NA	NA	NA	NA	ND (1)	NA	NA	NA	NA
	12/02/99	***3,600***	ND (100)	ND (100)	250	3,850	NA	NA	NA	NA	NA	ND (1)	NA	NA	NA	NA
	11/16/00	***990***	ND (100)	ND (100)	ND (200)	990	ND (100)	NA	NA	NA	NA	ND (1)	NA	NA	NA	NA
	11/14/01	***6,100***	ND (500)	ND (500)	ND (1,000)	6,100	ND (500)	NA	NA	NA	NA	ND (1)	NA	NA	NA	NA
	11/12/02	***5,500***	170	**790**	460	6,920	NA	NA	NA	NA	NA	ND (15)	NA	NA	NA	NA
	11/13/03	***3,600***	130	**836**	489	5,055	18.8	NA	NA	NA	NA	ND (2.0)	NA	NA	NA	NA
	10/19/04	***720***	31	150	90	991	ND (4.4)	39	50	ND (0.020)	**11**	ND (0.14)	ND (10)	ND (10)	ND (10)	ND (0.0050)
	11/30/06	***890***	32	48	34	1,004	7.0	13	9.0	ND (0.0099)	ND (1.0)	1.0 J	ND (1.0)	2.0 J	3.0 J	0.0002 J
	12/05/07	**15**	1.0	3.0	3.0	22	NA	2.0 J	1.0 J	ND (0.0096)	ND (0.5)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	0.00040 J
S-44	10/18/04	***1,700***	37	16	28	1,722	19	51	ND (10)	**0.058**	ND (5.0)	ND (0.16)	ND (11)	ND (11)	ND (11)	ND (0.0050)
S-46	10/19/04	**260**	32	52	35	379	***880***	180	33	ND (0.020)	ND (5.0)	ND (0.16)	ND (11)	ND (11)	ND (11)	ND (0.0050)
S-47 D	10/19/04	**5.4**	ND (5.0)	ND (5.0)	ND (10)	5.4	**140**	100	ND (5.0)	ND (0.020)	ND (5.0)	ND (0.16)	ND (11)	ND (11)	ND (11)	ND (0.0050)
S-50	1985	***23,000***	BDL	**5,400**	**23,000**	51,400	NA	NA	NA	NA	NA	BDL	NA	NA	NA	NA
	1986	***24,000***	BDL	**2,300**	1,520	27,820	NA	NA	NA	NA	NA	BDL	NA	NA	NA	NA
	1988	***24,000***	BDL	BDL	BDL	24,000	NA	NA	NA	NA	NA	BDL	NA	NA	NA	NA
	1994	**290**	20 J	160 J	40 J	510	NA	NA	NA	NA	NA	ND (10)	NA	NA	NA	NA
	12/28/95	***17,000***	**1,600**	98 J	3,000	21,698	NA	NA	NA	NA	NA	BDL	NA	NA	NA	NA
	1996	**14**	ND (0.3)	ND (0.4)	ND (0.6)	14	NA	NA	NA	NA	NA	ND (1)	NA	NA	NA	NA
	11/19/97	***21,000***	210	**1300**	2,200	24,710	NA	NA	NA	NA	NA	ND (1)	NA	NA	NA	NA
	11/12/98	***18,000***	57 J	570	980	19,607	NA	NA	NA	NA	NA	ND (1)	NA	NA	NA	NA
	12/02/99	***28,000***	ND (1,000)	ND (1,000)	ND (2,000)	28,000	NA	NA	NA	NA	NA	ND (1)	NA	NA	NA	NA
	11/16/00	***47,000***	ND (100)	240	370	47,610	***590***	NA	NA	NA	NA	ND (1)	NA	NA	NA	NA
	11/27/01	***53,000***	**1,400**	9	1,300	55,709	***5,200***	NA	NA	NA	NA	ND (2)	NA	NA	NA	NA
	11/12/02	NS	NS	NS	NS	NS	NS	NA	NA	NA	NA	NS	NA	NA	NA	NA
	11/30/06	***42,000***	94 J	**720**	630	43,444	**99 J**	ND (50)	**170 J**	ND (0.0098)	ND (50)	ND (1.0)	1.0 J	1.0 J	ND (1.0)	0.00015 J
	12/04/07	***31,000***	86	420	370	31,876	NA	35 J	93 J	ND (0.0098)	ND (25)	ND (1.0)	ND (1.0)	1.0 J	ND (1.0)	0.00014 J
S-51	12/05/07	**120**	10	5.0 J	9.0	144 J	NA	60	ND (5.0)	**0.034**	ND (3.0)	ND (10)	22 J	24 J	ND (10)	0.00032 J
	04/19/05	***590***	ND (100)	ND (100)	190	780	***1900***	ND (100)	15	ND (0.029)	ND (100)	ND (10)	ND (10)	ND (10)	ND (10)	ND (0.001)
S-52	10/19/04	**57**	5.3	ND (5.0)	ND (10)	62.3	***960***	30	34	ND (0.020)	ND (5.0)	ND (0.16)	ND (11)	ND (11)	ND (11)	ND (0.0050)
	04/19/05	**230**	ND (50)	ND (50)	ND (50)	230.0	***1200***	ND (50)	ND (50)	ND (0.029)	ND (50)	ND (10)	ND (10)	ND (10)	ND (10)	ND (0.001)
	11/07/05	**72**	ND (10)	ND (10)	11	83.0	***1390***	33	ND (10)	ND (0.02)	ND (10)	ND (0.01)	1.5	0.8	0.2	ND (0.010)
S-74	10/15/04	ND (1.0)	ND (5.0)	ND (5.0)	ND (10)	ND	ND (5.0)	ND (5.0)	ND (5.0)	ND (0.020)	ND (5.0)	ND (0.14)	ND (10)	ND (10)	ND (10)	ND (0.0050)
	12/18/07	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND	NA	ND (0.5)	ND (1.0)	ND (0.0094)	ND (0.5)	ND (1.0)	ND (1.0)	ND (1.0)	3.0 J	0.000064 J
S-77P	10/12/04	***16,000***	68	270	650	16,988	***4,100***	93	**650**	ND (0.020)	ND (20)	***22***	110	240	58	ND (0.0050)
S-81	1993	***20,000***	64	680	600	21,344	NA	NA	NA	NA	NA	BDL	NA	NA	NA	NA
	1994	***9,500***	180 J	70 J	150 J	9,900	NA	NA	NA	NA	NA	ND (10)	NA	NA	NA	NA
	12/28/95	***21,000***	300	BDL	470 J	21,770	NA	NA	NA	NA	NA	ND	NA	NA	NA	NA
	1996	**130**	ND (0.3)	3.7	2.6	136.3	NA	NA	NA	NA	NA	***2***	NA	NA	NA	NA
	11/19/97	***17,000***	92 J	230	280	17,602	NA	NA	NA	NA	NA	***2***	NA	NA	NA	NA
	11/12/98	***12,000***	ND (100)	120	94 J	12,214	NA	NA	NA	NA	NA	ND (1)	NA	NA	NA	NA
	12/02/99	***4,000***	ND (100)	110	230	4,340	NA	NA	NA	NA	NA	***3***	NA	NA	NA	NA
	11/16/00	***54,000***	ND (100)	ND (100)	ND (200)	54,000	ND (100)	NA	NA	NA	NA	***2***	NA	NA	NA	NA
	11/14/01	***2,100***	ND (100)	ND (100)	ND (200)	2,100	**130**	NA	NA	NA	NA	***2***	NA	NA	NA	NA
S-84	03/18/04	**74**	ND (10)	440	5000	5,514	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	04/19/05	**72**	ND (20)	140	4,800	5,012	ND (20)	160	**420**	ND (0.029)	ND (20)	ND (10)	ND (10)	ND (10)	ND (10)	ND (0.001)
S-84 P	10/14/04	**66**	ND (5.0)	130	5,000	5,196	11	260	**530**	ND (0.020)	ND (5.0)	ND (0.14)	ND (10)	ND (10)	ND (10)	ND (0.0050)
	04/19/05	**72**	ND (20)	140	4,800	5,012	ND (20)	160	**420**	ND (0.029)	ND (20)	ND (10)	ND (10)	ND (10)	ND (10)	ND (0.001)
S-88	12/14/07	**5.0**	2.0	1.0	ND (0.5)	8.0	NA	13	ND (1.0)	ND (0.0095)	ND (0.5)	***5.0 J***	2.0 J	3.0 J	6.0	0.0011
S-95	10/19/04	**14**	ND (5.0)	ND (5.0)	ND (10)	14	ND (5.0)	61	ND (5.0)	ND (0.020)	ND (5.0)	ND (0.14)	ND (10)	ND (10)	ND (10)	ND (0.0050)
S-98	03/17/04	**770**	53	560	5600	6,983	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/12/04	***670***	11	60	330	1,071	ND (5.0)	24	53	ND (0.020)	ND (5.0)	ND (0.14)	ND (10)	ND (10)	ND (10)	ND (0.0050)
S-99	10/12/04	**150**	25	6.2	25	206.2	ND (5.0)	72	ND (5.0)	ND (0.020)	ND (5.0)	ND (0.14)	ND (10)	ND (10)	ND (10)	ND (0.0050)
S-101	10/12/04	***1,100***	7.5	16	68	1,191.5	ND (5.0)	13	74	ND (0.020)	ND (5.0)	ND (0.14)	ND (10)	ND (10)	ND (10)	ND (0.0050)
S-116	10/12/04	**1.1**	ND (5.0)	ND (5.0)	ND (10)	1.1	ND (5.0)	ND (5.0)	ND (5.0)	ND (0.020)	ND (5.0)	ND (0.14)	ND (10)	ND (10)	ND (10)	ND (0.0050)
S-118	10/19/04	**340**	11	310	510	1,171	ND (1.8)	18	71	ND (0.020)	**5.0**	ND (0.14)	ND (10)	ND (10)	ND (10)	ND (0.0050)
S-125	03/17/04	**14,000**	200	230	720	15,150	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/13/04	***7,600***	190	380	1,300	9,470	***800***	ND (39)	91	ND (0.020)	***110***	ND (0.14)	ND (10)	ND (10)	ND (10)	ND (0.0050)
	04/19/05	***17,000***	180	250	920	18,350	***11000***	61	**160**	ND (0.029)	ND (50)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
S-126	10/12/04	ND (1.0)	ND (5.0)	ND (5.0)	ND (10)	ND	ND (5.0)	ND (5.0)	ND (5.0)	ND (0.020)	ND (5.0)	ND (0.14)	ND (10)	ND (10)	ND (10)	ND (0.0050)
S-127	10/19/04	***15,000***	130	**1,400**	1,700	18,230	***6,400***	66	**720**	ND (0.020)	ND (20)	ND (0.16)	ND (11)	ND (11)	ND (11)	ND (0.0050)
S-164	10/18/04	**110**	32	32	65	239	***310***	160	ND (5.0)	ND (0.020)	ND (5.0)	0.73	ND (11)	14	ND (11)	ND (0.0050)
S-172	10/19/04	**800**	ND (5.0)	52	300	1,152	**93**	9.6	33	ND (0.020)	ND (5.0)	ND (0.16)	ND (11)	ND (11)	ND (11)	ND (0.0050)
S-173	10/18/04	***2,800***	9.7	580	1,300	4,689.7	***710***	230	**130**	ND (0.020)	ND (5.0)	ND (0.78	11	18	2.1	ND (0.0050)
S-179	03/17/04	**5**	ND (5)	13	89	107	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/14/04	**2.1**	ND (5.0)	ND (5.0)	ND (10)	2.1	ND (5.0)	97	ND (5.0)	ND (0.020)	ND (5.0)	ND (0.14)	ND (10)	ND (10)	ND (10)	ND (0.0050)
	04/19/08	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND	ND (5.0)	110	ND (10)	ND (0.029)	ND (5.0)	ND (10)	ND (10)	ND (10)	ND (10)	ND (0.001)
S-180	03/18/04	ND (5)	ND (5)	ND (5)	18	18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/14/04	ND (1.0)	ND (5.0)	ND (5.0)	ND (10)	ND	ND (5.0)	ND (5.0)	ND (5.0)	ND (0.020)	ND (5.0)	0.5	ND (10)	ND (10)	ND (10)	ND (0.0050)
	04/19/05	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND	ND (5.0)	ND (5.0)	ND (10)	ND (0.029)	ND (5.0)	ND (10)	ND (10)	ND (10)	ND (10)	ND (0.001)
S-181	03/18/04	***5,100***	250	480	2200	8,030	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/14/04	***1,600***	250	160	660	2,670	***200***	12	40	ND (0.020)	ND (5.0)	ND (0.14)	ND (10)	ND (10)	ND (10)	ND (0.0050)
	04/19/07	***460***	ND (50)	ND (50)	95	555	***240***	ND (50)	ND (10)	ND (0.029)	ND (50)	ND (10)	ND (10)	ND (10)	ND (10)	0.0014 (total)
S-182	03/17/04	***14,000***	160	130	270	14,560	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/13/04	***9,500***	130	130	250	10,010	***240***	89	**330**	ND (0.020)	***120***	ND (0.14)	ND (10)	ND (10)	ND (10)	**0.011**
	04/19/05	***12,000***	150	140	320	12,610	***340***	120	**240**	ND (0.029)	ND (100)	ND (10)	ND (10)	ND (10)	ND (10)	**0.011 (total)**
S-183	03/18/04	***14,000***	130	170	650	14,950	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/13/04	***9,900***	84	77	190	10,251	ND (44)	53	**480**	ND (0.020)	***140***	ND (0.14)	ND (10)	ND (10)	ND (10)	**0.011**
	04/19/05	***14,000***	130	ND (130)	320	14,450	140	ND (130)	**540**	ND (0.029)	ND (130)	ND (10)	ND (10)	ND (10)	ND (10)	**0.0099 (total)**
S-184	03/18/04	***700***	20	41	98	859	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/13/04	**460**	11	19	51	541	ND (1.8)	45	18	ND (0.020)	**6.9**	ND (0.14)	ND (10)	ND (10)	ND (10)	**0.006**
	04/19/05	***650***	ND (25)	ND (25)	46	696	ND (25)	57	24	ND (0.029)	ND (25)	ND (10)	ND (10)	ND (10)	ND (10)	**0.0054 (total)**
S-185	03/18/04	**160**	16	40	78	294	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/13/04	**45**	ND (5.0)	7.4	14	66.4	ND (5.0)	8.5	12	ND (0.020)	ND (5.0)	ND (0.14)	ND (10)	ND (10)	ND (10)	ND (0.0050)
	04/19/05	***850***	ND (50)	68	130	1048	ND (50)	50	560	ND (0.029)	ND (50)	ND (10)	10	ND (10)	ND (10)	**0.0063 (total)**
S-186	03/18/04	**89**	8	7	15	119	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/13/04	**32**	ND (5.0)	5.0	12	49	ND (5.0)	45	ND (5.0)	ND (0.020)	ND (5.0)	ND (0.14)	ND (10)	ND (10)	ND (10)	ND (0.0050)
	04/19/05	**47**	ND (10)	ND (10)	ND (10)	47	ND (10)	49	ND (10)	ND (0.029)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	**0.0021 (total)**
S-187	03/17/04	**450**	37	46	100	633	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/13/04	**270**	29	22	50	371	ND (1.8)	43	12	ND (0.020)	3.70	ND (0.14)	ND (10)	ND (10)	ND (10)	ND (0.0050)
	04/19/05	**130**	ND (20)	ND (20)	30	160	ND (20)	42	ND (10)	ND (0.029)	ND (20)	ND (10)	ND (10)	ND (10)	ND (10)	**0.0044 (total)**
S-188	03/17/04	***990***	15	320	660	1,985	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/13/04	***3,700***	23	300	270	4,293	ND (18)	63	**140**	ND (0.020)	***56***	ND (0.14)	ND (10)	ND (10)	ND (10)	ND (0.0050)
	04/19/05	***1,200***	15	97	210	1,522	ND (5)	110	**66**	0.038	ND (5)	ND (10)	10	12	ND (10)	**0.0063 (total)**
S-189	03/18/04	***3,400***	25	180	490	4,095	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/12/04	***1,200***	25	82	190	1,497	ND (5.0)	110	**180**	ND (0.020)	ND (5.0)	***3.0***	20	35	ND (10)	**0.014**

Well Number	Date Collected	Benzene (ug/l)	Toluene (ug/l)	Ethylbenzene (ug/l)	Total Xylenes (ug/l)	Total BTEX	MTBE (ug/l)	Cumene (ug/l)	Naphthalene (ug/l)	1,2-Dibromoethane (ug/l)	1,2-Dichloroethane (ug/l)	Chrysene (ug/l)	Fluorene (ug/l)	Phenanthrene (ug/l)	Pyrene (ug/l)	Dissolved Lead (mg/l)
S-192	03/18/04	***990***	28	1200	2700	4,918	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/12/04	***930***	11	380	600	1,921	**34**	54	**190**	ND (0.020)	ND (5.0)	***2.0***	ND (11)	16	ND (11)	ND (0.0050)
S-193	03/17/04	**170**	ND (5)	51	68	289	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/07/05	**404**	ND (10)	13	28	445	ND (10)	28	ND (10)	ND (0.02)	10	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.100)
	12/05/06	**140**	2.0 J	19.0	31.0	192 J	ND (0.5)	7.0	3.0 J	ND (0.0098)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	0.00019 J
	12/19/07	**270**	4.0	7.0	13	294	NA	16	2.0 J	ND (0.0095)	ND (0.5)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	0.00038 J
S-194	03/17/04	**7**	ND (5)	33	120	160	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-195	03/17/04	ND (5)	ND (5)	ND (5)	ND (5)	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/07/05	ND (1)	ND (1)	ND (1)	ND (1)	ND	ND (1)	ND (1)	ND (1)	ND (0.02)	ND (1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.010)
S-196	03/18/04	ND (5)	ND (5)	ND (5)	ND (5)	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/07/05	ND (1)	ND (1)	ND (1)	ND (1)	ND	ND (1)	4	ND (1)	ND (0.02)	ND (1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.01)
	12/19/06[1]	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND	ND (0.5)	ND (0.5)	ND (1.0)	ND (0.0097)	ND (0.5)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	0.00021 J
	12/19/07	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND	NA	ND (0.5)	ND (1.0)	ND (0.0096)	ND (0.5)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	0.000066 J
S-197	03/18/04	ND (5)	ND (5)	ND (5)	ND (5)	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/07/05	ND (1)	ND (1)	ND (1)	ND (1)	ND	ND (1)	ND (1)	ND (1)	ND (0.02)	ND (1)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.010)
S-226	12/04/07	***29,000***	890	810	3,500	34,200	NA	49 J	**220**	ND (0.0096)	ND (25)	ND (1.0)	1.0 J	ND (1.0)	ND (1.0)	0.00014 J
S-268 (formerly S-264)	12/19/07	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND	NA	ND (0.5)	ND (1.0)	ND (0.0096)	ND (0.5)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	0.00093 J
PZ-402	10/13/04	***21,000***	230	810	1,500	23,540	***2,800***	ND (78)	**310**	ND (0.020)	***290***	***4.3***	ND (10)	84	11	**0.017**
OW-14	10/15/04	**72**	ND (5.0)	ND (5.0)	ND (10)	72	**16**	ND (5.0)	27	ND (0.020)	ND (5.0)	ND (0.14)	ND (10)	ND (10)	ND (10)	ND (0.0050)
TW-3	10/15/04	***130,000***	**48,000**	**3,500**	**20,000**	201,500	***170,000***	ND (780)	**3,000**	ND (0.020)	***2,200***	***80***	320	640	***210***	**0.05**
TW-5	10/14/04	***700,000***	**12,000**	540	2,100	714,640	ND (200)	ND (200)	ND (1,000)	ND (0.020)	ND (200)	***3.0***	ND (14)	ND (14)	ND (14)	ND (0.0050)
TW-8	10/15/04	***1,500***	ND (80)	**2,100**	1,800	5,400	***290***	210	**14,000**	ND (0.020)	ND (74)	***270***	800	***1,800***	***740***	ND (0.0050)
	12/05/06	**150**	5.0	**2,100**	1,700	3,955	**17**	290	**13,000**	ND (0.0099)	ND (1.0)	***580***	***2,100***	***4,300***	***1,700***	0.00015 J
	12/18/07	***660***	12 J	**1,400**	870	2942 J	NA	190	**12,000**	ND (0.0094)	ND (10)	***240***	700	***1,500***	***570***	0.00015 J
TW-9	10/14/04	**6.6**	ND (5.0)	ND (5.0)	ND (10)	6.6	ND (5.0)	ND (5.0)	ND (5.0)	ND (0.020)	ND (5.0)	NA	NA	NA	NA	ND (0.0050)
TW-11	10/14/04	**2.3**	ND (5.0)	ND (5.0)	ND (10)	2.3	ND (5.0)	ND (5.0)	ND (5.0)	ND (0.020)	ND (5.0)	ND (0.14)	ND (10)	ND (10)	ND (10)	ND (0.0050)
S-88	12/05/06	**22.0**	6.0	5.0	1.0 J	34 J	**81.0**	24.0	ND (1.0)	ND (0.0099)	ND (1.0)	***3.0 J***	8.0	10.0	10.0	0.0013

NOTES

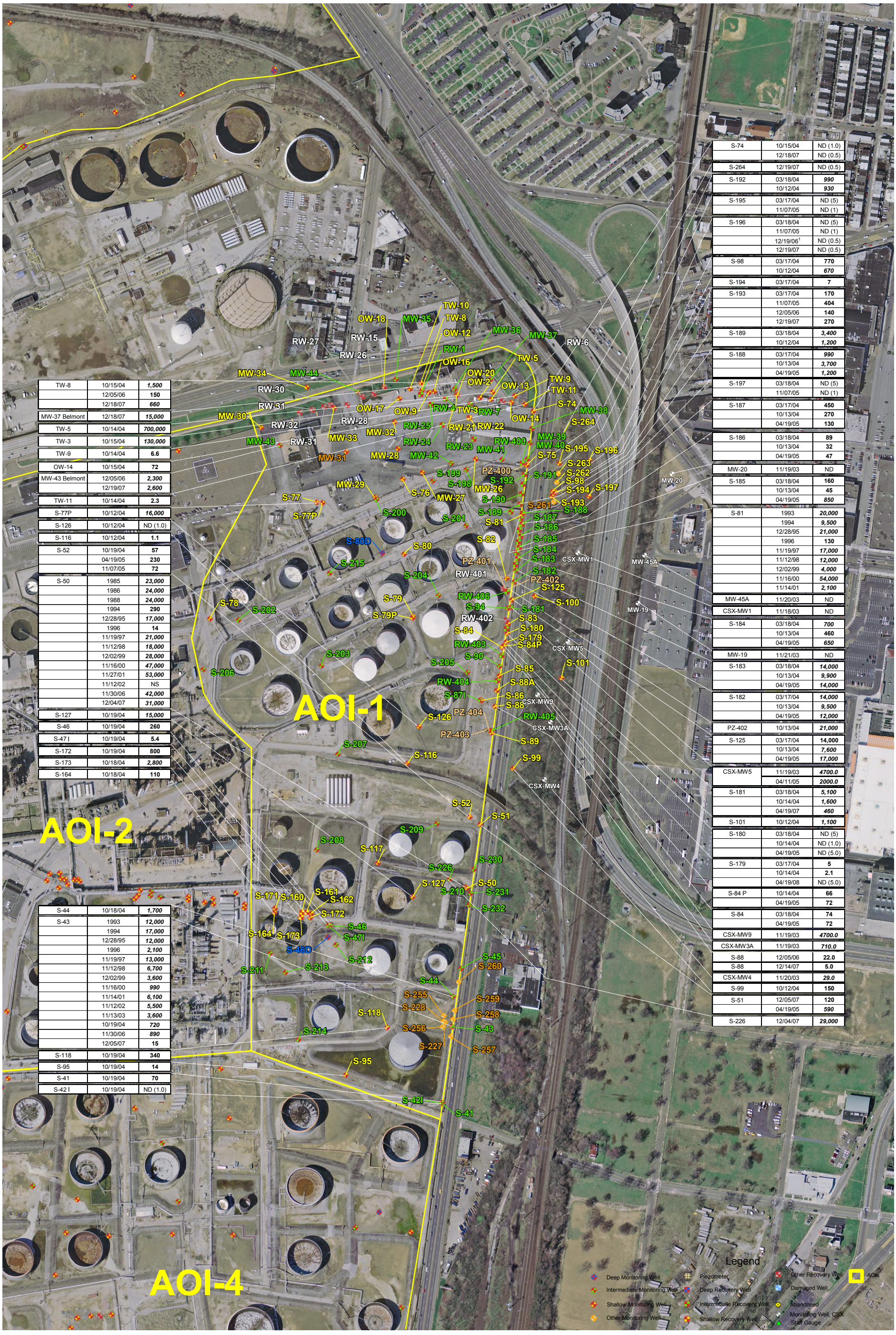
ND (5.0) = Not detected, detection limit provided in parenthesis.
NA= Not Analyzed
BDL = below method detection limit.
J = indicates an estimated value below method detection limit.
mg/l = milligrams per liter.
ug/l = micrograms per liter.
WI = well was inaccessible for sampling.
NS = Not sampled due to presence of LNAPL.

[1] = CSX-196, N-1 and N-28 were resampled on 12-19-06 due to the laboratory missing the hold time for SVOC extraction, the results for 12-19-06 are posted.

Results are compared to the Medium-Specific Concentrations provided in PA Code Chapter 25 Appendix A, Table 1 and Table 2.

Bold indicates the detected level exceeds the Non-Residential Used Aquifer MSCs

Bold and italicized indicates the detected level exceeds the Non-Residential Used and Non-Use Aquifer MSCs



TW-8	10/15/04	*1,500*
	12/05/06	**150**
	12/18/07	*660*
MW-37 Belmont	12/18/07	*15,000*
TW-5	10/14/04	*700,000*
TW-3	10/15/04	*130,000*
TW-9	10/14/04	**6.6**
OW-14	10/15/04	**72**
MW-43 Belmont	12/05/06	*2,300*
	12/19/07	*2,600*
TW-11	10/14/04	**2.3**
S-77P	10/12/04	*16,000*
S-126	10/12/04	ND (1.0)
S-116	10/12/04	**1.1**
S-52	10/19/04	**57**
	04/19/05	**230**
	11/07/05	**72**
S-50	1985	*23,000*
	1986	*24,000*
	1988	*24,000*
	1994	**290**
	12/28/95	*17,000*
	1996	**14**
	11/19/97	*21,000*
	11/12/98	*18,000*
	12/02/99	*28,000*
	11/16/00	*47,000*
	11/27/01	*53,000*
	11/12/02	NS
	11/30/06	*42,000*
	12/04/07	*31,000*
S-127	10/19/04	*15,000*
S-46	10/19/04	**260**
S-47 I	10/19/04	**5.4**
S-172	10/19/04	**800**
S-173	10/18/04	*2,800*
S-164	10/18/04	**110**
S-44	10/18/04	*1,700*
S-43	1993	*12,000*
	1994	*17,000*
	12/28/95	*12,000*
	1996	*2,100*
	11/19/97	*13,000*
	11/12/98	*6,700*
	12/02/99	*3,600*
	11/16/00	*990*
	11/14/01	*6,100*
	11/12/02	*5,500*
	11/13/03	*3,600*
	10/19/04	*720*
	11/30/06	*890*
	12/05/07	**15**
S-118	10/19/04	**340**
S-95	10/19/04	**14**
S-41	10/19/04	**70**
S-42 I	10/19/04	ND (1.0)

S-74	10/15/04	ND (1.0)
	12/18/07	ND (0.5)
S-264	12/19/07	ND (0.5)
S-192	03/18/04	*990*
	10/12/04	*930*
S-195	03/17/04	ND (5)
	11/07/05	ND (1)
S-196	03/18/04	ND (5)
	11/07/05	ND (1)
	12/19/06[1]	ND (0.5)
	12/19/07	ND (0.5)
S-98	03/17/04	**770**
	10/12/04	*670*
S-194	03/17/04	**7**
S-193	03/17/04	**170**
	11/07/05	**404**
	12/05/06	**140**
	12/19/07	**270**
S-189	03/18/04	*3,400*
	10/12/04	*1,200*
S-188	03/17/04	*990*
	10/13/04	*3,700*
	04/19/05	*1,200*
S-197	03/18/04	ND (5)
	11/07/05	ND (1)
S-187	03/17/04	**450**
	10/13/04	**270**
	04/19/05	**130**
S-186	03/18/04	**89**
	10/13/04	**32**
	04/19/05	**47**
MW-20	11/19/03	ND
S-185	03/18/04	**160**
	10/13/04	**45**
	04/19/05	*850*
S-81	1993	*20,000*
	1994	*9,500*
	12/28/95	*21,000*
	1996	**130**
	11/19/97	*17,000*
	11/12/98	*12,000*
	12/02/99	*4,000*
	11/16/00	*54,000*
	11/14/01	*2,100*
MW-45A	11/20/03	ND
CSX-MW1	11/18/03	ND
S-184	03/18/04	*700*
	10/13/04	**460**
	04/19/05	*650*
MW-19	11/21/03	ND
S-183	03/18/04	*14,000*
	10/13/04	*9,900*
	04/19/05	*14,000*
S-182	03/17/04	*14,000*
	10/13/04	*9,500*
	04/19/05	*12,000*
PZ-402	10/13/04	*21,000*
S-125	03/17/04	**14,000**
	10/13/04	*7,600*
	04/19/05	*17,000*
CSX-MW5	11/19/03	*4700.0*
	04/11/05	*2000.0*
S-181	03/18/04	*5,100*
	10/14/04	*1,600*
	04/19/07	*460*
S-101	10/12/04	*1,100*
S-180	03/18/04	ND (5)
	10/14/04	ND (1.0)
	04/19/05	ND (5.0)
S-179	03/17/04	**5**
	10/14/04	**2.1**
	04/19/08	ND (5.0)
S-84 P	10/14/04	**66**
	04/19/05	**72**
S-84	03/18/04	**74**
	04/19/05	**72**
CSX-MW9	11/19/03	*4700.0*
CSX-MW3A	11/19/03	*710.0*
S-88	12/05/06	**22.0**
S-88	12/14/07	**5.0**
CSX-MW4	11/20/03	*29.0*
S-99	10/12/04	**150**
S-51	12/05/07	**120**
	04/19/05	*590*
S-226	12/04/07	*29,000*

Note: New Wells in AOI-1 and AOI-2 Well Classification Data Pending

Stantec
102 PICKERING WAY, SUITE 200
EXTON, PENNSYLVANIA
PHONE: (484) 875-3075 FAX: (484) 875-9286

FOR: SUNOCO PHILADELPHIA REFINERY PHILADELPHIA, PA

Philadelphia Refinery
26th Street Area
Benzene

FIGURE:

JOB NUMBER:	DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:
	TFB			04/25/2008

Appendix A6
Proposed Well Points to be included in Groundwater Sampling Events

Sunoco, Inc. (R&M)
Philadelphia Refinery
3144 Passyunk Avenue
Philadelphia, PA. 19145

Legend

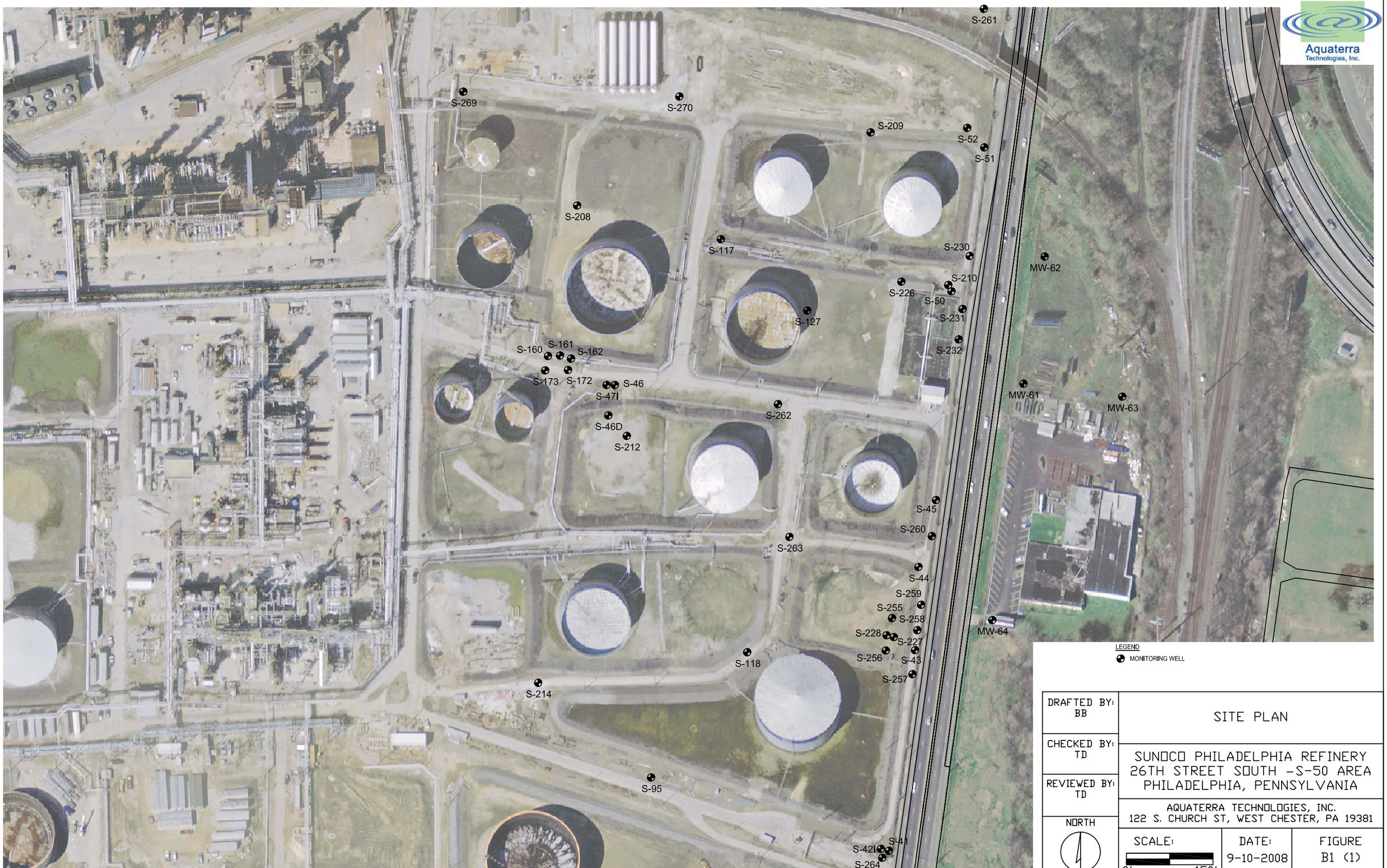
- Shallow Monitoring Well to be Sampled
- Intermediate Monitoring Well to be Sampled
- Deep Monitoring Well to be Sampled
- Existing Monitoring Well
- AOIs

Figure A-6: Proposed Quarterly Sampling Locations
AOI Remedial Action Plan Addendum
Sunoco Philadelphia Refinery
Philadelphia Pennsylvania

Job Number	Scale: 1" = 350'	Date
2574601	0 175 350 Feet	December 18, 2008

Q:\Data6\2574601\ArcGIS\MapDocuments\AOI 1 Remedial Action Plan\Addendum\Appendix A-6- Quaterly Monitoring.mxd

APPENDIX B
26TH STREET SOUTH AREA SUPPORT DOCUMENTATION



Aquaterra Technologies, Inc.

LEGEND

MONITORING WELL

DRAFTED BY: BB	SITE PLAN
CHECKED BY: TD	SUNOCO PHILADELPHIA REFINERY 26TH STREET SOUTH -S-50 AREA PHILADELPHIA, PENNSYLVANIA
REVIEWED BY: TD	AQUATERRA TECHNOLOGIES, INC. 122 S. CHURCH ST, WEST CHESTER, PA 19381
NORTH	SCALE: 0' 150' / DATE: 9-10-2008 / FIGURE B1 (1)

Aquaterra Technologies, Inc.

S-261 (4.95)
S-269
S-270
S-52 (0.27)
S-51 (2.07)
S-209 (0.57)
S-208 (1.53)
S-117 (1.21)
S-226 (0.19)
S-230 (0.49)
MW-62
S-210 (-0.09)
S-50 (0.42)
S-231 (-0.24)
S-127 (0.67)
S-232 (-0.51)
S-161 (NG)
S-160 (NG-lost)
S-162 (1.21)
S-173 (1.27)
S-172 (1.27)
S-46 (1.17)
S-47I (1.12)
S-46D
S-212 (1.11)
S-262 (1.23)
MW-61
MW-63
S-45 (-1.35)
S-260 (-1.92)
S-263 (0.82)
S-44 (-2.16)
S-259 (-2.45)
S-255 (-0.97)
S-228 (-0.29)
MW-64
S-258 (-0.73)
S-256 (-0.52)
S-43 (-0.72)
S-118 (0.30)
S-257 (-0.30)
S-214 (0.60)
S-227 (-0.77)
S-95 (0.52)
S-41 (0.01)
S-42I (0.31)
S-264 (0.39)

4
3
2
1
0
-1
-2

LEGEND

⊕	MONITORING WELL
0	GROUNDWATER CONTOUR
(1.23)	GROUNDWATER ELEVATION (feet)
(NS)	NOT SAMPLED

DRAFTED BY: BB	FILL / ALLUVIUM GROUNDWATER ELEVATION MAP JUNE 9, 2007	
CHECKED BY: TD	SUNOCO PHILADELPHIA REFINERY 26TH STREET SOUTH -S-50 AREA PHILADELPHIA, PENNSYLVANIA	
REVIEWED BY: TD	AQUATERRA TECHNOLOGIES, INC. 122 S. CHURCH ST, WEST CHESTER, PA 19381	
NORTH	SCALE: 0′ 150′	DATE: 9-10-2008
		FIGURE B1 (2)

Appendix B2
Soil Boring and Well Construction Logs

SUBSURFACE LOG: S-261D
AND WELL CONSTRUCTION : S-261

PROJECT:	**Sunoco-Philadelphia Refinery**	DRILLING CO.:	**Parratt-Wolffe**
SITE LOCATION:	**AOI-1**	DRILLING METHOD:	**Hollow Stem Auger**
LOGGED BY:	**Tiffani Doerr**	SAMPLING METHOD:	**Split Spoon**
DATES DRILLED:	**18 & 19 December 2007**	SCREEN/RISER DIAMETER:	**4-inch**
TOTAL BORING DEPTH:	**66'**	WELLBORE DIAMETER:	**8-inch**
BORING ELEVATION	**25.485 feet**	TOC (inner) ELEVATION:	**27.412 feet (ASML)**

NOTE: Well S-261 drilled within 5 feet of boring S-261D. Screen=0.010 slot; "0" sand; 2' stickup finish. Screen (15'-30'); Riser (2' stickup - 15'); Sand (13'-30'); Bentonite (11'-13'); Grout (surface to 11')

Depth (feet)	Blow Counts	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL DIAGRAM
					Boring location pre-cleared by Mobile Dredge to 4'	
	4'-6'	0.0		Fill, brown slightly plastic sand with rock fragments, brick and cinders		
-5					Auger to 10'	
-10	10'-12'	0.0		Top 6" fill Laminated orange and gray, very slightly plastic stiff silt, no sand		
					Auger to 14'	

Aquaterra Technologies, Inc.

SUBSURFACE LOG: S-261D
AND WELL CONSTRUCTION: S-261

Depth (feet)	Sample Int	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL DIAGRAM
	14'-16'	0.0		Sandy clay with round gravel to 15'. At 15.5', wet, orange loose silty sand with few gravels	Sample (14'-16') submitted for laboratory analysis	
-15						
	16'-18'	0.0		Same, loose, wet sand to 17'	Sample (16'-17.5') submitted for laboratory analysis	
				(17'-17.5') Gravel with sand and silt		
				(17.5'-18') Orange-gray clay		
	18'-20'	0.0		Orange and gray stiff clay, wet, with few gravels	Sample (18'-20') submitted for laboratory analysis	
				At 19.5' Sandy clay with gravel, moist		
-20	20'-22'	2.5		(20'-21') Wet orange-gray mottled clay with few gravels		
				Sand and gravel, moist	Sample (21'-22') submitted for laboratory analysis	
	22'-24'	109		Moist, brown sand and fine to coarse gravel of varying composition (mudstone, sandstone, quartzite)	Sample (22'-24') submitted for laboratory analysis	
	24'-26'	1849		Same as above, saturated	Sample (24'-26') submitted for laboratory analysis	
-25						
	26'-28'	436		Same as above	Sample (26'-28') submitted for laboratory analysis	
	28'-30'	1635		Same as above with layers having less gravel, more med sand	Sample (28'-30') submitted for laboratory analysis	
-30	30'-32'	722		Same as above, 31.5' - 32' less gravel more sand	Sample (30'-32') submitted for laboratory analysis	

Aquaterra Technologies, Inc.

SUBSURFACE LOG: S-261D
AND WELL CONSTRUCTION: S-261

Depth (feet)	Sample Int	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL DIAGRAM
	32'-24'	1550		Same as above, sand and gravel to 33', less gravel, more sand 33'-34'	Sample (32'-34') submitted for laboratory analysis	
	34'-36'	877		Through shelby tube: top few inches are gravel, remainder looks like clay	Shelby Tube sample (34'-36') and laboratory sample	
-35						
	36'-36.5'	720		Gravel with sand	Sample (36'-36.5') submitted for laboratory analysis	
	36.5'-38'	7.7		Clayey sand to fine sandy clay	Sample (36.5'-38') accidentally discarded before collection	
	38'-40'	84.7		Med-coarse sand 20% gravel to 39'	Sample (38'-39') submitted for laboratory analysis	
				Medium sand, no gravel, 1-inch clay layer at 39'		
-40	40'-42'	162		Medium sand with gravel in top 1-inch, clay lenses	Sample (40'-42') submitted for laboratory analysis	
	42'-44'	7.0			Shelby Tube sample (42'-44') and laboratory sample	
	44'-46'	4.0		Brown medium-fine sand, no gravel	Sample (44'-46') submitted for laboratory analysis	
-45						
	46'-48'	6.6		Same as above with sandy clay lenses	Sample (46'-48') submitted for laboratory analysis	
	48'-50'	6.1		Medium-coarse sand, thin sandy clay lenses with clay	Sample (48'-50') submitted for laboratory analysis	
-50	50'-52'	2.4		Brown, fine to med sand (bottom 4"-medium-coarse	Sample (50'-52')	

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SUBSURFACE LOG: S-261D
AND WELL CONSTRUCTION: S-261

Depth (feet)	Sample Int	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL DIAGRAM
				sand)	submitted for laboratory analysis	
	52'-54'	2.3		Fining upward sequence- medium-coarse sand with gravel fining upward to dark brown medium sand	Sample (52'-54') submitted for laboratory analysis	
	54'-56'	15.4			Shelby Tube sample (54'-56') and laboratory sample	
-55						
	56'-58'	16.6		Medium-coarse sand and gravel to 56' 4", grading into med sand with some gravel, dark brown	Sample (56'-58') submitted for laboratory analysis	
	58'-60'	176		Loose fine to med sandy clay. Bottom 4-inches coarse sand with fine gravels.	Sample (58'-60') submitted for laboratory analysis	
-60	60'-62'	33		Same clayey sand with fine gravel to 61.5	Sample (61.5'-62') submitted for laboratory analysis	
				At 61.5' gravels with sand, large red sandstone gravel in bottom of sample		
	62'-64'	5.6		Brown fine to med sand with occassional fine and coarse gravel	Sample (62'-64') submitted for laboratory analysis	
	64'-66'	70.2		Med to coarse sand and gravel	Sample (64'-66') submitted for laboratory analysis	
-65					Borehole complete to 66'	

SUBSURFACE LOG: S-262D
AND WELL CONSTRUCTION : S-262

PROJECT:	**Sunoco-Philadelphia Refinery**	DRILLING CO.:	**Parrat Wolffe**
SITE LOCATION:	**AOI-1**	DRILLING METHOD:	**Hollow Stem Auger**
LOGGED BY:	**Tiffani Doerr**	SAMPLING METHOD:	**Split Spoon**
DATES DRILLED:	**12 & 13 December 2007**	SCREEN/RISER DIAMETER:	**4-inch**
TOTAL BORING DEPTH:	**65'**	WELLBORE DIAMETER:	**8-inch**
BORING ELEVATION	**17.559 feet**	TOC (inner) ELEVATION:	**19.443 feet (ASML)**

NOTE: Well S-262 drilled within 5 feet of boring S-262D. Screen=0.010 slot; "0" sand; 2' stickup finish. Screen (15'-30'); Riser (2' stickup to 15'); Sand (13'-30); Bentonite (11'-13'); Grout (surface to 11').

Depth (feet)	Blow Counts	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL DIAGRAM
					Boring location pre-cleared by Mobile Dredge to 4.5'	
					Perched water in hole at 3'	
-5	5'-7'	1735		Gravel (5'-5.5')	Sample (5'-7') submitted for laboratory analysis	
				Gray clay with some yellow-brown mottling, wet, very little fine sand; grades to silt with fine sand at bottom.		
					Auger to 7' to 10'	
-10	10'-12'	2900		Very slightly plastic fine sand to 11' 8"		
					Sample (11'8" -12') submitted for laboratory analysis	
				Medium sand (11' 8" to 12')		
					Auger 12' to 15'	

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SUBSURFACE LOG: S-262D
AND WELL CONSTRUCTION: S-262

Depth (feet)	Sample Int	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL DIAGRAM
-15	15'-17'	2745		Coarse sand and 1" subround gravel. Large gravel at bottom of spoon (2")	Sample (16' -16.5') submitted for laboratory analysis	
	17'-19'			Purple and gray-brown sand	Shelby Tube sample (17'-19') and laboratory sample	
	19'-21'	1210		Saturated sand and gravel of variable colors.	Sample (19' -21') submitted for laboratory analysis	
-20	21'-23'	3145		Same as above	Sample (21' -23') submitted for laboratory analysis	
	23'-25'				Shelby Tube sample (23'-25')	
-25	25'-27'	632		Same as above with few large gravels	Sample (25' -27') submitted for laboratory analysis	
	27'-29'	1335		Same as above with medium-fine sand at botton 3"	Sample (27' -29') submitted for laboratory analysis	
	29'-31'	266		Top 1-inch fissil shale (shattered cobble). 1" gravel with fine-med sand		
-30	31'-33'	318		Same to 32'		

Aquaterra Technologies, Inc.

SUBSURFACE LOG: S-262D
AND WELL CONSTRUCTION: S-262

Depth (feet)	Sample Int	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL DIAGRAM
				Medium-coarse sand with some gravel with large gravels at bottom	Sample (32' -33') submitted for laboratory analysis	
	33'-35'	222		Yellow-gray fine sand	Sample (33' -34') submitted for laboratory analysis	
		34.0		Yellow-gray silty clay to brown silty clay in bottom 6" with few very fine sands.	Sample (34' -35') submitted for laboratory analysis	
-35	35'-37'	119		Medium sand top 8-inches. Remainder of spoon is alternating layers of clay with 1-2 inch layers of fine sand.	Sample (35' -35.5') submitted for laboratory analysis	
		12.3				
	37'-39'	25.4		Dark brown silty clay with few fine sands	Sample (37' -39') submitted for laboratory analysis	
	39'-41'	23.8		Dark gray clay	Shelby Tube sample and laboratory sample (37'-39')	
-40						
	41'-43'	146		Dark brown-gray silty clay with few fine sands		
	43'-45'	250		Same as above with few thin (1"-2") layers of fine sand		
-45	45'-46'	18.2		Same as above, very stiff		
					Sample (46' -47') submitted for laboratory analysis	
	47'-49'	43.7		Stiff, dark gray silty clay with fine sand. Loose, saturated clay fine sand layer (47'6" - 47'10")	Sample (47' -49') submitted for laboratory analysis	
	49'-51'	7.8		Same as above, very silty, very stiff clay with fine sand.	Sample (49' -51') submitted for laboratory analysis	
-50						

Aquaterra Technologies, Inc.

SUBSURFACE LOG: S-262D
AND WELL CONSTRUCTION: S-262

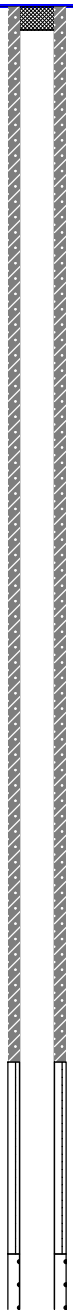
Depth (feet)	Sample Int	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL DIAGRAM
	51'-53'	1.4		Same as above	Sample (51' -53') submitted for laboratory analysis	
	53'-55'	6.4		Clayey silt with sand, plastic. Loose silty sand layer (53.5'-54')	Sample (53' -55') submitted for laboratory analysis	
-55	55'-57'	3.8		Same as above-clayey silt with sand	Sample (55' -57') submitted for laboratory analysis	
	57'-59'	13.3		Dark gray medium-fine sand with few round gravels. Large gravel at bottom, little bit of orange color.	Sample (57' -59') submitted for laboratory analysis	
	59'-61'				Shelby Tube sample (59'-61')	
-60	61'-63'	9.1		Medium dense, orange, medium to coarse grained sand. No gravel	Sample (61' -63') submitted for laboratory analysis	
	63'-65'	6.5		Same as above	Sample (63' -65') submitted for laboratory analysis Borehole complete to 65'	
-65						

SUBSURFACE LOG: S-263D
AND WELL CONSTRUCTION : S-263

PROJECT:	**Sunoco-Philadelphia Refinery**	DRILLING CO.:	**Parratt-Wolffe**
SITE LOCATION:	**AOI-1**	DRILLING METHOD:	**Hollow Stem Auger**
LOGGED BY:	**Tiffani Doerr**	SAMPLING METHOD:	**Split Spoon**
DATES DRILLED:	**13 & 14 December 2007**	SCREEN/RISER DIAMETER:	**4-inch**
TOTAL BORING DEPTH:	**66'**	WELLBORE DIAMETER:	**8-inch**
BORING ELEVATION	**17.114 feet**	TOC (inner) ELEVATION:	**16.785 feet (ASML)**

NOTE: Well S-263 drilled within 5 feet of boring S-263D. Screen=0.010 slot; "0" sand; flushmount finish. Screen (15'-30'); Riser (0'-15'); Sand (13'-30'); Bentonite (11'-13'); Grout (surface to 11')

Depth (feet)	Sample Int.	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL DIAGRAM
0					Boring location pre-cleared by Mobile Dredge to 4'	
-5	5'-7'	877		Stiff dark gray clay with large chunk of wood (fill), saturated (water from dredging)	Sample (5'-7') submitted for laboratory analysis	
					Auger to 10'	
-10	10'-12'	232		Clay with organics, dark gray. Sheen on outside of spoon	Sample (10'-12') submitted for laboratory analysis	
					Auger to 16'	



SUBSURFACE LOG: S-263D
AND WELL CONSTRUCTION: S-263

Depth (feet)	Sample Int	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL DIAGRAM
-15						
	16'-18'	232		Gravel and sand matrix	Shelby Tube sample (16'-18') and lab sample	
	18'-20'	261		Gravels of variable composition and size in clayey-sandy matirx, moist	Sample (18'-20') submitted for laboratory analysis	
-20	20'-22'	1147		Same as above	Sample (20'-22') submitted for laboratory analysis	
	22'-24'	1371		Same as above	Sample (22'-24') submitted for laboratory analysis	
	24'-26'	1516		Medium brown, Medium sand	Sample (24'-26') submitted for laboratory analysis	
-25				Sand with fine gravel.		
	26'-28'	1445		Same as above-sand and gravel (larger and more gravel at bottom of sample, less gravel and more sand at top-fining upward)	Sample (26'-28') submitted for laboratory analysis	
	28'-30'	1347		Mottled gray and orange clay, very little sand, saturated. Bottom 2" of spoon very fine light gray and orange sand	Sample (28'-30') submitted for laboratory analysis	
-30	30'-32'	1411		Same as above to 31'8".	Sample (30'-32') submitted for laboratory analysis	
				Medium coarse sand, no gravel, light brown		

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SUBSURFACE LOG: S-263D
AND WELL CONSTRUCTION: S-263

Depth (feet)	Sample Int	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL DIAGRAM
	32'-34'	1520		In shelby tube: looks like light brown, med coarse sand; product visible in air bubbles inside of tube (LNAPL).	Shelby Tube sample (32'-34') and lab sample	
	34'-36'	440		Soft clay with medium coarse sand, no gravel, saturated, light brown	Sample (34'-36') submitted for laboratory analysis	
-35						
	36'-38'	277		Light brown, med sand with few coarse sands, no gravel, saturated	Sample (36'-38') submitted for laboratory analysis	
	38'-40'	109		Light brown medium sand, no gravel	Sample (38'-40') submitted for laboratory analysis	
-40	40'-42'	55.3		Light brown med-coarse sand, medium dense	Sample (40'-42') submitted for laboratory analysis	
	42'-44'	101		Same as above, more orange in color in last 4" of spoon	Sample (42'-44') submitted for laboratory analysis	
	44'-46'	35.8		From tube look like same as above-bottom of tube was clay	Shelby Tube sample (44'-46') and lab sample	
-45						
	46'-48'	96.6		Light brown medium-coarse sand with fine sand at 47'-47.5'	Sample (46'-48') submitted for laboratory analysis	
	48'-50'	64.9		Light brown med-coarse sand, orange at bottom of spoon	Sample (48'-50') submitted for laboratory analysis	
-50	50'-52'	14.4		Orange brown med-coarse grained sand	Sample (50'-52')	

Aquaterra Technologies, Inc.

SUBSURFACE LOG: S-263D
AND WELL CONSTRUCTION: S-263

Depth (feet)	Sample Int	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL DIAGRAM
					submitted for laboratory analysis	
	52'-54'	194		Same as above	Sample (52'-54') submitted for laboratory analysis	
	54'-56'	209		Same as above	Sample (54'-56') submitted for laboratory analysis	
-55						
	56'-58'	81.7		Same as above, very little gravel at bottom	Sample (56'-58') submitted for laboratory analysis	
				Same as above to 59.5		
	58'-60'	151			Sample (58'-59.5') submitted for laboratory analysis	
				At 59.5' sand; orange very weathered sandstone rock at bottom		
-60	60'-62'	154			Sample (60'-62') submitted for laboratory analysis	
				Same as above-orange brown med-coarse grained sand to 61.5		
				At 61.5' Orange coarse grained sand; few fine gravels (sub-angular) <1cm		
	62'-64'	375			Sample (62'-64') submitted for laboratory analysis	
				Orange, coarse sand with few small gravels ranging up to 2 cm		
	64'-66'	134		Sand	Shelby Tube sample (64'-66') and lab sample	
-65						
					Borehole complete to 66'	

SUBSURFACE LOG: S-264D
AND WELL CONSTRUCTION : S-264D

PROJECT:	**Sunoco-Philadelphia Refinery**	DRILLING CO.:	**Parratt-Wolffe**
SITE LOCATION:	**AOI-1**	DRILLING METHOD:	**Hollow Stem Auger**
LOGGED BY:	**Tiffani Doerr**	SAMPLING METHOD:	**Split Spoon**
DATES DRILLED:	**19 & 20 December 2007**	SCREEN/RISER DIAMETER:	**4-inch**
TOTAL BORING DEPTH:	**82'**	WELLBORE DIAMETER:	**8-inch**
BORING ELEVATION	**25.097 feet (AMSL)**	TOC (inner) ELEVATION:	**26.63 feet**

NOTE: Well S-264D drilled within 5 feet of boring S-264D. Screen= 0.010 slot; "0" sand; 2' stickup finish. Screen (71'-81'); Riser (0'-71'); Sand (69'-81'); Bentonite (64'-69'); Grout (surface-64')

Depth (feet)	Sample Int.	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL DIAGRAM
					Boring location pre-cleared by Mobile Dredge to 8'	
-5						
	8'-10'	0.3		Gray silty clay with few orange laminations and some vey fine sand, slightly moist, no odors	No Sample	
-10						
	14'-16'	37.2		Same as above with large gravel in bottom of spoon	Sample (14'-16') submitted for laboratory analysis	

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SUBSURFACE LOG: S-264D
AND WELL CONSTRUCTION: S-264D

Depth (feet)	Sample Int	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL DIAGRAM
-15						
	16'-18'	5.2		Med to coarse sand and gravel (variable size and color, gravels subrounded & subangular)	Sample (16'-18') submitted for laboratory analysis	
	18'-20'	6.9		In shelby tube: gravel appears to continue to 18.5 Gray clay with organics	Shelby Tube sample (18'-20') and laboratory sample	
-20	20'-22'	1.6		Same as 16'-18' interval	Sample (20'-22') submitted for laboratory analysis	
	22'-24'	28.6		Same as above, gravel and coarse sand. Top 1' less gravel/smaller gravel, green and red sandstone and quartzite frags	Sample (22'-24') submitted for laboratory analysis	
	24'-26'	115		Same as above, Larger gravels up to 2", bottom wet.	Sample (24'-26') submitted for laboratory analysis	
-25	26'-28'	1805		Same as above, wet, sheen visible on gravel surfaces.	Sample (26'-28') submitted for laboratory analysis	
	28'-30'	1810		Sand and gravel	Shelby Tube sample (28'-30') and laboratory sample	
-30	30'-32'	1262		Coarse sand with less gravel, color changing with depth (gray then orange then multicolored) (31.5'-32') Med-coarse sand, gray brown with occassional gravel	Sample (30'-32') submitted for laboratory analysis	
	32'-24'	1560		Same as above, gray-brown, med to coarse sand with fne gravel	Sample (32'-34') submitted for laboratory analysis	
	34'-36'	1746		Same as above, bottom 4-inch with coarser gravels	Sample (34'-36') submitted for laboratory analysis	
-35						

Aquaterra Technologies, Inc.

SUBSURFACE LOG: S-264D
AND WELL CONSTRUCTION: S-264D

Depth (feet)	Sample Int	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL DIAGRAM
	36'-38'	1555		Same as above, less gravel	Sample (36'-38') submitted for laboratory analysis	
	38'-40'	1566		Same to 39.5	Sample (38'-40') submitted for laboratory analysis	
-40	40'-42'	829		Gray fine to med sand, no gravel. 2" caliche layer Same as above to 41'. Same as above, increased gravel content (41'-41.5')	Sample (40'-42') submitted for laboratory analysis	
	42'-44'	30.3		(41.5'-42') Orange & dark orange laminated clay then gray-orange clay at bottom, no sand. (42'-43') Fine sand layers with orange clay plug (43'-44') Orange clay w/ brown organic laminations in bottom 4"	Sample (42'-44') submitted for laboratory analysis	
-45	44'-46'	297		Brown medium coarse sand	Sample (44'-46') submitted for laboratory analysis	
	46'-48'	38.1		(45.5'-46') Light brown medium coarse sand with some gravel Medium to coarse sand with some gravel	Sample (46'-48') submitted for laboratory analysis	
	48'-50'	37.2		Light brown medium sand with occassional gravel	Sample (48'-50') submitted for laboratory analysis	
-50	50'-52'	291		Brown medium sand with occassional gravel, (51.5'-51.8') Reddish-brown plastic clay Very coarse medium sand and gravel	Sample (50'-52') submitted for laboratory analysis	
	52'-54'	3.4		Fine-med grained sand (fining grading upward sequence) to med-coarse sand with large gravel	Sample (52'-54') submitted for laboratory analysis	
-55	54'-56'	18.6		Medium sand to 55.3'	Sample (54'-56') submitted for laboratory analysis	

Aquaterra Technologies, Inc.

SUBSURFACE LOG: S-264D
AND WELL CONSTRUCTION: S-264D

Depth (feet)	Sample Int	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL DIAGRAM
				Sandy silt to 55.9'		
	56'-58'	16.8		Reddish-orange silty clay	Sample (56'-58') submitted for laboratory analysis	
				Medium coarse sand with gravel (56.5' - 57'), Fine-med sand, gray color (57' - 57.5')		
				(57.5'-57.8') Reddish-brown sandy silt, gravel present at 57.8'		
	58'-60'	105		Medium to very coarse sand and gravel	Sample (58'-60') submitted for laboratory analysis	
-60	60'-62'	6.3		(60'-60.5') Clayey sand. (60.5'- 61') Medium to coarse sand with some gravel.	Sample (60'-62') submitted for laboratory analysis	
				(61'-62) Coarse to very coarse sand and gravel		
	62'-64'	33.3		(62.5'-63.5') Medium to coarse sand with very little gravel. At 63'-very sandy clay (2")	Sample (62'-64') submitted for laboratory analysis	
	64'-66'	216		Medium to coarse sand with some gravel	Sample (64'-66') submitted for laboratory analysis	
-65				(65.5'-66') Fine to medium sand		
	66-68'	6.1		Orange medium sand	Sample (66'-68') submitted for laboratory analysis	
	68'-70'	61.8		Spoon refusal at 69', gravel with clayey sand matrix at 68.5'-69'	Sample (68'-69') submitted for laboratory analysis	
					Auger to 70'	
-70	70'-72'	7.2		Same as above, saturated, less gravel to 70.5'	Sample (70'-70.5') submitted for laboratory analysis	
				Dark brown fine sandy clay		
	72'-74'	-		6-inch recovery: clayey sand to sandy clay to rock	No Sample	
	74'-76	15.5		Orange coarse sand with few gravel at top	Sample (74'-76') submitted for laboratory analysis	
-75				Milky white coarse sand and gray fine gravel		

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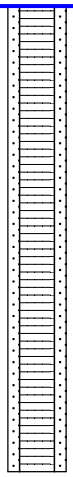
SUBSURFACE LOG: S-264D
AND WELL CONSTRUCTION: S-264D

Depth (feet)	Sample Int	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL DIAGRAM
	76'-78'	27.6		6" recovery. Same as above, bottom 1-inch orange coarse sand and coarse gravel	Sample (76'-78') submitted for laboratory analysis	
	78'-80'	11.6		Coarse sand with gravel	Sample (78'-80') submitted for laboratory analysis	
				Coarse gravel with sand		
-80	80'-82'	25.6		Same as above, bottom 3-inches = round cobble with white sandy clay matrix	Shelby Tube sample (80'-82') and laboratory sample	
					Borehole complete to 82'	



MONITORING WELL LOG: S-269

PROJECT:	**Sunoco Philadelphia Refinery**	DRILLING CO.:	**Parratt Wolff Inc.**
SITE LOCATION:	**26th Street South**	DRILLING METHOD:	**Hollow Stem Auger**
JOB NO.:		SAMPLING METHOD:	**Split Spoon**
LOGGED BY:	**Shaun Sykes**	SCREEN/RISER DIAMETER:	**4"**
DATES DRILLED:	**8-27-08**	WELLBORE DIAMETER:	**8"**
TOTAL DEPTH:	**30'**	ELEVATION:	**-**

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0						
-5				Cleared to 8'	Riser 0-10'	
				Fill observed during clearing activities, but depth of contact with native materials not determined.		
-10	276		Sligthly moist, light brown clayey fine sand, slightly to 13'			
	323					
	562					
	613		Moist fine brown/gray sand and			

MONITORING WELL LOG: S-269

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
			gravel to 15.5'			
	622					
-15	573					
			Moist, fine light gray clayey sand to 16.5'			
	322					
			Gray/red sand and gravel to 17.5'			
	302					
			Moist, light gray clayey sand, compact			
	57.6		Gray/brown fine sand, trace clay and gravel, slightly moist			
	51.4		Orange-brown fine sand and gravel (mixed), slightly moist			
-20	65.6		Gray/light gray clayey fine sand and mixed gravels, slightly moist, slight odor		Screen 10-30'	
	49.7		Orange/yellow/brown fine sand and mixed gravels, trace clay, slightly moist			
	102		Red/brown fine sand and gravel, slightly moist			
			Gray/green/red/blue coarse sand and mixed gravels, wet			
	67.7					
	216		Same as above with blue and red tinted layers of fine sand, moist			
-25	327		Gold/dark brown medium sands, very moist, petroleum odors			
	215		Same with small gravels			
	205					
	117		Gray/brown fine clayey sand and trace small gravels, very moist to wet			
	102		Same as above (10" recovery)	Auger complete to 30'		
-30						

MONITORING WELL LOG: S-270

PROJECT:	**Sunoco Philadelphia Refinery**	DRILLING CO.:	**Parratt Wolff Inc.**
SITE LOCATION:	**26th Street South**	DRILLING METHOD:	**Hollow Stem Auger**
JOB NO.:		SAMPLING METHOD:	**Split Spoon**
LOGGED BY:	**Shaun Sykes**	SCREEN/RISER DIAMETER:	**4"**
DATES DRILLED:	**8-27-08**	WELLBORE DIAMETER:	**8"**
TOTAL DEPTH:	**30'**	ELEVATION:	**-**

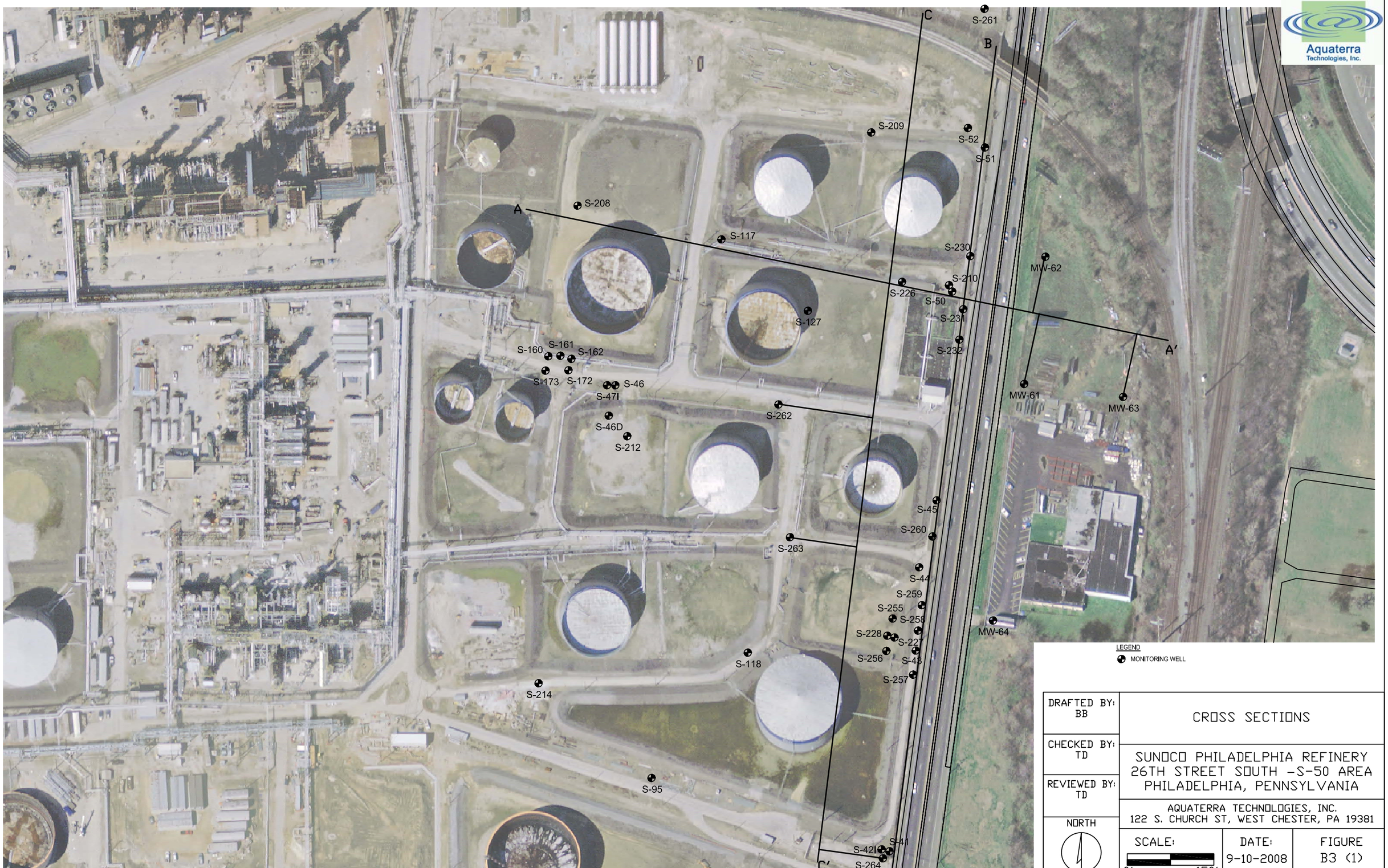
Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0				Cleared to 8'		
-5				Water observed entering hole from approximately 4' below grade during clearing activities (constant ~1gpm)	Riser 0-10'	
				Fill observed to 8' in cleared hole. Coarse sand with gravel, wood, and much broken cinder block		
-10	356		Brown/black clayey fine sand and gravel, moist (6" recovery)			
	478		Compact, slightly moist,brown/red sandy silt to 14.5'			
	513					
	472					

MONITORING WELL LOG: S-270

Aquaterra Technologies, Inc.

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
	356					
-15	782		Coarse sand and gravel, increasing sand content with depth, moist			
	825		Coarse sand and gravel to 23'			
	1215		Strong petroleum odors noted at 17'			
	1163					
	1172		Same as above, sand w/ reddish color			
-20	1065				Screen 10-30'	
	1345		Wet @ 21'			
	1271					
	1175		Medium reddish gray & white sands, some gravel, wet			
	1221					
-25	963					
	827					
	563					
	615		Same as above, shift to finer sands at 28'			
	421		Same as above, shift back to coarser sand, wet	Auger complete to 30'		
	315		Same, gravel at 29.5"			
-30						

Appendix B3
Geologic Cross Section Key and Associated Cross Sections


C
B
A
A′
C′
B′
S-261
S-209
S-52
S-51
S-208
S-117
S-230
S-210
S-226
S-50
S-231
S-127
S-232
S-160
S-161
S-162
S-173
S-172
S-46
S-47I
S-46D
S-212
S-262
S-263
S-45
S-260
S-44
S-259
S-255
S-258
S-228
S-227
S-256
S-43
S-257
S-118
S-214
S-95
S-42I
S-41
S-264
MW-62
MW-61
MW-63
MW-64
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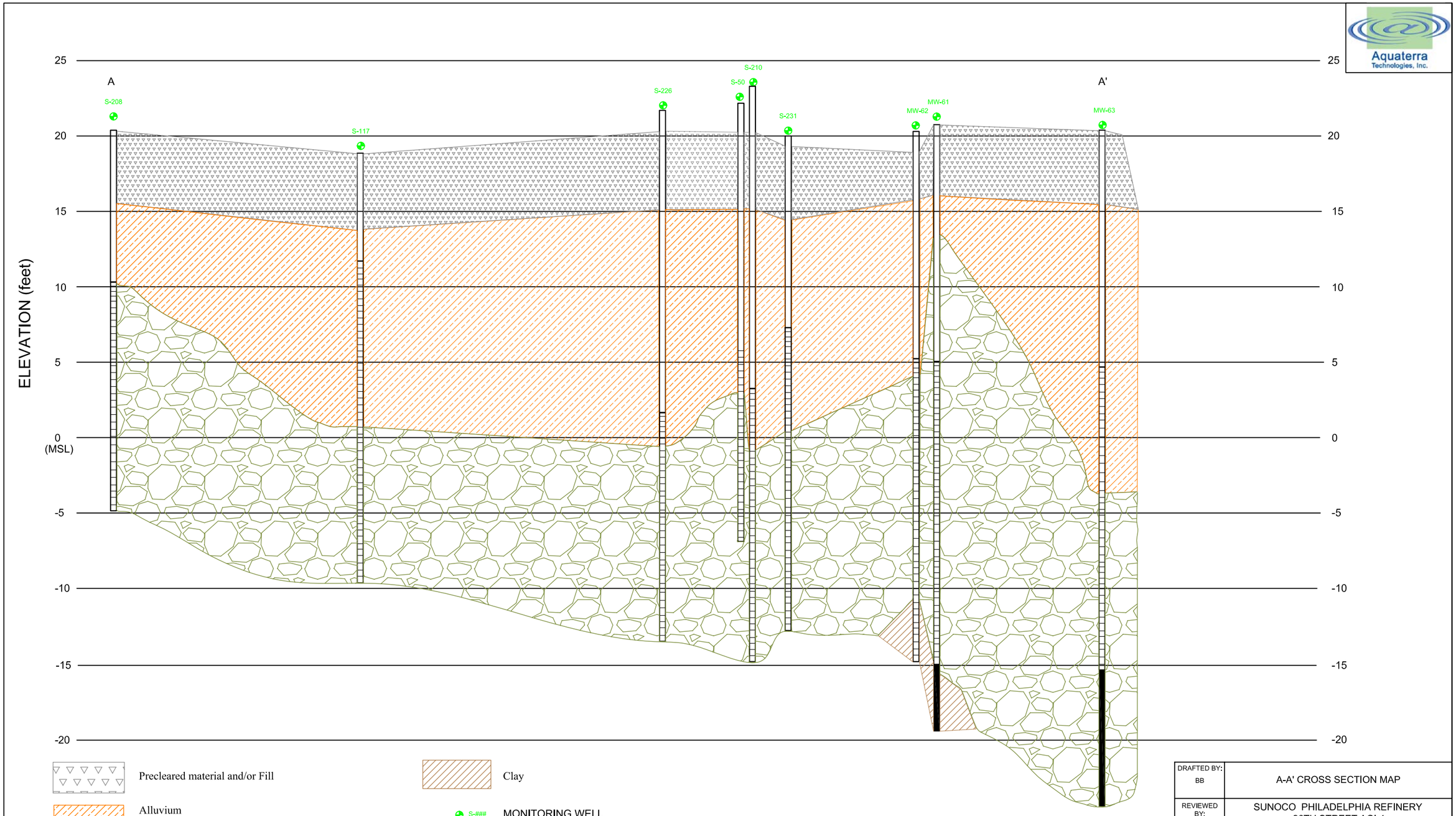
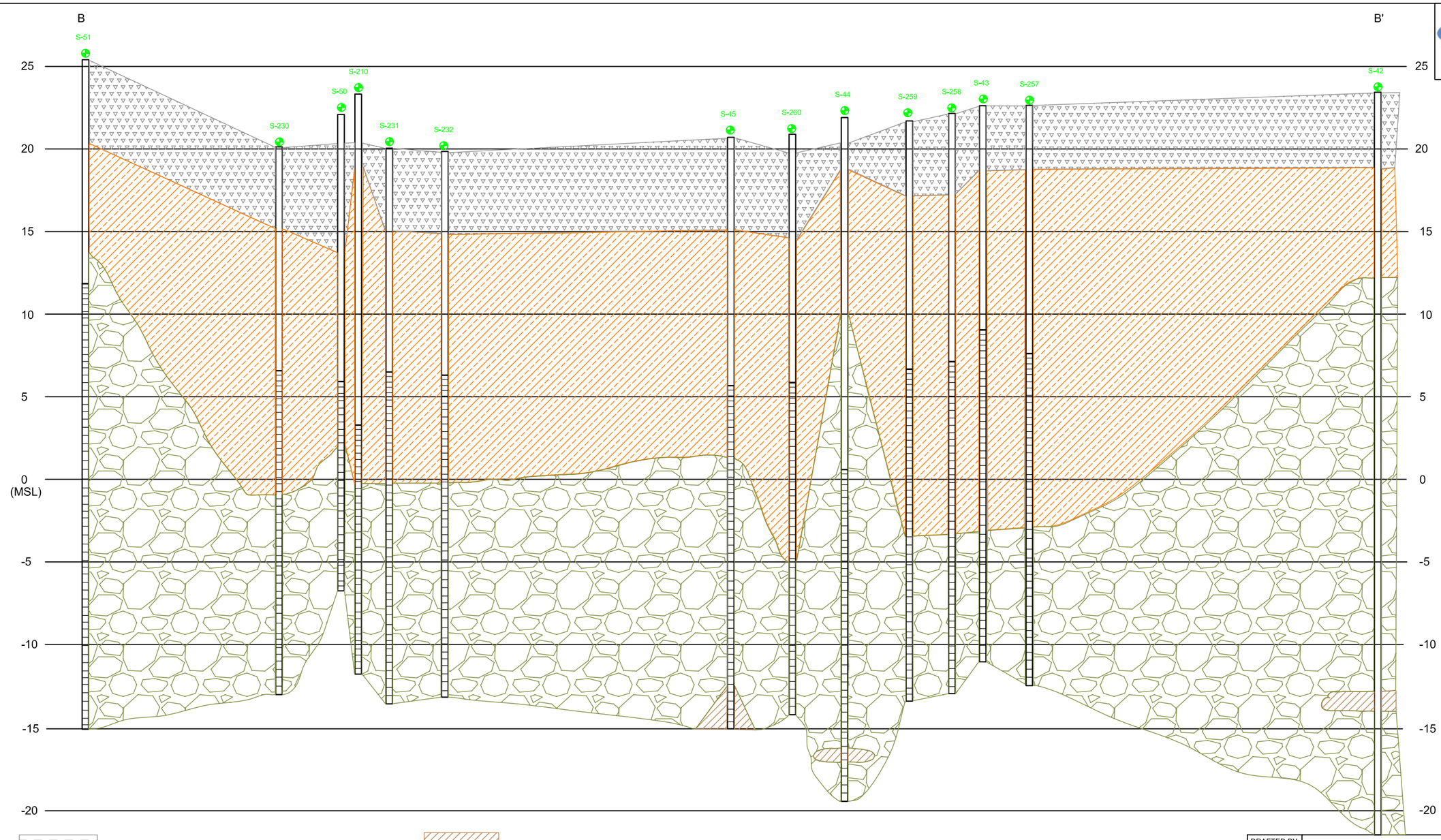
Technologies, Inc.
LEGEND
MONITORING WELL
DRAFTED BY: BB
CHECKED BY: TD
REVIEWED BY: TD
NORTH
CROSS SECTIONS
SUNOCO PHILADELPHIA REFINERY
26TH STREET SOUTH -S-50 AREA
PHILADELPHIA, PENNSYLVANIA
AQUATERRA TECHNOLOGIES, INC.
122 S. CHURCH ST, WEST CHESTER, PA 19381
SCALE:
0′
150′
DATE:
9-10-2008
FIGURE
B3 (1)



Aquaterra Technologies, Inc.

DRAFTED BY: BB	A-A' CROSS SECTION MAP		
REVIEWED BY: TD	SUNOCO PHILADELPHIA REFINERY 26TH STREET AOI-1 PHILADELPHIA, PENNSYLVANIA		
CHECKED BY: KM	AQUATERRA TECHNOLOGIES, INC. 122 S. CHURCH ST, WEST CHESTER, PA 19381		
	Horizontal Scale: 1" = 100'	DATE 12-18-2008	FIGURE B3 (2)



Aquaterra
Technologies, Inc.

DRAFTED BY: BB	B-B' CROSS SECTION MAP		
REVIEWED BY: TD	SUNOCO PHILADELPHIA REFINERY 26TH STREET AOI-1 PHILADELPHIA, PENNSYLVANIA		
CHECKED BY: KM	AQUATERRA TECHNOLOGIES, INC. 122 S. CHURCH ST, WEST CHESTER, PA 19381		
	Horizontal Scale: 1" = 100'	DATE 12-18-2008	FIGURE B3 (3)

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ELEVATION (feet)

C

C'

S-261

S-262

S-263

S-264

30
20
10
0
(MSL)
-10
-20
-30
-40
-50
-60

Precleared material and/or Fill

Alluvium
(Clay, silt and/or fine sand)

Sand and gravel or sand

Clay

S-### MONITORING WELL

DRAFTED BY: BB	C-C' CROSS SECTION MAP		
REVIEWED BY: TD	SUNOCO PHILADELPHIA REFINERY 26TH STREET AOI-1 PHILADELPHIA, PENNSYLVANIA		
CHECKED BY: KM	AQUATERRA TECHNOLOGIES, INC. 122 S. CHURCH ST, WEST CHESTER, PA 19381		
	Horizontal Scale: 1" = 150'	DATE 12-18-2008	FIGURE B3 (4)

Appendix B4
Groundwater Elevation and Analytical Results Summary Table

TABLE 1
Groundwater Gauging/Sampling Event - June 2008
26th Street South - S-50 Area (AOI-1)
Sunoco, Inc. Philadelphia Refinery

Well ID	Casing Elev (feet)	DTW	DTP	DTB	GW Elev	Benzene	Toluene	Ethylbenzene	Total Xylenes	MTBE
S-117	18.41	17.20	-	29	1.21	7,400	43	900	69	89
S-118	17.9	17.60	-	30	0.30	770	28	170	100	14
S-127	17.1	16.43	-	32	0.67	2,100	93	360	220	820
S-160	17.919	pump in well								
S-161	18.07	could not locate - lost according to Secor								
S-162	18.24	17.03	-	22	1.21	98	4	4	7	86
S-172	17.931	16.66	-	28	1.27	3,200	<10	920	3,600	300
S-173	17.788	16.52	-	32	1.27	94	4	3	4	100
S-208	20.86	19.33	-	30	1.53	17,000	900	2,100	6,100	1,300
S-209	26.9	26.33	-	39	0.57	8,400	<20	190	380	63
S-210	23.69	23.78	-	40	-0.09	34,000	5,800	470	1,400	190
S-212	18.37	17.26	-	29	1.11	110	11	35	28	34
S-214	19.84	19.24	-	35	0.60	140	18	12	19	<5
S-226	22.02	21.83	-	40	0.19	57,000	560	1,200	5,000	260
S-227	21.83	22.60	-	36	-0.77	560	55	560	970	10
S-228	21.12	21.41	-	36	-0.29	320	30	250	400	34
S-230	20.188	19.70	-	32	0.49	990	<5	17	34	<5
S-231	19.939	20.18	-	28	-0.24	33,000	170	280	1,100	<50
S-232	20.312	20.82	-	32	-0.51	180	6	41	58	11
S-255	21.91	22.88	-	38	-0.97	390	17	120	260	58
S-256	21.41	21.93	-	37	-0.52	65	14	260	380	<2
S-257	23.27	23.57	-	29	-0.30	400	86	810	1,400	<3
S-258	22.8	23.53	-	35	-0.73	750	36	300	370	<5
S-259	22.56	25.01	-	35	-2.45	600	61	650	490	8
S-260	21.7	23.62	-	35	-1.92	38	10	12	3	37
S-41	25.75	25.74	-	36	0.01	13	5	<1	3	43
S-42I	25.72	25.41	-	68	0.31	1	<1	<1	<1	<1
S-43	23.32	24.04	-	35	-0.72	930	46	180	130	6
S-44	23.48	25.64	-	40	-2.16	1,000	23	16	33	260
S-45	21.57	22.92	-	24	-1.35	11	2	<1	<1	<1
S-46	22.61	21.44	-	33	1.17	77	25	52	46	63
S-47I	22.21	21.09	-	42	1.12	20	12	1	6	70
S-50	22.48	22.06	-	29	0.42	880	2	17	7	2
S-51	25.38	23.31	-	32	2.07	160	9	<5	8	120
S-52	23.54	23.27	-	40	0.27	12	<5	<5	<5	1,300
S-95	22.99	22.47	-	31	0.52	<1	<1	<1	1	2
S-46D	15.718	14.91	-	70	0.81	46	3	2	4	<1
S-261	27.412	22.46	-	32	4.95	5	<1	3	6	<1
S-262	19.443	18.21	-	32	1.23	670	8	260	720	12
S-263	16.785	16.27	-	31	0.52	5,200	140	1,100	3,400	260
S-264	26.63	26.24	-	85	0.39	<1	<1	<1	<1	<1
S-269	tbd	21.88	-	30	-	830	200	240	2,000	72
S-270	tbd	21.70	-	30	-	1,800	200	350	1,400	15
PADEP Act 2 SHS MSC (non-res):						**5**	**1,000**	**700**	**10,000**	**20**

DTW = depth to water (measured from top of inner casing)
DTP = depth to product if present (measured from top of inner casing)
DTB = depth to bottom of well (measured from top of inner casing)
tbd - to be determined (not yet surveyed)

PADEP Act 2 SHS MSC = Pennsylvania Department of Environmental Protection Act 2 Statewide Health Standard Medium Specific Concentrations based on used aquifer, non-residential, total dissolved solids ≤2,500.

Shaded cells indicate concentrations greater than the SHS MSC.

All wells gauged on 9-June-08, samples collected between 10 & 13-June-08, with the exception of S-117 which was initially burried beneath gravel and could not be located. Upon uncovering the well, it was gauged and sampled on 6-Aug-08.

Wells S-269 and S-270 installed on 27 August 2008, and sampled on 29 August 2008.

Appendix B5
Laboratory Analytical Results

Lancaster Laboratories

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Analysis Report

ANALYTICAL RESULTS

Prepared for:

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

610-431-5733

Prepared by:

Lancaster Laboratories
2425 New Holland Pike
Lancaster, PA 17605-2425

SAMPLE GROUP

The sample group for this submittal is 1096736. Samples arrived at the laboratory on Wednesday, June 18, 2008. The PO# for this group is SUNOCO PHILLY REFINER.

Client Description	Lancaster Labs Number
S-232 Grab Water	5393345
S-231 Grab Water	5393346
S-50 Grab Water	5393347
S-210 Grab Water	5393348
S-208 Grab Water	5393349
S-46 Grab Water	5393350
S-47I Grab Water	5393351
S-46D Grab Water	5393352
S-212 Grab Water	5393353
S-173(Red Sediment) Grab Water	5393354
S-172 Grab Water	5393355
S-162 Grab Water	5393356

ELECTRONIC COPY TO	Langan	Attn: Joseph Catricks
ELECTRONIC COPY TO	SUN: Aquaterra Tech.	Attn: Tiffani Doerr
ELECTRONIC COPY TO	LLI	Attn: EDD Group

Lancaster Laboratories

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Analysis Report

Questions? Contact your Client Services Representative
Jessica A Heun at (717) 656-2300

Respectfully Submitted,

Dorothy M. Love

Dorothy M. Love
Group Leader

Lancaster Laboratories

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Analysis Report

Lancaster Laboratories Sample No. 5393345 WW Group No. 1096736

S-232 Grab Water
Philadelphia Refinery AOI-1
DUNS# COC: 185985 S-232

Collected:06/12/2008 09:00 by SS Account Number: 10132

Submitted: 06/18/2008 17:40
Reported: 06/27/2008 at 16:31
Discard: 08/27/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR232

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	11.	2.	1.	ug/l	2
05401	Benzene	71-43-2	180.	2.	1.	ug/l	2
05407	Toluene	108-88-3	6.	2.	1.	ug/l	2
05415	Ethylbenzene	100-41-4	41.	2.	1.	ug/l	2
06310	Xylene (Total)	1330-20-7	58.	2.	1.	ug/l	2

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/26/2008 00:46	Florida A Cimino	2
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/26/2008 00:46	Florida A Cimino	2

*=This limit was used in the evaluation of the final result

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Analysis Report

Lancaster Laboratories Sample No. 5393346 WW Group No. 1096736

S-231 Grab Water
Philadelphia Refinery AOI-1
DUNS# COC: 185985 S-231

Collected:06/12/2008 09:15 by SS Account Number: 10132

Submitted: 06/18/2008 17:40
Reported: 06/27/2008 at 16:31
Discard: 08/27/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR231

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	< 50.	50.	25.	ug/l	50
05401	Benzene	71-43-2	33,000.	500.	250.	ug/l	500
05407	Toluene	108-88-3	170.	50.	25.	ug/l	50
05415	Ethylbenzene	100-41-4	280.	50.	25.	ug/l	50
06310	Xylene (Total)	1330-20-7	1,100.	50.	25.	ug/l	50

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/26/2008 01:06	Florida A Cimino	50
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/26/2008 01:26	Florida A Cimino	500
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/26/2008 01:06	Florida A Cimino	50
01163	GC/MS VOA Water Prep	SW-846 5030B	2	06/26/2008 01:26	Florida A Cimino	500

*=This limit was used in the evaluation of the final result

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Analysis Report

Lancaster Laboratories Sample No. 5393347 WW Group No. 1096736

S-50 Grab Water
Philadelphia Refinery AOI-1
DUNS# COC: 185985 S-50

Collected:06/12/2008 09:25 by SS Account Number: 10132

Submitted: 06/18/2008 17:40
Reported: 06/27/2008 at 16:31
Discard: 08/27/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR050

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	2.	1.	0.5	ug/l	1
05401	Benzene	71-43-2	880.	10.	5.	ug/l	10
05407	Toluene	108-88-3	2.	1.	0.5	ug/l	1
05415	Ethylbenzene	100-41-4	17.	1.	0.5	ug/l	1
06310	Xylene (Total)	1330-20-7	7.	1.	0.5	ug/l	1

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/26/2008 01:46	Florida A Cimino	10
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/26/2008 10:44	Daniel H Heller	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/26/2008 10:44	Daniel H Heller	1
01163	GC/MS VOA Water Prep	SW-846 5030B	2	06/26/2008 01:46	Florida A Cimino	10

*=This limit was used in the evaluation of the final result

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Analysis Report

Lancaster Laboratories Sample No. 5393348 WW Group No. 1096736

S-210 Grab Water
Philadelphia Refinery AOI-1
DUNS# COC: 185985 S-210

Collected:06/12/2008 09:55 by SS Account Number: 10132

Submitted: 06/18/2008 17:40
Reported: 06/27/2008 at 16:31
Discard: 08/27/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR210

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	190.	50.	25.	ug/l	50
05401	Benzene	71-43-2	34,000.	500.	250.	ug/l	500
05407	Toluene	108-88-3	5,800.	50.	25.	ug/l	50
05415	Ethylbenzene	100-41-4	470.	50.	25.	ug/l	50
06310	Xylene (Total)	1330-20-7	1,400.	50.	25.	ug/l	50

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/26/2008 02:06	Florida A Cimino	50
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/26/2008 02:27	Florida A Cimino	500
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/26/2008 02:06	Florida A Cimino	50
01163	GC/MS VOA Water Prep	SW-846 5030B	2	06/26/2008 02:27	Florida A Cimino	500

*=This limit was used in the evaluation of the final result

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Analysis Report

Lancaster Laboratories Sample No. 5393349 WW Group No. 1096736

S-208 Grab Water
Philadelphia Refinery AOI-1
DUNS# COC: 185985 S-208

Collected:06/12/2008 10:30 by SS Account Number: 10132

Submitted: 06/18/2008 17:40
Reported: 06/27/2008 at 16:31
Discard: 08/27/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR208

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	1,300.	20.	10.	ug/l	20
05401	Benzene	71-43-2	17,000.	200.	100.	ug/l	200
05407	Toluene	108-88-3	900.	20.	10.	ug/l	20
05415	Ethylbenzene	100-41-4	2,100.	20.	10.	ug/l	20
06310	Xylene (Total)	1330-20-7	6,100.	20.	10.	ug/l	20

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/26/2008 02:47	Florida A Cimino	20
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/26/2008 03:08	Florida A Cimino	200
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/26/2008 02:47	Florida A Cimino	20
01163	GC/MS VOA Water Prep	SW-846 5030B	2	06/26/2008 03:08	Florida A Cimino	200

*=This limit was used in the evaluation of the final result

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Analysis Report

Lancaster Laboratories Sample No. 5393350 WW Group No. 1096736

S-46 Grab Water
Philadelphia Refinery AOI-1
DUNS# COC: 185985 S-46

Collected:06/12/2008 11:10 by SS Account Number: 10132

Submitted: 06/18/2008 17:40
Reported: 06/27/2008 at 16:31
Discard: 08/27/2008

SUN: Aquaterra Tech.
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West Chester PA 19381

PR046

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	63.	5.	3.	ug/l	5
05401	Benzene	71-43-2	77.	5.	3.	ug/l	5
05407	Toluene	108-88-3	25.	5.	3.	ug/l	5
05415	Ethylbenzene	100-41-4	52.	5.	3.	ug/l	5
06310	Xylene (Total)	1330-20-7	46.	5.	3.	ug/l	5

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/26/2008 01:54	Florida A Cimino	5
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/26/2008 01:54	Florida A Cimino	5

*=This limit was used in the evaluation of the final result

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Analysis Report

Lancaster Laboratories Sample No. 5393351 WW Group No. 1096736

S-47I Grab Water
Philadelphia Refinery AOI-1
DUNS# COC: 185985 S-47I

Collected:06/12/2008 11:30 by SS Account Number: 10132

Submitted: 06/18/2008 17:40
Reported: 06/27/2008 at 16:31
Discard: 08/27/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR47I

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	70.	1.	0.5	ug/l	1
05401	Benzene	71-43-2	20.	1.	0.5	ug/l	1
05407	Toluene	108-88-3	12.	1.	0.5	ug/l	1
05415	Ethylbenzene	100-41-4	1.	1.	0.5	ug/l	1
06310	Xylene (Total)	1330-20-7	6.	1.	0.5	ug/l	1

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All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/26/2008 02:21	Florida A Cimino	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/26/2008 02:21	Florida A Cimino	1

*=This limit was used in the evaluation of the final result

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Analysis Report

Lancaster Laboratories Sample No. 5393352 WW Group No. 1096736

S-46D Grab Water
Philadelphia Refinery AOI-1
DUNS# COC: 185985 S-46D

Collected:06/13/2008 11:00 by SS Account Number: 10132

Submitted: 06/18/2008 17:40
Reported: 06/27/2008 at 16:31
Discard: 08/27/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR46D

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	< 1.	1.	0.5	ug/l	1
05401	Benzene	71-43-2	46.	1.	0.5	ug/l	1
05407	Toluene	108-88-3	3.	1.	0.5	ug/l	1
05415	Ethylbenzene	100-41-4	2.	1.	0.5	ug/l	1
06310	Xylene (Total)	1330-20-7	4.	1.	0.5	ug/l	1

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/26/2008 02:48	Florida A Cimino	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/26/2008 02:48	Florida A Cimino	1

*=This limit was used in the evaluation of the final result

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Analysis Report

Lancaster Laboratories Sample No. 5393353 WW Group No. 1096736

S-212 Grab Water
Philadelphia Refinery AOI-1
DUNS# COC: 185985 S-212

Collected:06/13/2008 11:25 by SS Account Number: 10132

Submitted: 06/18/2008 17:40
Reported: 06/27/2008 at 16:31
Discard: 08/27/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR212

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	34.	1.	0.5	ug/l	1
05401	Benzene	71-43-2	110.	1.	0.5	ug/l	1
05407	Toluene	108-88-3	11.	1.	0.5	ug/l	1
05415	Ethylbenzene	100-41-4	35.	1.	0.5	ug/l	1
06310	Xylene (Total)	1330-20-7	28.	1.	0.5	ug/l	1

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/26/2008 23:02	Florida A Cimino	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/26/2008 23:02	Florida A Cimino	1

*=This limit was used in the evaluation of the final result

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Analysis Report

Lancaster Laboratories Sample No. 5393354 WW Group No. 1096736

S-173(Red Sediment) Grab Water
Philadelphia Refinery AOI-1
DUNS# COC: 185985 S-173

Collected:06/13/2008 12:45 by SS Account Number: 10132

Submitted: 06/18/2008 17:40
Reported: 06/27/2008 at 16:31
Discard: 08/27/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PRRDS

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	100.	1.	0.5	ug/l	1
05401	Benzene	71-43-2	94.	1.	0.5	ug/l	1
05407	Toluene	108-88-3	4.	1.	0.5	ug/l	1
05415	Ethylbenzene	100-41-4	3.	1.	0.5	ug/l	1
06310	Xylene (Total)	1330-20-7	4.	1.	0.5	ug/l	1

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/26/2008 03:42	Florida A Cimino	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/26/2008 03:42	Florida A Cimino	1

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Analysis Report

Lancaster Laboratories Sample No. 5393355 WW Group No. 1096736

S-172 Grab Water
Philadelphia Refinery AOI-1
DUNS# COC: 185985 S-172

Collected:06/13/2008 12:00 by SS Account Number: 10132

Submitted: 06/18/2008 17:40
Reported: 06/27/2008 at 16:31
Discard: 08/27/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR172

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	300.	10.	5.	ug/l	10
05401	Benzene	71-43-2	3,200.	100.	50.	ug/l	100
05407	Toluene	108-88-3	< 10.	10.	5.	ug/l	10
05415	Ethylbenzene	100-41-4	920.	10.	5.	ug/l	10
06310	Xylene (Total)	1330-20-7	3,600.	10.	5.	ug/l	10

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/26/2008 04:08	Florida A Cimino	10
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/26/2008 04:35	Florida A Cimino	100
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/26/2008 04:08	Florida A Cimino	10
01163	GC/MS VOA Water Prep	SW-846 5030B	2	06/26/2008 04:35	Florida A Cimino	100

*=This limit was used in the evaluation of the final result

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Analysis Report

Lancaster Laboratories Sample No. 5393356 WW Group No. 1096736

S-162 Grab Water
Philadelphia Refinery AOI-1
DUNS# COC: 185985 S-162

Collected:06/13/2008 11:35 by SS Account Number: 10132

Submitted: 06/18/2008 17:40
Reported: 06/27/2008 at 16:31
Discard: 08/27/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR173

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	86.	1.	0.5	ug/l	1
05401	Benzene	71-43-2	98.	1.	0.5	ug/l	1
05407	Toluene	108-88-3	4.	1.	0.5	ug/l	1
05415	Ethylbenzene	100-41-4	4.	1.	0.5	ug/l	1
06310	Xylene (Total)	1330-20-7	7.	1.	0.5	ug/l	1

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/26/2008 05:02	Florida A Cimino	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/26/2008 05:02	Florida A Cimino	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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Analysis Report

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1096736
Reported: 06/27/08 at 04:31 PM

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Laboratory Compliance Quality Control

Analysis Name	Blank Result	Blank LOQ**	Blank MDL	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: F081773AA	Sample number(s): 5393345-5393349								
Methyl Tertiary Butyl Ether	< 1.	1.	0.5	ug/l	103	104	73-119	2	30
Benzene	< 1.	1.	0.5	ug/l	107	109	78-119	3	30
Toluene	< 1.	1.	0.5	ug/l	104	105	85-115	1	30
Ethylbenzene	< 1.	1.	0.5	ug/l	105	105	82-119	0	30
Xylene (Total)	< 1.	1.	0.5	ug/l	102	104	83-113	1	30
Batch number: P081773AA	Sample number(s): 5393350-5393352,5393354-5393356								
Methyl Tertiary Butyl Ether	< 1.	1.	0.5	ug/l	97	99	73-119	2	30
Benzene	< 1.	1.	0.5	ug/l	97	96	78-119	1	30
Toluene	< 1.	1.	0.5	ug/l	93	93	85-115	0	30
Ethylbenzene	< 1.	1.	0.5	ug/l	91	92	82-119	1	30
Xylene (Total)	< 1.	1.	0.5	ug/l	92	91	83-113	1	30
Batch number: P081781AA	Sample number(s): 5393347								
Methyl Tertiary Butyl Ether	< 1.	1.	0.5	ug/l	96	96	73-119	1	30
Toluene	< 1.	1.	0.5	ug/l	94	94	85-115	1	30
Ethylbenzene	< 1.	1.	0.5	ug/l	92	91	82-119	1	30
Xylene (Total)	< 1.	1.	0.5	ug/l	92	90	83-113	3	30
Batch number: P081783AA	Sample number(s): 5393353								
Methyl Tertiary Butyl Ether	< 1.	1.	0.5	ug/l	90	91	73-119	1	30
Benzene	< 1.	1.	0.5	ug/l	89	92	78-119	3	30
Toluene	< 1.	1.	0.5	ug/l	87	90	85-115	3	30
Ethylbenzene	< 1.	1.	0.5	ug/l	85	88	82-119	4	30
Xylene (Total)	< 1.	1.	0.5	ug/l	84	88	83-113	5	30

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: F081773AA	Sample number(s): 5393345-5393349 UNSPK: P393210								
Methyl Tertiary Butyl Ether	105		69-127						
Benzene	112		83-128						
Toluene	111		83-127						
Ethylbenzene	110		82-129						
Xylene (Total)	107		82-130						
Batch number: P081773AA	Sample number(s): 5393350-5393352,5393354-5393356 UNSPK: P390928								
Methyl Tertiary Butyl Ether	106		69-127						
Benzene	104		83-128						
Toluene	99		83-127						

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1096736
Reported: 06/27/08 at 04:31 PM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Ethylbenzene	97		82-129						
Xylene (Total)	95		82-130						
Batch number: P081781AA	Sample number(s): 5393347 UNSPK: P393360								
Methyl Tertiary Butyl Ether	100		69-127						
Toluene	99		83-127						
Ethylbenzene	98		82-129						
Xylene (Total)	98		82-130						
Batch number: P081783AA	Sample number(s): 5393353 UNSPK: P391121								
Methyl Tertiary Butyl Ether	99		69-127						
Benzene	102		83-128						
Toluene	99		83-127						
Ethylbenzene	98		82-129						
Xylene (Total)	97		82-130						

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: UST-Unleaded Waters by 8260B
Batch number: F081773AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
5393345	90	87	91	95
5393346	85	84	88	88
5393348	88	89	90	92
5393349	87	87	91	93
Blank	89	89	89	90
LCS	88	87	90	94
LCSD	90	91	88	92
MS	90	92	90	95
Limits:	80-116	77-113	80-113	78-113

Analysis Name: UST-Unleaded Waters by 8260B
Batch number: P081773AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
5393350	88	84	95	93
5393351	89	87	93	93
5393352	91	83	93	86
5393354	91	85	93	93
5393355	87	86	95	92
5393356	90	87	94	96
Blank	92	87	93	85
LCS	90	92	92	88
LCSD	93	90	93	88
MS	94	89	93	89

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1096736
Reported: 06/27/08 at 04:31 PM

Surrogate Quality Control

Limits:	80-116	77-113	80-113	78-113

Analysis Name: UST-Unleaded Waters by 8260B
Batch number: P081781AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
5393347	85	82	93	87
Blank	92	88	94	85
LCS	92	92	94	89
LCSD	92	88	93	89
MS	92	88	90	89
Limits:	80-116	77-113	80-113	78-113

Analysis Name: UST-Unleaded Waters by 8260B
Batch number: P081783AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
5393353	90	87	93	98
Blank	91	89	92	84
LCS	93	90	90	88
LCSD	93	90	92	88
MS	92	89	91	90
Limits:	80-116	77-113	80-113	78-113

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only
Acct. # 10132 Group# 1096736 Sample # 5393345 - 57

COC # 185985

Please print. Instructions on reverse side correspond with circled numbers. cooler temp 4.0-5.5°C

① Client: SUN-AQUATERRA Acct. #:
Project Name/#: PHILA REF AOI-1 PWSID #:
Project Manager: T. DOERR P.O.#:
Sampler: S. SYKES Quote #:
Name of state where samples were collected: PA

For Lab Use Only
FSC:
SCR#:

Preservation Codes
H=HCl T=Thiosulfate
N=HNO_3 B=NaOH
S=H_2SO_4 O=Other

⑤ Analyses Requested — Preservation Codes

② Sample Identification	Date Collected	Time Collected	③ Grab	Composite	Matrix: Soil	Water (☐ Potable ☐ NPDES)	Other	④ Total # of Containers	BTEX + MTBE (PAVE 8260B)									Remarks	⑥ Temperature of samples upon receipt (if requested)
S-232	6/12/08	900	X			X		3	X										
S-231	|	415	X			X		3	X										
S-50	|	925	X			X		3	X										
S-210	|	955	X			X		3	X										
S-208	|	1030	X			X		3	X										
S-46	|	1110	X			X		3	X										
S-47I	|	1130	X			X		3	X										

⑦ **Turnaround Time Requested** (TAT) (please circle): Normal (circled) Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax E-mail
Phone #: Fax #:
E-mail address:

⑧ **Data Package Options** (please circle if required)
Type I (validation/NJ Reg) TX TRRP-13
Type II (Tier II) MA MCP CT RCP
Type III (Reduced NJ)
Type IV (CLP SOW)
Type VI (Raw Data Only)

SDG Complete? Yes No
Site-specific QC (MS/MSD/Dup)? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Internal COC Required? Yes / No

⑨

Relinquished by:	Date	Time	Received by:	Date	Time
[signature] / AQUATERRA	6/13/08	1400	AQUATERRA FRIDGE	6/13/08	1400
AT FRIDGE	6/18/08	1140	[signature] Aquaterra	6/18/08	1140
[signature] Aquaterra	6/18/08	1140	P. Lefever	6/18/08	1140
P. Lefever	6/18/08	1740			
			[signature]	6/18/08	1740

Lancaster Laboratories, Inc., 2425 New Holland Pike, Lancaster, PA 17601 (717) 656-2300 Fax: (717) 656-6766
Copies: White and yellow should accompany samples to Lancaster Laboratories. The pink copy should be retained by the client.

2102.03

Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1096736 Sample # 5393345-57

COC # 185986

Please print. Instructions on reverse side correspond with circled numbers. cooler temp 4.0-5.5°C

(1) Client: SUN-AQUATERRA Acct. #:

Project Name/#: PHILA REF AOI-1 PWSID #:

Project Manager: T. DOERR P.O.#:

Sampler: S. SYKES Quote #:

Name of state where samples were collected: PA

For Lab Use Only
FSC:
SCR#:

(5) Analyses Requested — Preservation Codes

Preservation Codes: H=HCl T=Thiosulfate N=HNO_3 B=NaOH S=H_2SO_4 O=Other

(2) Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix: Soil	Water	Other	(4) Total # of Containers	BTEX+MTBE (PAV6 8260B)									Remarks	(6) Temperature of samples upon receipt (if requested)
S-46D	6/13/08	1100	X			X		3	X										
S-212	|	1125	X			X		3	X										
S-162	|	1135	X			X		3	X									VIALS LABELED AS S-173 TS 6-19-08	
S-172	|	1200	X			X		3	X										
S-173	|	1245	X			X		3	X									RED SEDIMENT TS 6-19-08	

Matrix: ☐ Potable ☐ NPDES — Check if Applicable

(7) **Turnaround Time Requested** (TAT) (please circle): Normal (circled) Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax E-mail
Phone #: Fax #:
E-mail address:

(8) **Data Package Options** (please circle if required)
Type I (validation/NJ Reg) TX TRRP-13
Type II (Tier II) MA MCP CT RCP
Type III (Reduced NJ)
Type IV (CLP SOW)
Type VI (Raw Data Only)

SDG Complete? Yes No

Site-specific QC (MS/MSD/Dup)? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Internal COC Required? Yes / No

(9)

Relinquished by:	Date	Time	Received by:	Date	Time
[signature] / AQUATERRA	6/13/08	1400	AQUATERRA FRIDGE	6/13/08	1400
AT FRIDGE	6/18/08	1140	[signature] Aquaterra	6/18/08	1140
[signature] Aquaterra	6/18/08	1140	P. Lefever	6/18/08	1140
P. Lefever	6/18/08	1740			
			Katie Northrop	6/18/08	17:40

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Copies: White and yellow should accompany samples to Lancaster Laboratories. The pink copy should be retained by the client.

2102.03

Lancaster Laboratories
Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib >5 um/ml**	fibers greater than 5 microns in length per ml

< less than – The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million – One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quatitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
J	Estimated value
N	Presumptive evidence of a compound (TICs only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike amount not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Analytical test results for methods listed on the laboratories' accreditation scope meet all requirements of NELAC unless otherwise noted under the individual analysis.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

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Analysis Report

REVISED

ANALYTICAL RESULTS

Prepared for:

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

610-431-5733

Prepared by:

Lancaster Laboratories
2425 New Holland Pike
Lancaster, PA 17605-2425

SAMPLE GROUP

The sample group for this submittal is 1095800. Samples arrived at the laboratory on Thursday, June 12, 2008. The PO# for this group is PHILADELPHIA.

Client Description	Lancaster Labs Number
S-95 Grab Water	5387885
S-264 Grab Water	5387886
S-42I Grab Water	5387887
S-41 Grab Water	5387888
S-257 Grab Water	5387889
S-43 Grab Water	5387890
S-258 Grab Water	5387891
S-259 Grab Water	5387892
S-255 Grab Water	5387893
S-228 Grab Water	5387894
S-227 Grab Water	5387895
S-256 Grab Water	5387896
S-44 Grab Water	5387897
S-214 Grab Water	5387898
S-118 Grab Water	5387899
S-263 Grab Water	5387900
S-262 Grab Water	5387901
S-261 Grab Water	5387902
S-209 Grab Water	5387903
S-52 Grab Water	5387904
S-51 Grab Water	5387905
S-45 Grab Water	5387906
S-260 Grab Water	5387907
S-226 Grab Water	5387908
S-127 Grab Water	5387909

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Analysis Report

REVISED

S-230 Grab Water 5387910

ELECTRONIC COPY TO	Langan	Attn: Joseph Catricks
ELECTRONIC COPY TO	SUN: Aquaterra Tech.	Attn: Tiffani Doerr

Questions? Contact your Client Services Representative
Jessica A Heun at (717) 656-2300

Respectfully Submitted,

Christine Dulaney
Senior Specialist

Lancaster Laboratories

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Analysis Report

REVISED

Lancaster Laboratories Sample No. 5387885 WW Group No. 1095800

S-95 Grab Water
Philadelphia Refinery AOI-1
COC: 177768 S-95

Collected:06/10/2008 09:00 by SS Account Number: 10132

Submitted: 06/12/2008 15:15
Reported: 07/08/2008 at 08:13
Discard: 09/07/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR095

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	2.	1.	0.5	ug/l	1
05401	Benzene	71-43-2	< 1.	1.	0.5	ug/l	1
05407	Toluene	108-88-3	< 1.	1.	0.5	ug/l	1
05415	Ethylbenzene	100-41-4	< 1.	1.	0.5	ug/l	1
06310	Xylene (Total)	1330-20-7	1.	1.	0.5	ug/l	1

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/19/2008 06:14	Florida A Cimino	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/19/2008 06:14	Florida A Cimino	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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Analysis Report

REVISED

Lancaster Laboratories Sample No. 5387886 WW Group No. 1095800

S-264 Grab Water
Philadelphia Refinery AOI-1
COC: 177768 S-264

Collected:06/10/2008 09:45 by SS Account Number: 10132

Submitted: 06/12/2008 15:15
Reported: 07/08/2008 at 08:13
Discard: 09/07/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR264

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	< 1.	1.	0.5	ug/l	1
05401	Benzene	71-43-2	< 1.	1.	0.5	ug/l	1
05407	Toluene	108-88-3	< 1.	1.	0.5	ug/l	1
05415	Ethylbenzene	100-41-4	< 1.	1.	0.5	ug/l	1
06310	Xylene (Total)	1330-20-7	< 1.	1.	0.5	ug/l	1

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/19/2008 06:35	Florida A Cimino	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/19/2008 06:35	Florida A Cimino	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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Analysis Report

REVISED

Lancaster Laboratories Sample No. 5387887 WW Group No. 1095800

S-42I Grab Water
Philadelphia Refinery AOI-1
COC: 177768 S-42I

Collected:06/10/2008 10:15 by SS Account Number: 10132

Submitted: 06/12/2008 15:15
Reported: 07/08/2008 at 08:13
Discard: 09/07/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR42I

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	< 1.	1.	0.5	ug/l	1
05401	Benzene	71-43-2	1.	1.	0.5	ug/l	1
05407	Toluene	108-88-3	< 1.	1.	0.5	ug/l	1
05415	Ethylbenzene	100-41-4	< 1.	1.	0.5	ug/l	1
06310	Xylene (Total)	1330-20-7	< 1.	1.	0.5	ug/l	1

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/19/2008 06:56	Florida A Cimino	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/19/2008 06:56	Florida A Cimino	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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Analysis Report

REVISED

Lancaster Laboratories Sample No. 5387888 WW Group No. 1095800

S-41 Grab Water
Philadelphia Refinery AOI-1
COC: 177768 S-41

Collected:06/10/2008 10:30 by SS Account Number: 10132

Submitted: 06/12/2008 15:15
Reported: 07/08/2008 at 08:13
Discard: 09/07/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR041

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	43.	1.	0.5	ug/l	1
05401	Benzene	71-43-2	13.	1.	0.5	ug/l	1
05407	Toluene	108-88-3	5.	1.	0.5	ug/l	1
05415	Ethylbenzene	100-41-4	< 1.	1.	0.5	ug/l	1
06310	Xylene (Total)	1330-20-7	3.	1.	0.5	ug/l	1

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/19/2008 07:17	Florida A Cimino	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/19/2008 07:17	Florida A Cimino	1

*=This limit was used in the evaluation of the final result

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Analysis Report

REVISED

Lancaster Laboratories Sample No. 5387889 WW Group No. 1095800

S-257 Grab Water
Philadelphia Refinery AOI-1
COC: 177768 S-257

Collected:06/10/2008 10:45 by SS Account Number: 10132

Submitted: 06/12/2008 15:15
Reported: 07/08/2008 at 08:13
Discard: 09/07/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR257

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	< 3.	3.	1.	ug/l	2.5
05401	Benzene	71-43-2	400.	3.	1.	ug/l	2.5
05407	Toluene	108-88-3	86.	3.	1.	ug/l	2.5
05415	Ethylbenzene	100-41-4	810.	25.	13.	ug/l	25
06310	Xylene (Total)	1330-20-7	1,400.	25.	13.	ug/l	25

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/19/2008 07:38	Florida A Cimino	2.5
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/19/2008 07:59	Florida A Cimino	25
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/19/2008 07:38	Florida A Cimino	2.5
01163	GC/MS VOA Water Prep	SW-846 5030B	2	06/19/2008 07:59	Florida A Cimino	25

*=This limit was used in the evaluation of the final result

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Analysis Report

REVISED

Lancaster Laboratories Sample No. 5387890 WW Group No. 1095800

S-43 Grab Water
Philadelphia Refinery AOI-1
COC: 177768 S-43

Collected:06/10/2008 11:10 by SS Account Number: 10132

Submitted: 06/12/2008 15:15
Reported: 07/08/2008 at 08:13
Discard: 09/07/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR043

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	6.	4.	2.	ug/l	4
05401	Benzene	71-43-2	930.	20.	10.	ug/l	20
05407	Toluene	108-88-3	46.	4.	2.	ug/l	4
05415	Ethylbenzene	100-41-4	180.	4.	2.	ug/l	4
06310	Xylene (Total)	1330-20-7	130.	4.	2.	ug/l	4

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/20/2008 18:10	Anita M Dale	4
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/20/2008 18:37	Anita M Dale	20
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/20/2008 18:10	Anita M Dale	4
01163	GC/MS VOA Water Prep	SW-846 5030B	2	06/20/2008 18:37	Anita M Dale	20

*=This limit was used in the evaluation of the final result

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Analysis Report

REVISED

Lancaster Laboratories Sample No. 5387891 WW Group No. 1095800

S-258 Grab Water
Philadelphia Refinery AOI-1
COC: 177768 S-258

Collected:06/10/2008 11:35 by SS Account Number: 10132

Submitted: 06/12/2008 15:15 SUN: Aquaterra Tech.
Reported: 07/08/2008 at 08:13 PO Box 744
Discard: 09/07/2008 West Chester PA 19381

PR258

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	< 5.	5.	3.	ug/l	5
05401	Benzene	71-43-2	750.	5.	3.	ug/l	5
05407	Toluene	108-88-3	36.	5.	3.	ug/l	5
05415	Ethylbenzene	100-41-4	300.	5.	3.	ug/l	5
06310	Xylene (Total)	1330-20-7	370.	5.	3.	ug/l	5

The reporting limits for the GC/MS volatile compounds were raised due to the level of target and non-target compounds.

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/20/2008 19:04	Anita M Dale	5
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/20/2008 19:04	Anita M Dale	5

*=This limit was used in the evaluation of the final result

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Analysis Report

REVISED

Lancaster Laboratories Sample No. 5387892 WW Group No. 1095800

S-259 Grab Water
Philadelphia Refinery AOI-1
COC: 177768 S-259

Collected:06/10/2008 12:00 by SS Account Number: 10132

Submitted: 06/12/2008 15:15
Reported: 07/08/2008 at 08:13
Discard: 09/07/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR259

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	8.	5.	3.	ug/l	5
05401	Benzene	71-43-2	600.	5.	3.	ug/l	5
05407	Toluene	108-88-3	61.	5.	3.	ug/l	5
05415	Ethylbenzene	100-41-4	650.	5.	3.	ug/l	5
06310	Xylene (Total)	1330-20-7	490.	5.	3.	ug/l	5

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/23/2008 18:29	Anita M Dale	5
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/23/2008 18:29	Anita M Dale	5

*=This limit was used in the evaluation of the final result

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Analysis Report

REVISED

Lancaster Laboratories Sample No. 5387893 WW Group No. 1095800

S-255 Grab Water
Philadelphia Refinery AOI-1
COC: 177768 S-255

Collected:06/10/2008 13:20 by SS Account Number: 10132

Submitted: 06/12/2008 15:15
Reported: 07/08/2008 at 08:13
Discard: 09/07/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR255

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	58.	4.	2.	ug/l	4
05401	Benzene	71-43-2	390.	4.	2.	ug/l	4
05407	Toluene	108-88-3	17.	4.	2.	ug/l	4
05415	Ethylbenzene	100-41-4	120.	4.	2.	ug/l	4
06310	Xylene (Total)	1330-20-7	260.	4.	2.	ug/l	4

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/23/2008 18:49	Anita M Dale	4
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/23/2008 18:49	Anita M Dale	4

*=This limit was used in the evaluation of the final result

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Analysis Report

REVISED

Lancaster Laboratories Sample No. 5387894 WW Group No. 1095800

S-228 Grab Water
Philadelphia Refinery AOI-1
COC: 177768 S-228

Collected:06/10/2008 13:50 by SS Account Number: 10132

Submitted: 06/12/2008 15:15
Reported: 07/08/2008 at 08:13
Discard: 09/07/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR228

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	34.	2.	1.	ug/l	2
05401	Benzene	71-43-2	320.	2.	1.	ug/l	2
05407	Toluene	108-88-3	30.	2.	1.	ug/l	2
05415	Ethylbenzene	100-41-4	250.	2.	1.	ug/l	2
06310	Xylene (Total)	1330-20-7	400.	2.	1.	ug/l	2

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/23/2008 10:51	Anita M Dale	2
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/23/2008 10:51	Anita M Dale	2

*=This limit was used in the evaluation of the final result

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Analysis Report

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Lancaster Laboratories Sample No. 5387895 WW Group No. 1095800

S-227 Grab Water
Philadelphia Refinery AOI-1
COC: 177768 S-227

Collected:06/10/2008 14:15 by SS Account Number: 10132

Submitted: 06/12/2008 15:15
Reported: 07/08/2008 at 08:13
Discard: 09/07/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR227

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	10.	4.	2.	ug/l	4
05401	Benzene	71-43-2	560.	4.	2.	ug/l	4
05407	Toluene	108-88-3	55.	4.	2.	ug/l	4
05415	Ethylbenzene	100-41-4	560.	4.	2.	ug/l	4
06310	Xylene (Total)	1330-20-7	970.	4.	2.	ug/l	4

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/23/2008 11:12	Anita M Dale	4
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/23/2008 11:12	Anita M Dale	4

*=This limit was used in the evaluation of the final result

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Analysis Report

REVISED

Lancaster Laboratories Sample No. 5387896 WW Group No. 1095800

S-256 Grab Water
Philadelphia Refinery AOI-1
COC: 177768 S-256

Collected:06/10/2008 14:45 by SS Account Number: 10132

Submitted: 06/12/2008 15:15
Reported: 07/08/2008 at 08:13
Discard: 09/07/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR256

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	< 2.	2.	1.	ug/l	2
05401	Benzene	71-43-2	65.	2.	1.	ug/l	2
05407	Toluene	108-88-3	14.	2.	1.	ug/l	2
05415	Ethylbenzene	100-41-4	260.	2.	1.	ug/l	2
06310	Xylene (Total)	1330-20-7	380.	2.	1.	ug/l	2

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/23/2008 12:58	Anita M Dale	2
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/23/2008 12:58	Anita M Dale	2

*=This limit was used in the evaluation of the final result

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Analysis Report

REVISED

Lancaster Laboratories Sample No. 5387897 WW Group No. 1095800

S-44 Grab Water
Philadelphia Refinery AOI-1
COC: 177768 S-44

Collected:06/10/2008 15:05 by SS Account Number: 10132

Submitted: 06/12/2008 15:15
Reported: 07/08/2008 at 08:13
Discard: 09/07/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR044

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	260.	5.	3.	ug/l	5
05401	Benzene	71-43-2	1,000.	25.	13.	ug/l	25
05407	Toluene	108-88-3	23.	5.	3.	ug/l	5
05415	Ethylbenzene	100-41-4	16.	5.	3.	ug/l	5
06310	Xylene (Total)	1330-20-7	33.	5.	3.	ug/l	5

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/23/2008 13:19	Anita M Dale	5
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/23/2008 13:39	Anita M Dale	25
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/23/2008 13:19	Anita M Dale	5
01163	GC/MS VOA Water Prep	SW-846 5030B	2	06/23/2008 13:39	Anita M Dale	25

*=This limit was used in the evaluation of the final result

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Analysis Report

REVISED

Lancaster Laboratories Sample No. 5387898 WW Group No. 1095800

S-214 Grab Water
Philadelphia Refinery AOI-1
COC: 177768 S-214

Collected:06/11/2008 09:30 by SS Account Number: 10132

Submitted: 06/12/2008 15:15
Reported: 07/08/2008 at 08:13
Discard: 09/07/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR214

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	< 5.	5.	3.	ug/l	5
05401	Benzene	71-43-2	140.	5.	3.	ug/l	5
05407	Toluene	108-88-3	18.	5.	3.	ug/l	5
05415	Ethylbenzene	100-41-4	12.	5.	3.	ug/l	5
06310	Xylene (Total)	1330-20-7	19.	5.	3.	ug/l	5

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/23/2008 14:01	Anita M Dale	5
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/23/2008 14:01	Anita M Dale	5

*=This limit was used in the evaluation of the final result

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Analysis Report

REVISED

Lancaster Laboratories Sample No. 5387899 WW Group No. 1095800

S-118 Grab Water
Philadelphia Refinery AOI-1
COC: 177768 S-118

Collected:06/11/2008 10:25 by SS Account Number: 10132

Submitted: 06/12/2008 15:15
Reported: 07/08/2008 at 08:13
Discard: 09/07/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR118

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	14.	5.	3.	ug/l	5
05401	Benzene	71-43-2	770.	5.	3.	ug/l	5
05407	Toluene	108-88-3	28.	5.	3.	ug/l	5
05415	Ethylbenzene	100-41-4	170.	5.	3.	ug/l	5
06310	Xylene (Total)	1330-20-7	100.	5.	3.	ug/l	5

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/23/2008 14:21	Anita M Dale	5
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/23/2008 14:21	Anita M Dale	5

*=This limit was used in the evaluation of the final result

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Analysis Report

REVISED

Lancaster Laboratories Sample No. 5387900 WW Group No. 1095800

S-263 Grab Water
Philadelphia Refinery AOI-1
COC: 177768 S-263

Collected:06/11/2008 10:00 by SS Account Number: 10132

Submitted: 06/12/2008 15:15
Reported: 07/08/2008 at 08:13
Discard: 09/07/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR263

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	260.	20.	10.	ug/l	20
05401	Benzene	71-43-2	5,200.	100.	50.	ug/l	100
05407	Toluene	108-88-3	140.	20.	10.	ug/l	20
05415	Ethylbenzene	100-41-4	1,100.	20.	10.	ug/l	20
06310	Xylene (Total)	1330-20-7	3,400.	20.	10.	ug/l	20

Preservation requirements were not met. The vial submitted for volatile analysis did not have a pH < 2 at the time of analysis. Due to the volatile nature of the analytes, it is not appropriate for the laboratory to adjust the pH at the time of sample receipt. The pH of this sample was pH = 5.

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/24/2008 01:49	Florida A Cimino	20
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/24/2008 02:09	Florida A Cimino	100
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/24/2008 01:49	Florida A Cimino	20
01163	GC/MS VOA Water Prep	SW-846 5030B	2	06/24/2008 02:09	Florida A Cimino	100

*=This limit was used in the evaluation of the final result

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Analysis Report

REVISED

Lancaster Laboratories Sample No. 5387901 WW Group No. 1095800

S-262 Grab Water
Philadelphia Refinery AOI-1
COC: 177768 S-262

Collected:06/11/2008 10:50 by SS Account Number: 10132

Submitted: 06/12/2008 15:15
Reported: 07/08/2008 at 08:13
Discard: 09/07/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR262

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	12.	5.	3.	ug/l	5
05401	Benzene	71-43-2	670.	5.	3.	ug/l	5
05407	Toluene	108-88-3	8.	5.	3.	ug/l	5
05415	Ethylbenzene	100-41-4	260.	5.	3.	ug/l	5
06310	Xylene (Total)	1330-20-7	720.	5.	3.	ug/l	5

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/19/2008 03:17	Florida A Cimino	5
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/19/2008 03:17	Florida A Cimino	5

*=This limit was used in the evaluation of the final result

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Analysis Report

REVISED

Lancaster Laboratories Sample No. 5387902 WW Group No. 1095800

S-261 Grab Water
Philadelphia Refinery AOI-1
COC: 177768 S-261

Collected:06/11/2008 11:35 by SS Account Number: 10132

Submitted: 06/12/2008 15:15
Reported: 07/08/2008 at 08:13
Discard: 09/07/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR261

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	< 1.	1.	0.5	ug/l	1
05401	Benzene	71-43-2	5.	1.	0.5	ug/l	1
05407	Toluene	108-88-3	< 1.	1.	0.5	ug/l	1
05415	Ethylbenzene	100-41-4	3.	1.	0.5	ug/l	1
06310	Xylene (Total)	1330-20-7	6.	1.	0.5	ug/l	1

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/19/2008 03:59	Florida A Cimino	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/19/2008 03:59	Florida A Cimino	1

*=This limit was used in the evaluation of the final result

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Analysis Report

REVISED

Lancaster Laboratories Sample No. 5387903 WW Group No. 1095800

S-209 Grab Water
Philadelphia Refinery AOI-1
COC: 177768 S-209

Collected:06/11/2008 12:00 by SS Account Number: 10132

Submitted: 06/12/2008 15:15
Reported: 07/08/2008 at 08:13
Discard: 09/07/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR209

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	63.	20.	10.	ug/l	20
05401	Benzene	71-43-2	8,400.	100.	50.	ug/l	100
05407	Toluene	108-88-3	< 20.	20.	10.	ug/l	20
05415	Ethylbenzene	100-41-4	190.	20.	10.	ug/l	20
06310	Xylene (Total)	1330-20-7	380.	20.	10.	ug/l	20

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/19/2008 04:20	Florida A Cimino	20
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/19/2008 04:41	Florida A Cimino	100
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/19/2008 04:20	Florida A Cimino	20
01163	GC/MS VOA Water Prep	SW-846 5030B	2	06/19/2008 04:41	Florida A Cimino	100

*=This limit was used in the evaluation of the final result

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Analysis Report

REVISED

Lancaster Laboratories Sample No. 5387904 WW Group No. 1095800

S-52 Grab Water
Philadelphia Refinery AOI-1
COC: 177768 S-52

Collected:06/11/2008 12:25 by SS Account Number: 10132

Submitted: 06/12/2008 15:15
Reported: 07/08/2008 at 08:13
Discard: 09/07/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR052

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	1,300.	5.	3.	ug/l	5
05401	Benzene	71-43-2	12.	5.	3.	ug/l	5
05407	Toluene	108-88-3	< 5.	5.	3.	ug/l	5
05415	Ethylbenzene	100-41-4	< 5.	5.	3.	ug/l	5
06310	Xylene (Total)	1330-20-7	< 5.	5.	3.	ug/l	5

The reporting limits for the GC/MS volatile compounds were raised due to the level of non-target compounds.

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/19/2008 05:02	Florida A Cimino	5
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/19/2008 05:02	Florida A Cimino	5

*=This limit was used in the evaluation of the final result

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Analysis Report

REVISED

Lancaster Laboratories Sample No. 5387905 WW Group No. 1095800

S-51 Grab Water
Philadelphia Refinery AOI-1
COC: 177768 S-51

Collected:06/11/2008 13:00 by SS Account Number: 10132

Submitted: 06/12/2008 15:15
Reported: 07/08/2008 at 08:13
Discard: 09/07/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR051

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	120.	5.	3.	ug/l	5
05401	Benzene	71-43-2	160.	5.	3.	ug/l	5
05407	Toluene	108-88-3	9.	5.	3.	ug/l	5
05415	Ethylbenzene	100-41-4	< 5.	5.	3.	ug/l	5
06310	Xylene (Total)	1330-20-7	8.	5.	3.	ug/l	5

The reporting limits for the GC/MS volatile compounds were raised due to the level of non-target compounds.

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/19/2008 05:23	Florida A Cimino	5
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/19/2008 05:23	Florida A Cimino	5

*=This limit was used in the evaluation of the final result

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Analysis Report

REVISED

Lancaster Laboratories Sample No. 5387906 WW Group No. 1095800

S-45 Grab Water
Philadelphia Refinery AOI-1
COC: 177768 S-45

Collected:06/11/2008 13:15 by SS Account Number: 10132

Submitted: 06/12/2008 15:15
Reported: 07/08/2008 at 08:13
Discard: 09/07/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR045

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	< 1.	1.	0.5	ug/l	1
05401	Benzene	71-43-2	11.	1.	0.5	ug/l	1
05407	Toluene	108-88-3	2.	1.	0.5	ug/l	1
05415	Ethylbenzene	100-41-4	< 1.	1.	0.5	ug/l	1
06310	Xylene (Total)	1330-20-7	< 1.	1.	0.5	ug/l	1

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/20/2008 22:31	Kelly E Brickley	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/20/2008 22:31	Kelly E Brickley	1

*=This limit was used in the evaluation of the final result

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Analysis Report

REVISED

Lancaster Laboratories Sample No. 5387907 WW Group No. 1095800

S-260 Grab Water
Philadelphia Refinery AOI-1
COC: 177768 S-260

Collected:06/11/2008 13:50 by SS Account Number: 10132

Submitted: 06/12/2008 15:15
Reported: 07/08/2008 at 08:13
Discard: 09/07/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR260

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	37.	4.	2.	ug/l	4
05401	Benzene	71-43-2	38.	4.	2.	ug/l	4
05407	Toluene	108-88-3	10.	4.	2.	ug/l	4
05415	Ethylbenzene	100-41-4	12.	4.	2.	ug/l	4
06310	Xylene (Total)	1330-20-7	6.	4.	2.	ug/l	4

The reporting limits for the GC/MS volatile compounds were raised due to the level of non-target compounds.

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/19/2008 05:44	Florida A Cimino	4
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/19/2008 05:44	Florida A Cimino	4

*=This limit was used in the evaluation of the final result

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Analysis Report

REVISED

Lancaster Laboratories Sample No. 5387908 WW Group No. 1095800

S-226 Grab Water
Philadelphia Refinery AOI-1
COC: 177768 S-226

Collected:06/11/2008 14:30 by SS Account Number: 10132

Submitted: 06/12/2008 15:15
Reported: 07/08/2008 at 08:13
Discard: 09/07/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR226

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	260.	100.	50.	ug/l	100
05401	Benzene	71-43-2	57,000.	500.	250.	ug/l	500
05407	Toluene	108-88-3	560.	100.	50.	ug/l	100
05415	Ethylbenzene	100-41-4	1,200.	100.	50.	ug/l	100
06310	Xylene (Total)	1330-20-7	5,000.	100.	50.	ug/l	100

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/19/2008 06:05	Florida A Cimino	100
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/19/2008 06:26	Florida A Cimino	500
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/19/2008 06:05	Florida A Cimino	100
01163	GC/MS VOA Water Prep	SW-846 5030B	2	06/19/2008 06:26	Florida A Cimino	500

*=This limit was used in the evaluation of the final result

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Analysis Report

REVISED

Lancaster Laboratories Sample No. 5387909 WW Group No. 1095800

S-127 Grab Water
Philadelphia Refinery AOI-1
COC: 177768 S-127

Collected:06/11/2008 15:00 by SS Account Number: 10132

Submitted: 06/12/2008 15:15
Reported: 07/08/2008 at 08:13
Discard: 09/07/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR127

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	820.	10.	5.	ug/l	10
05401	Benzene	71-43-2	2,100.	50.	25.	ug/l	50
05407	Toluene	108-88-3	93.	10.	5.	ug/l	10
05415	Ethylbenzene	100-41-4	360.	10.	5.	ug/l	10
06310	Xylene (Total)	1330-20-7	220.	10.	5.	ug/l	10

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/19/2008 06:47	Florida A Cimino	10
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/19/2008 07:08	Florida A Cimino	50
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/19/2008 06:47	Florida A Cimino	10
01163	GC/MS VOA Water Prep	SW-846 5030B	2	06/19/2008 07:08	Florida A Cimino	50

*=This limit was used in the evaluation of the final result

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Analysis Report

REVISED

Lancaster Laboratories Sample No. 5387910 WW Group No. 1095800

S-230 Grab Water
Philadelphia Refinery AOI-1
COC: 177768 S-230

Collected:06/11/2008 15:20 by SS Account Number: 10132

Submitted: 06/12/2008 15:15
Reported: 07/08/2008 at 08:13
Discard: 09/07/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR230

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	< 5.	5.	3.	ug/l	5
05401	Benzene	71-43-2	990.	5.	3.	ug/l	5
05407	Toluene	108-88-3	< 5.	5.	3.	ug/l	5
05415	Ethylbenzene	100-41-4	17.	5.	3.	ug/l	5
06310	Xylene (Total)	1330-20-7	34.	5.	3.	ug/l	5

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	06/19/2008 07:29	Florida A Cimino	5
01163	GC/MS VOA Water Prep	SW-846 5030B	1	06/19/2008 07:29	Florida A Cimino	5

*=This limit was used in the evaluation of the final result

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Analysis Report

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1095800
Reported: 07/08/08 at 08:13 AM

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Laboratory Compliance Quality Control

Analysis Name	Blank Result	Blank LOQ**	Blank MDL	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: F081703AA	Sample number(s): 5387885-5387889								
Methyl Tertiary Butyl Ether	< 1.	1.	0.5	ug/l	100		73-119		
Benzene	< 1.	1.	0.5	ug/l	104		78-119		
Toluene	< 1.	1.	0.5	ug/l	106		85-115		
Ethylbenzene	< 1.	1.	0.5	ug/l	106		82-119		
Xylene (Total)	< 1.	1.	0.5	ug/l	107		83-113		
Batch number: F081704AA	Sample number(s): 5387901-5387905,5387907-5387910								
Methyl Tertiary Butyl Ether	< 1.	1.	0.5	ug/l	98		73-119		
Benzene	< 1.	1.	0.5	ug/l	97		78-119		
Toluene	< 1.	1.	0.5	ug/l	97		85-115		
Ethylbenzene	< 1.	1.	0.5	ug/l	96		82-119		
Xylene (Total)	< 1.	1.	0.5	ug/l	98		83-113		
Batch number: F081751AA	Sample number(s): 5387892-5387899								
Methyl Tertiary Butyl Ether	< 1.	1.	0.5	ug/l	95		73-119		
Benzene	< 1.	1.	0.5	ug/l	98		78-119		
Toluene	< 1.	1.	0.5	ug/l	97		85-115		
Ethylbenzene	< 1.	1.	0.5	ug/l	94		82-119		
Xylene (Total)	< 1.	1.	0.5	ug/l	95		83-113		
Batch number: F081754AA	Sample number(s): 5387900								
Methyl Tertiary Butyl Ether	< 1.	1.	0.5	ug/l	97	95	73-119	2	30
Benzene	< 1.	1.	0.5	ug/l	97	94	78-119	3	30
Toluene	< 1.	1.	0.5	ug/l	91	91	85-115	1	30
Ethylbenzene	< 1.	1.	0.5	ug/l	92	89	82-119	4	30
Xylene (Total)	< 1.	1.	0.5	ug/l	92	90	83-113	3	30
Batch number: P081721AA	Sample number(s): 5387890-5387891								
Methyl Tertiary Butyl Ether	< 1.	1.	0.5	ug/l	98		73-119		
Benzene	< 1.	1.	0.5	ug/l	96		78-119		
Toluene	< 1.	1.	0.5	ug/l	96		85-115		
Ethylbenzene	< 1.	1.	0.5	ug/l	92		82-119		
Xylene (Total)	< 1.	1.	0.5	ug/l	99		83-113		
Batch number: P081724AA	Sample number(s): 5387906								
Methyl Tertiary Butyl Ether	< 1.	1.	0.5	ug/l	90	90	73-119	0	30
Benzene	< 1.	1.	0.5	ug/l	93	92	78-119	1	30
Toluene	< 1.	1.	0.5	ug/l	93	95	85-115	2	30
Ethylbenzene	< 1.	1.	0.5	ug/l	90	90	82-119	0	30
Xylene (Total)	< 1.	1.	0.5	ug/l	97	97	83-113	0	30

Sample Matrix Quality Control

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1095800
Reported: 07/08/08 at 08:13 AM
Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: F081703AA	Sample number(s): 5387885-5387889 UNSPK: P386718								
Methyl Tertiary Butyl Ether	100	101	69-127	2	30				
Benzene	110	110	83-128	0	30				
Toluene	109	112	83-127	3	30				
Ethylbenzene	107	111	82-129	4	30				
Xylene (Total)	109	113	82-130	3	30				
Batch number: F081704AA	Sample number(s): 5387901-5387905,5387907-5387910 UNSPK: P386595								
Methyl Tertiary Butyl Ether	102	120	69-127	17	30				
Benzene	106	104	83-128	2	30				
Toluene	105	104	83-127	0	30				
Ethylbenzene	103	101	82-129	2	30				
Xylene (Total)	105	102	82-130	3	30				
Batch number: F081751AA	Sample number(s): 5387892-5387899 UNSPK: P389276								
Methyl Tertiary Butyl Ether	101	100	69-127	2	30				
Benzene	109	106	83-128	3	30				
Toluene	104	103	83-127	2	30				
Ethylbenzene	104	102	82-129	1	30				
Xylene (Total)	105	103	82-130	2	30				
Batch number: F081754AA	Sample number(s): 5387900 UNSPK: P389550								
Methyl Tertiary Butyl Ether	101		69-127						
Benzene	106		83-128						
Toluene	102		83-127						
Ethylbenzene	103		82-129						
Xylene (Total)	99		82-130						
Batch number: P081721AA	Sample number(s): 5387890-5387891 UNSPK: P387548								
Methyl Tertiary Butyl Ether	99	99	69-127	1	30				
Benzene	106	104	83-128	1	30				
Toluene	104	103	83-127	1	30				
Ethylbenzene	100	99	82-129	1	30				
Xylene (Total)	106	105	82-130	1	30				
Batch number: P081724AA	Sample number(s): 5387906 UNSPK: P385227								
Methyl Tertiary Butyl Ether	105 (2)		69-127						
Benzene	100		83-128						
Toluene	104		83-127						
Ethylbenzene	97		82-129						
Xylene (Total)	103		82-130						

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed
unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: UST-Unleaded Waters by 8260B
Batch number: F081703AA

Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1095800
Reported: 07/08/08 at 08:13 AM

Surrogate Quality Control

5387885	94	89	89	92
5387886	92	91	87	85
5387887	93	92	89	87
5387888	92	88	89	96
5387889	91	90	94	95
Blank	96	95	93	88
LCS	94	94	93	92
MS	94	95	89	89
MSD	95	92	92	90
Limits:	80-116	77-113	80-113	78-113

Analysis Name: UST-Unleaded Waters by 8260B
Batch number: F081704AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
5387901	92	92	86	107
5387902	94	95	87	89
5387903	93	91	86	88
5387904	95	96	88	86
5387905	91	89	84	87
5387907	94	95	88	91
5387908	91	90	84	84
5387909	94	93	87	87
5387910	91	90	85	84
Blank	93	92	88	86
LCS	92	94	86	86
MS	96	97	90	89
MSD	90	94	87	87
Limits:	80-116	77-113	80-113	78-113

Analysis Name: UST-Unleaded Waters by 8260B
Batch number: F081751AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
5387892	91	90	87	88
5387893	90	89	86	88
5387894	89	87	87	91
5387895	90	90	88	96
5387896	93	92	90	89
5387897	90	87	87	87
5387898	92	88	87	88
5387899	90	89	87	86
Blank	92	91	86	84
LCS	93	93	87	89
MS	95	92	87	91
MSD	92	91	86	88
Limits:	80-116	77-113	80-113	78-113

Analysis Name: UST-Unleaded Waters by 8260B
Batch number: F081754AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
5387900	92	88	86	87
Blank	93	86	82	80
LCS	93	93	84	86

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1095800
Reported: 07/08/08 at 08:13 AM

Surrogate Quality Control

LCSD	90	88	81	84
MS	93	91	83	89
Limits:	80-116	77-113	80-113	78-113

Analysis Name: UST-Unleaded Waters by 8260B
Batch number: P081721AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
5387890	100	93	96	91
5387891	100	94	93	93
Blank	101	98	94	87
LCS	100	97	94	91
MS	100	99	94	91
MSD	100	101	95	91
Limits:	80-116	77-113	80-113	78-113

Analysis Name: UST-Unleaded Waters by 8260B
Batch number: P081724AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
5387906	102	92	96	91
Blank	106	95	95	88
LCS	105	98	95	90
LCSD	104	96	95	92
MS	104	94	95	91
Limits:	80-116	77-113	80-113	78-113

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only
Acct. # 10132 Group# 1095800 Sample # 5387885-910

COC # 177768

Please print. Instructions on reverse side correspond with circled numbers. cooler temp 3.4°C

For Lab Use Only
FSC:
SCR#: 56492

(1)
Client: SUN-AQUATERRA Acct. #:
Project Name/#: PHILA REF AOI-1 PWSID #:
Project Manager: T. DOERR P.O.#:
Sampler: S. SYKES Quote #:
Name of state where samples were collected: PA

(3) (4) (5) Analyses Requested — Preservation Codes

Preservation Codes: H=HCl, T=Thiosulfate, N=HNO_3, B=NaOH, S=H_2SO_4, O=Other

(6) Temperature of samples upon receipt (if requested)

(2) Sample Identification	Date Collected	Time Collected	Grab	Composite	Soil	Water (Potable / NPDES)	Other	Total # of Containers	BTEX (PAVG)(8260) + MTBE B								Remarks	Temperature
S-95	6/10/08	900	X			X		3	X									
S-264	|	945	X			X		3	X									
S-42I	|	1015	X			X		3	X									
S-41	|	1030	X			X		3	X									
S-257	|	1045	X			X		3	X									
S-43	|	1110	X			X		3	X									
S-258	|	1135	X			X		3	X									
S-259	|	1200	X			X		3	X									
S-255	|	1320	X			X		3	X									
S-228	|	1350	X			X		3	X									

(7) **Turnaround Time Requested** (TAT) (please circle): Normal Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax E-mail
Phone #: Fax #:
E-mail address:

(8) **Data Package Options** (please circle if required)
Type I (validation/NJ Reg) TX TRRP-13
Type II (Tier II) MA MCP CT RCP
Type III (Reduced NJ)
Type IV (CLP SOW)
Type VI (Raw Data Only)

SDG Complete? Yes No
Site-specific QC (MS/MSD/Dup)? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Internal COC Required? Yes / No

(9)

Relinquished by:	Date	Time	Received by:	Date	Time
~~Bo Hte Storage~~	~~6/13/08~~	~~7:30~~	~~Marven McFallen~~	~~6/13/08~~	~~7:30~~
~~Marven McFallen~~	~~6/13/08~~	~~10:00~~			
[signature] / AQUATERRA	6/10/08	1700	AQUATERRA / FRIDGE	6/10/08	1700
[signature]	6/12/08	11:40	Emma Dellman	6/12/08	11:40
Emma Dellman	6/12/08	15:15	[signature]	6/12/08	15:15

Lancaster Laboratories, Inc., 2425 New Holland Pike, Lancaster, PA 17601 (717) 656-2300 Fax: (717) 656-6766
Copies: White and yellow should accompany samples to Lancaster Laboratories. The pink copy should be retained by the client.

2102.03

Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only
Acct. # 10132 Group# 1095800 Sample # 5387885-910

COC # 186067

Please print. Instructions on reverse side correspond with circled numbers. Cooler Temp 3.4°C

For Lab Use Only
FSC:
SCR#:

(1) Client: SUN-AQUATERRA Acct. #:
Project Name/#: PHILA REF AOI-1 PWSID #:
Project Manager: T. DOERR P.O.#:
Sampler: S. SYKES Quote #:
Name of state where samples were collected: PA

(2) Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water (Potable / NPDES)	Other	Total # of Containers	(5) Analyses Requested — Preservation Codes: BTEX + MTBE (PAV6 8260B)
S-227	6/10/08	1415	X			X		3	X
S-256	"	1445	X			X		3	X
S-44	"	1505	X			X		3	X

Preservation Codes
H=HCl T=Thiosulfate
N=HNO_3 B=NaOH
S=H_2SO_4 O=Other

Remarks

(6) Temperature of samples upon receipt (if requested)

(7) **Turnaround Time Requested** (TAT) (please circle): Normal Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax E-mail
Phone #: Fax #:
E-mail address:

(8) **Data Package Options** (please circle if required)
Type I (validation/NJ Reg)
Type II (Tier II)
Type III (Reduced NJ)
Type IV (CLP SOW)
Type VI (Raw Data Only)
TX TRRP-13
MA MCP CT RCP
SDG Complete? Yes No
Site-specific QC (MS/MSD/Dup)? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Internal COC Required? Yes / No

Relinquished by:	Date	Time	Received by:	Date	Time (9)
S. Sykes / AQUATERRA	6/10/08	1700	AQUATERRA FRIDGE	6/10/08	1700
	6/12/08	11:40	Erma Uelleman	6/12/08	11:40
Erma Uelleman	6/12/08	1515			

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Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1095800 Sample # 5387885-910

COC # 185987

Please print. Instructions on reverse side correspond with circled numbers. Cooler temp 3.4°C

For Lab Use Only
FSC:
SCR#:

(1) Client: SUN-AQUATERRA Acct. #:
Project Name/#: PHILA REF AOI-7 PWSID #:
Project Manager: T. DOERR P.O.#:
Sampler: S. SYKES Quote #:
Name of state where samples were collected: PA

Preservation Codes: H=HCl, T=Thiosulfate, N=HNO_3, B=NaOH, S=H_2SO_4, O=Other

(2) Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix: Soil	Water (☐ Potable ☐ NPDES)	Other	(4) Total # of Containers	(5) Analyses Requested: BTEX + MTBE (PA 6/8260B)								Remarks	(6) Temperature of samples upon receipt (if requested)
S-214	6/11/08	930	X			X		3	X									
S-118	|	1025	X			X		3	X									
S-263	|	1000	X			X		3	X									
S-262	|	1050	X			X		3	X									
S-261	|	1135	X			X		3	X									
S-209	|	1200	X			X		3	X									
S-52	|	1225	X			X		3	X									
S-51	|	1300	X			X		3	X									
S-45	|	1315	X			X		3	X									
S-260	|	1350	X			X		3	X									

(7) **Turnaround Time Requested** (TAT) (please circle): Normal Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax E-mail
Phone #: Fax #:
E-mail address:

Relinquished by:	Date	Time	Received by:	Date	Time (9)
[signature] (AQUATERRA	6/11/08	1700	AQUATERRA FRIDGE	6/11/08	1700
[signature]	6/12/08	11:40	Erma Dellman	6/12/08	11:40
Erma Dellmon	6/12/08	15:15			
			[signature]	6/12/08	1515

(8) **Data Package Options** (please circle if required)
Type I (validation/NJ Reg) TX TRRP-13
Type II (Tier II) MA MCP CT RCP
Type III (Reduced NJ)
Type IV (CLP SOW)
Type VI (Raw Data Only)

SDG Complete? Yes No

Site-specific QC (MS/MSD/Dup)? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Internal COC Required? Yes / No

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Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1095800 Sample # 5387885-910

COC # 185988

Please print. Instructions on reverse side correspond with circled numbers. cooler temp 3.4°C

For Lab Use Only
FSC:
SCR#: C0752

(1) Client: SUN-AQUATERRA Acct. #:
Project Name/#: PHILA REF AOI-1 PWSID #:
Project Manager: T. DOERR P.O.#:
Sampler: S. SYKES Quote #:
Name of state where samples were collected: PA

(2) Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	(4) Matrix: Soil	Water	Other	Total # of Containers	(5) Analyses Requested: Preservation Codes — BTEX MTBE (PAHs 8260)	Remarks
S-226	6/11/08	1430	X		X	X		3	X	
S-127	"	1500	X			X		3	X	
S-230	"	1520	X			X		3	X	

Matrix: Potable ☐ NPDES ☐ (Check if Applicable)

Preservation Codes
H=HCl T=Thiosulfate
N=HNO_3 B=NaOH
S=H_2SO_4 O=Other

(6) Temperature of samples upon receipt (if requested)

(7) **Turnaround Time Requested** (TAT) (please circle): Normal Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax E-mail
Phone #: Fax #:
E-mail address:

(8) **Data Package Options** (please circle if required)
Type I (validation/NJ Reg)
Type II (Tier II)
Type III (Reduced NJ)
Type IV (CLP SOW)
Type VI (Raw Data Only)
TX TRRP-13
MA MCP CT RCP
SDG Complete? Yes No
Site-specific QC (MS/MSD/Dup)? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Internal COC Required? Yes / No

(9)

Relinquished by:	Date	Time	Received by:	Date	Time
Bottle Storage	6/10/08	915	T. Lefever	6/10/08	915
T. Lefever	6/10/08	1357			
AQUATERRA	6/11/08	1700	AQUATERRA FRIDGE	6/11/08	1700
	6/12/08	11:40	Emma Hallman	6/12/08	11:40
Emma Hallman	6/14/08	1515		6/17/08	1515

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2102.03

Lancaster Laboratories
Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib >5 um/ml**	fibers greater than 5 microns in length per ml

< less than – The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million – One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quatitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
J	Estimated value
N	Presumptive evidence of a compound (TICs only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike amount not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Analytical test results for methods listed on the laboratories' accreditation scope meet all requirements of NELAC unless otherwise noted under the individual analysis.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

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Analysis Report

ANALYTICAL RESULTS

Prepared for:

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

610-431-5733

Prepared by:

Lancaster Laboratories
2425 New Holland Pike
Lancaster, PA 17605-2425

SAMPLE GROUP

The sample group for this submittal is 1104406. Samples arrived at the laboratory on Thursday, August 07, 2008. The PO# for this group is SUNOCO PHILLY REFINER.

Client Description	Lancaster Labs Number
S-117 Grab Water	5435926

ELECTRONIC COPY TO	SUN: Aquaterra Tech.	Attn: Kevin Martin
ELECTRONIC COPY TO	Langan	Attn: Joseph Catricks
ELECTRONIC COPY TO	SUN: Aquaterra Tech.	Attn: Tiffani Doerr
ELECTRONIC COPY TO	LLI	Attn: EDD Group

Lancaster Laboratories

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Analysis Report

Questions? Contact your Client Services Representative
Jessica A Oknefski at (717) 656-2300

Respectfully Submitted,

Christine Dulaney
Senior Specialist

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Lancaster Laboratories Sample No. 5435926 WW Group No. 1104406

S-117 Grab Water
Philadelphia Refinery AOI-1
DUNS# COC: 188637 S-117

Collected:08/06/2008 11:45 by SS Account Number: 10132

Submitted: 08/07/2008 16:15
Reported: 08/15/2008 at 18:58
Discard: 10/15/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

S-117

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	89.	10.	5.	ug/l	10
05401	Benzene	71-43-2	7,400.	50.	25.	ug/l	50
05407	Toluene	108-88-3	43.	10.	5.	ug/l	10
05415	Ethylbenzene	100-41-4	900.	10.	5.	ug/l	10
06310	Xylene (Total)	1330-20-7	69.	10.	5.	ug/l	10

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	08/15/2008 04:48	Kathrine K Muramatsu	10
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	08/15/2008 05:15	Kathrine K Muramatsu	50
01163	GC/MS VOA Water Prep	SW-846 5030B	1	08/15/2008 04:48	Kathrine K Muramatsu	10
01163	GC/MS VOA Water Prep	SW-846 5030B	2	08/15/2008 05:15	Kathrine K Muramatsu	50

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1104406
Reported: 08/15/08 at 06:58 PM

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Laboratory Compliance Quality Control

Analysis Name	Blank Result	Blank LOQ**	Blank MDL	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: P082273AA	Sample number(s): 5435926								
Methyl Tertiary Butyl Ether	< 1.	1.	0.5	ug/l	94	93	73-119	1	30
Benzene	< 1.	1.	0.5	ug/l	94	91	78-119	3	30
Toluene	< 1.	1.	0.5	ug/l	92	91	85-115	1	30
Ethylbenzene	< 1.	1.	0.5	ug/l	91	88	82-119	3	30
Xylene (Total)	< 1.	1.	0.5	ug/l	93	93	83-113	0	30

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: P082273AA	Sample number(s): 5435926 UNSPK: P438031								
Methyl Tertiary Butyl Ether	96		69-127						
Benzene	99		83-128						
Toluene	101		83-127						
Ethylbenzene	98		82-129						
Xylene (Total)	101		82-130						

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: UST-Unleaded Waters by 8260B
Batch number: P082273AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
5435926	93	86	89	88
Blank	91	86	89	88
LCS	93	85	88	88
LCSD	91	88	88	87
MS	93	90	88	90
Limits:	80-116	77-113	80-113	78-113

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1104406 Sample # 5435926

COC # 188637

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: SUN- AQUATERRA Acct. #:
Project Name/#: PHREF AOI-1 PWSID #:
Project Manager: T. DOERR P.O.#:
Sampler: S. SYKES Quote #:
Name of state where samples were collected: PA

For Lab Use Only
FSC:
SCR#:

Preservation Codes
H=HCl T=Thiosulfate
N=HNO_3 B=NaOH
S=H_2SO_4 O=Other

(2) Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	(4) Matrix: Soil	Potable / Non-Potable Water	Other	Total # of Containers	(5) Analyses Requested: Preservation Codes — BTEX MTBE PAH 8260b	Remarks	(6) Temperature of samples upon receipt (if requested)
S-117	8/6/08	1145	X			X		3	X	temp 1.2°C	

(7) **Turnaround Time Requested** (TAT) (please circle): Normal Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharge.)
Date results are needed: No Rush
Rush results requested by (please circle): Phone Fax E-mail
Phone #: Fax #:
E-mail address:

(8) **Data Package Options** (please circle if required)
Type I (validation/NJ Reg)
Type II (Tier II)
Type III (Reduced NJ)
Type IV (CLP SOW)
Type VI (Raw Data Only)
TX TRRP-13
MA MCP CT RCP
SDG Complete? Yes No
Site-specific QC (MS/MSD/Dup)? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Internal COC Required? Yes / No

(9)

Relinquished by:	Date	Time	Received by:	Date	Time
[illegible] AQUATERRA	8/6/08	1530	AQUATERRA FRIDGE	8/6/08	1530
AT FRIDGE	8/7/08	0930	[illegible]	8/7/08	0930
[illegible]	8/7/08	0930	P. Lefever	8/7/08	950
P. Lefever	8/7/08	1615			
[illegible]			Mary Miller	8/7/08	1615

Lancaster Laboratories, Inc., 2425 New Holland Pike, Lancaster, PA 17601 (717) 656-2300 Fax: (717) 656-6766
Copies: White and yellow should accompany samples to Lancaster Laboratories. The pink copy should be retained by the client.

2102.03

Lancaster Laboratories
Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib >5 um/ml**	fibers greater than 5 microns in length per ml

< less than – The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million – One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quatitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
J	Estimated value
N	Presumptive evidence of a compound (TICs only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike amount not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Analytical test results for methods listed on the laboratories' accreditation scope meet all requirements of NELAC unless otherwise noted under the individual analysis.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

WARRANTY AND LIMITS OF LIABILITY – In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL LANCASTER LABORATORIES BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF LANCASTER LABORATORIES AND (B) WHETHER LANCASTER LABORATORIES HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Lancaster Laboratories which includes any conditions that vary from the Standard Terms and Conditions of Lancaster Laboratories and we hereby object to any conflicting terms contained in any acceptance or order submitted by client.

Lancaster Laboratories

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Analysis Report

ANALYTICAL RESULTS

Prepared for:

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

610-431-5733

Prepared by:

Lancaster Laboratories
2425 New Holland Pike
Lancaster, PA 17605-2425

SAMPLE GROUP

The sample group for this submittal is 1107790. Samples arrived at the laboratory on Friday, August 29, 2008. The PO# for this group is PHILADELPHIA.

Client Description	Lancaster Labs Number
S-269 Grab Water	5455262
S-270 Grab Water	5455263

ELECTRONIC COPY TO	SUN: Aquaterra Tech.	Attn: Kevin Martin
ELECTRONIC COPY TO	Langan	Attn: Joseph Catricks
ELECTRONIC COPY TO	SUN: Aquaterra Tech.	Attn: Tiffani Doerr
ELECTRONIC COPY TO	LLI	Attn: EDD Group

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Analysis Report

Questions? Contact your Client Services Representative
Jessica A Oknefski at (717) 656-2300

Respectfully Submitted,

Christine Dulaney
Senior Specialist

Lancaster Laboratories

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Analysis Report

Lancaster Laboratories Sample No. 5455262 WW Group No. 1107790

S-269 Grab Water
Philadelphia Refinery AOI-1
S-269

Collected:08/29/2008 13:00 by SS Account Number: 10132

Submitted: 08/29/2008 16:25
Reported: 09/04/2008 at 15:01
Discard: 11/04/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

S269-

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	72	1	0.5	ug/l	1
05401	Benzene	71-43-2	830	10	5	ug/l	10
05407	Toluene	108-88-3	200	1	0.5	ug/l	1
05415	Ethylbenzene	100-41-4	240	10	5	ug/l	10
06310	Xylene (Total)	1330-20-7	2,000	10	5	ug/l	10

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	09/03/2008 00:49	Kelly E Brickley	1
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	09/04/2008 06:32	Kelly E Brickley	10
01163	GC/MS VOA Water Prep	SW-846 5030B	1	09/03/2008 00:49	Kelly E Brickley	1
01163	GC/MS VOA Water Prep	SW-846 5030B	2	09/04/2008 06:32	Kelly E Brickley	10

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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Analysis Report

Lancaster Laboratories Sample No. 5455263 WW Group No. 1107790

S-270 Grab Water
Philadelphia Refinery AOI-1
S-270

Collected:08/29/2008 12:30 by SS Account Number: 10132

Submitted: 08/29/2008 16:25 SUN: Aquaterra Tech.
Reported: 09/04/2008 at 15:01 PO Box 744
Discard: 11/04/2008 West Chester PA 19381

S270-

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Units	Dilution Factor
02300	UST-Unleaded Waters by 8260B						
02010	Methyl Tertiary Butyl Ether	1634-04-4	15	1	0.5	ug/l	1
05401	Benzene	71-43-2	1,800	10	5	ug/l	10
05407	Toluene	108-88-3	200	1	0.5	ug/l	1
05415	Ethylbenzene	100-41-4	350	10	5	ug/l	10
06310	Xylene (Total)	1330-20-7	1,400	10	5	ug/l	10

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	09/03/2008 01:09	Kelly E Brickley	1
02300	UST-Unleaded Waters by 8260B	SW-846 8260B	1	09/04/2008 06:51	Kelly E Brickley	10
01163	GC/MS VOA Water Prep	SW-846 5030B	1	09/03/2008 01:09	Kelly E Brickley	1
01163	GC/MS VOA Water Prep	SW-846 5030B	2	09/04/2008 06:51	Kelly E Brickley	10

*=This limit was used in the evaluation of the final result

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Analysis Report

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1107790
Reported: 09/04/08 at 03:01 PM

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Laboratory Compliance Quality Control

Analysis Name	Blank Result	Blank LOQ**	Blank MDL	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: F082461AA	Sample number(s): 5455262-5455263								
Methyl Tertiary Butyl Ether	< 1	1.	0.5	ug/l	94	94	73-119	1	30
Toluene	< 1	1.	0.5	ug/l	92	90	85-115	2	30
Batch number: P082474AA	Sample number(s): 5455262-5455263								
Benzene	< 1	1.	0.5	ug/l	96	96	78-119	0	30
Ethylbenzene	< 1	1.	0.5	ug/l	95	96	82-119	1	30
Xylene (Total)	< 1	1.	0.5	ug/l	97	99	83-113	1	30

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: F082461AA	Sample number(s): 5455262-5455263 UNSPK: P447329								
Methyl Tertiary Butyl Ether	91		69-127						
Toluene	91		83-127						
Batch number: P082474AA	Sample number(s): 5455262-5455263 UNSPK: P450781								
Benzene	100		83-128						
Ethylbenzene	96		82-129						
Xylene (Total)	95		82-130						

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: UST-Unleaded Waters by 8260B
Batch number: F082461AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
5455262	90	87	98	98
5455263	88	86	96	100
Blank	94	97	95	95
LCS	97	97	98	103
LCSD	93	93	93	98
MS	95	97	95	100

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1107790
Reported: 09/04/08 at 03:01 PM

Surrogate Quality Control

Limits:	80-116	77-113	80-113	78-113

Analysis Name: 8260 Master Scan (water)
Batch number: P082474AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
Blank	99	96	94	85
LCS	97	96	94	87
LCSD	98	97	93	88
MS	97	95	93	86
Limits:	80-116	77-113	80-113	78-113

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10182 Group# 1107790 Sample # 5455262-68

COC # 187352

Please print. Instructions on reverse side correspond with circled numbers.

(1) Client: SUN-AQUATERRA Acct. #:

Project Name/#: PHILA REF ACT 26th St. PWSID #:

Project Manager: T. DOERR P.O.#:

Sampler: S. Sykes Quote #:

Name of state where samples were collected: PA

For Lab Use Only
FSC:
SCR#:

Preservation Codes
H=HCl T=Thiosulfate
N=HNO_3 B=NaOH
S=H_2SO_4 O=Other

(2) Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	(4) Matrix: Soil	Potable / NPDES (Check if Applicable)	Water	Other	Total # of Containers	(5) Analyses Requested: Preservation Codes — BTEX + MTBE	(6) Temperature of samples upon receipt (if required)
S-269	8/29/08	1300	X				X		3	3	
S-270	1	1230	X				X		3	3	

Method 8260. 3 day TAT per Tiffani D. 8/29/08

Remarks

Rush as requested by T. Doerr

temp 2.6-4.6°C

(7) **Turnaround Time Requested** (TAT) (please circle): Normal (Rush)
(Rush TAT is subject to Lancaster Laboratories approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax E-mail
Phone #: Fax #:
E-mail address:

(8) **Data Package Options** (please circle if required)
Type I (validation/NJ Reg)
Type II (Tier II)
Type III (Reduced NJ)
Type IV (CLP SOW)
Type VI (Raw Data Only)
TX TRRP-13
MA MCP CT RCP
SDG Complete? Yes No
Site-specific QC (MS/MSD/Dup)? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Internal COC Required? Yes / No

(9) Relinquished by:	Date	Time	Received by:	Date	Time
Sykes / AQUATERRA	8/29/08	1400	Jim Rydzy	8/29	1400
Jim Rydzy	8/29/08	16:25			
			Katie Hartline	8/29/08	16:25

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Lancaster Laboratories
Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib >5 um/ml**	fibers greater than 5 microns in length per ml

< less than – The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million – One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quatitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
J	Estimated value
N	Presumptive evidence of a compound (TICs only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike amount not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Analytical test results for methods listed on the laboratories' accreditation scope meet all requirements of NELAC unless otherwise noted under the individual analysis.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

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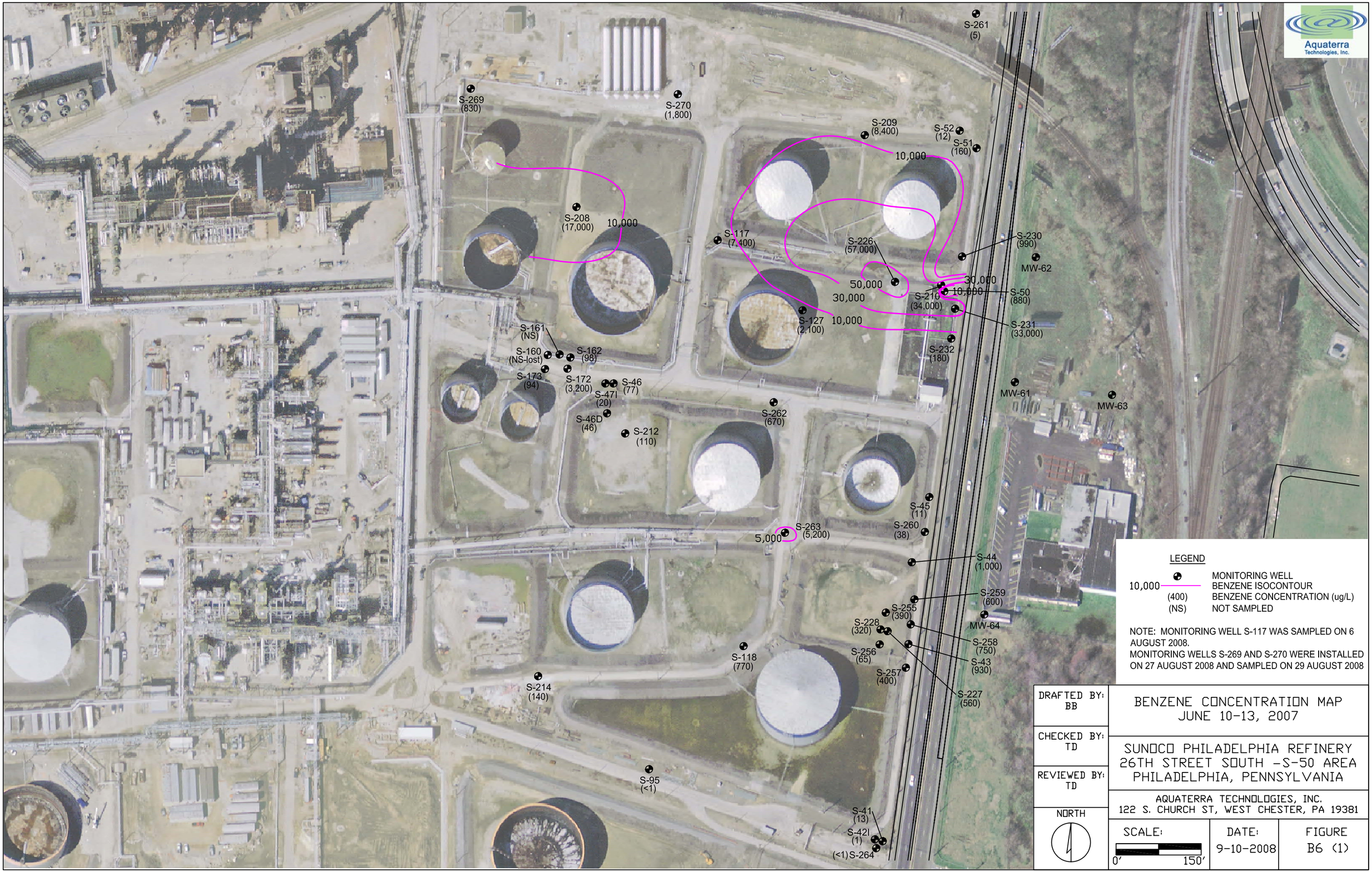
Appendix B6
Benzene and MTBE Iso-Concentration Maps



Aquaterra Technologies, Inc.

LEGEND

⊕	MONITORING WELL
10,000	BENZENE ISOCONTOUR
(400)	BENZENE CONCENTRATION (ug/L)
(NS)	NOT SAMPLED

NOTE: MONITORING WELL S-117 WAS SAMPLED ON 6 AUGUST 2008.
MONITORING WELLS S-269 AND S-270 WERE INSTALLED ON 27 AUGUST 2008 AND SAMPLED ON 29 AUGUST 2008

DRAFTED BY: BB	BENZENE CONCENTRATION MAP JUNE 10-13, 2007
CHECKED BY: TD	SUNOCO PHILADELPHIA REFINERY 26TH STREET SOUTH -S-50 AREA PHILADELPHIA, PENNSYLVANIA
REVIEWED BY: TD	AQUATERRA TECHNOLOGIES, INC. 122 S. CHURCH ST, WEST CHESTER, PA 19381
NORTH	SCALE: 0′ 150′ / DATE: 9-10-2008 / FIGURE B6 (1)

Aquaterra
Technologies, Inc.

S-261 (20)
20
S-269 (72)
S-270 (15)
1,000
S-209 (63)
S-52 (1,300)
S-51 (120)
1,000
S-208 (1,300)
S-117 (89)
20
S-230 (<5)
S-226 (260)
MW-62
1,000
S-210 (190)
S-50 (2)
S-127 (2,100)
S-231 (<50)
S-161 (NS)
S-160 (NS-lost)
S-162 (86)
S-232 (11)
S-173 (100)
S-172 (300)
S-46 (63)
S-47I (70)
MW-61
MW-63
S-262 (12)
S-46D (<1)
S-212 (34)
20
20
S-45 (<1)
20
S-263 (260)
S-260 (37)
S-44 (260)
20
S-259 (8)
S-255 (58)
S-228 (34)
MW-64
S-258 (<5)
S-256 (<2)
S-43 (6)
S-118 (14)
S-214 (<5)
S-227 (10)
S-257 (<3)
S-95 (2)
S-41 (43)
20
S-42I (<1)
(<1) S-264

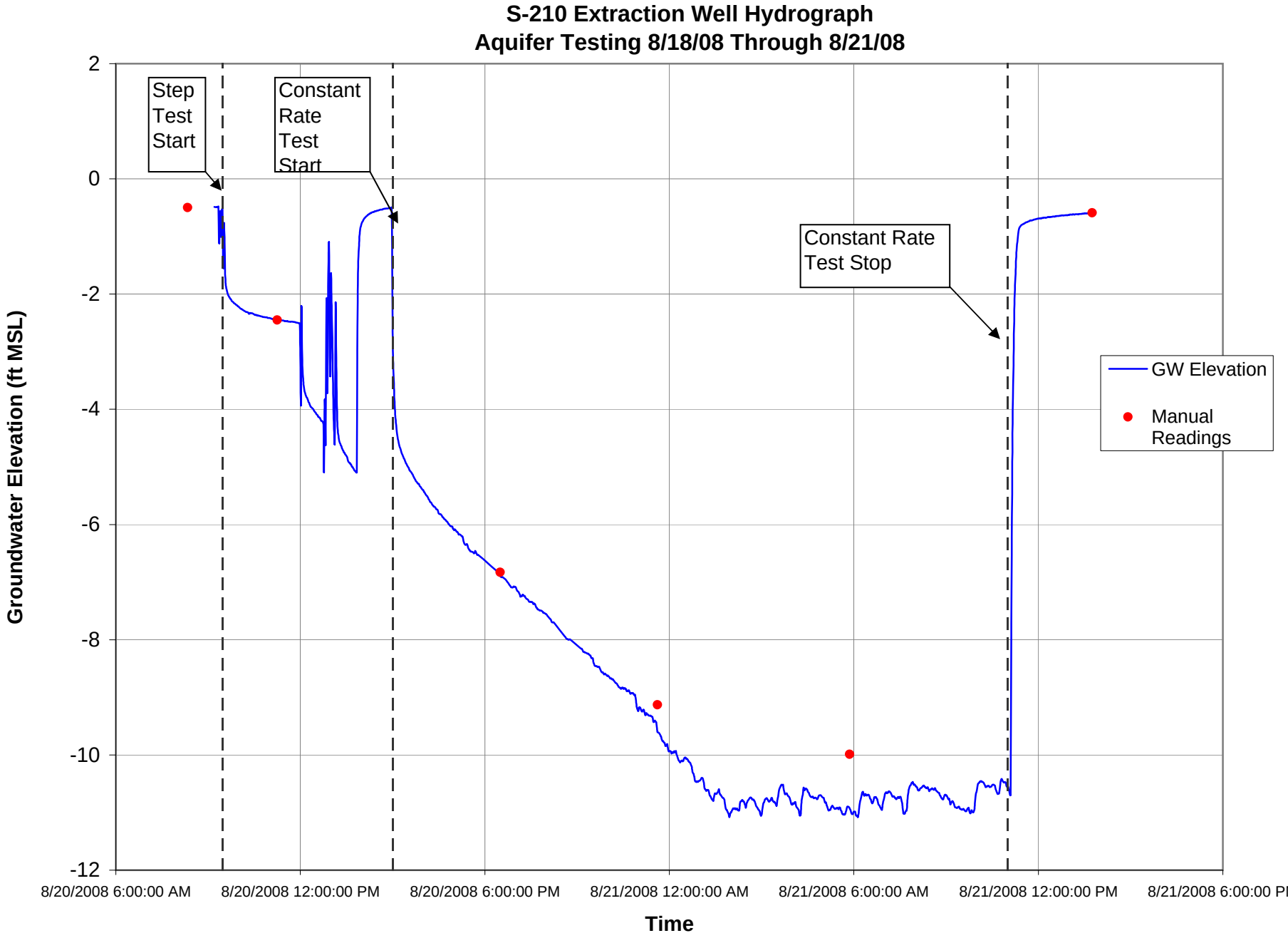
LEGEND

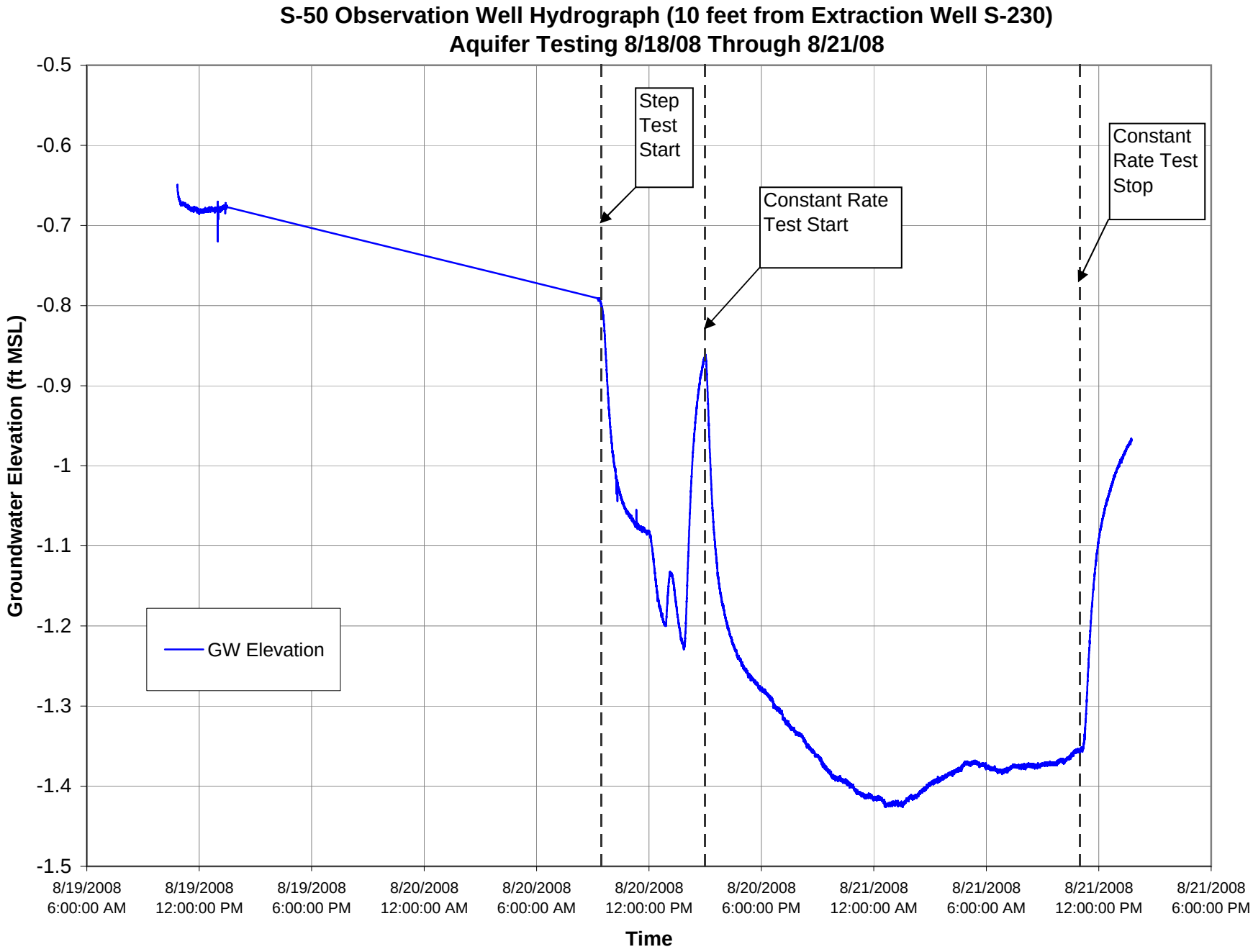
⊕	MONITORING WELL
1,000	MTBE ISOCONTOUR
(260)	MTBE CONCENTRATION (ug/L)
(NS)	NOT SAMPLED

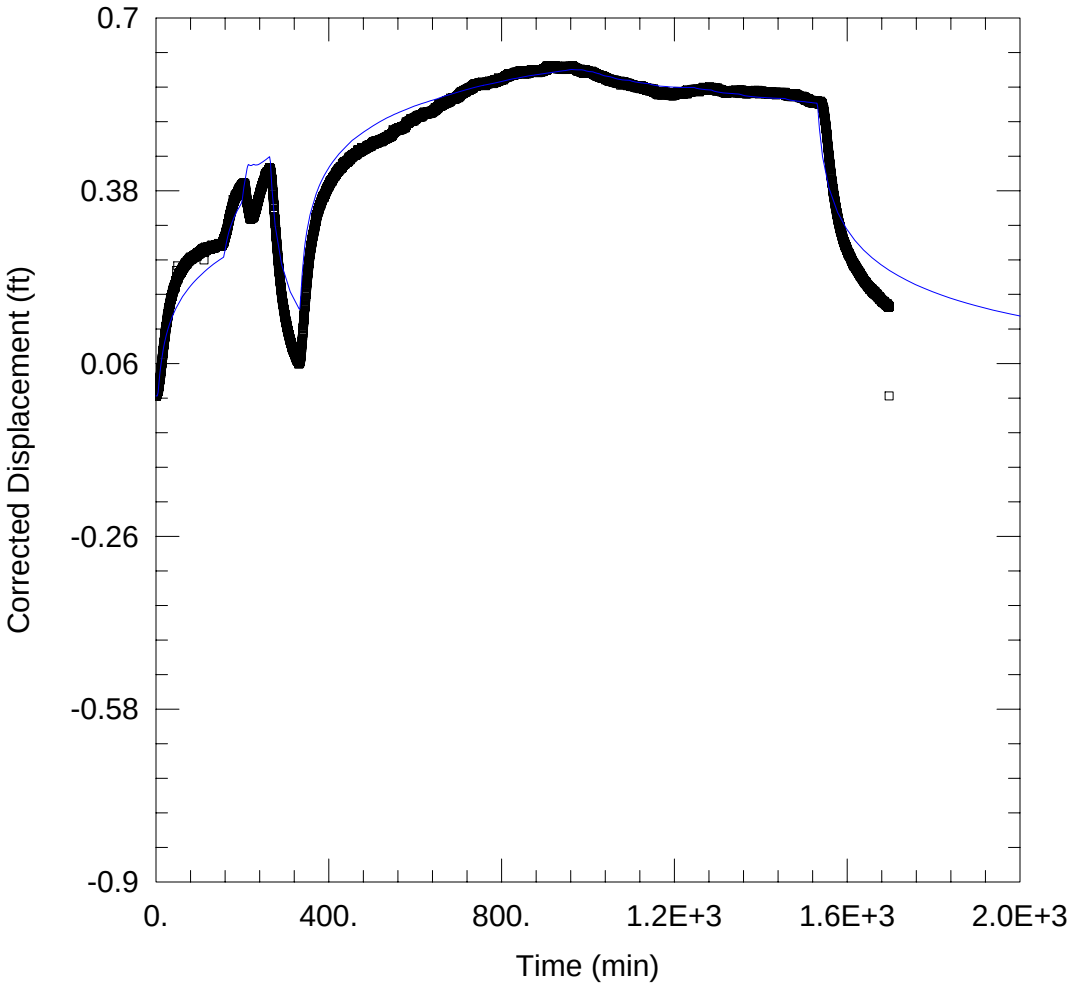
NOTE: MONITORING WELL S-117 WAS SAMPLED ON 6 AUGUST 2008.
MONITORING WELLS S-269 AND S-270 WERE INSTALLED ON 27 AUGUST 2008 AND SAMPLED ON 29 AUGUST 2008.

DRAFTED BY: BB	MTBE CONCENTRATION MAP JUNE 10-13, 2007
CHECKED BY: TD	SUNOCO PHILADELPHIA REFINERY 26TH STREET SOUTH -S-50 AREA PHILADELPHIA, PENNSYLVANIA
REVIEWED BY: TD	AQUATERRA TECHNOLOGIES, INC. 122 S. CHURCH ST, WEST CHESTER, PA 19381
NORTH	SCALE: 0' 150' / DATE: 9-10-2008 / FIGURE B6 (2)

Appendix B7
Aquifer Test Documentation


S-210 Extraction Well Hydrograph
Aquifer Testing 8/18/08 Through 8/21/08
Step Test Start
Constant Rate Test Start
Constant Rate Test Stop
GW Elevation
Manual Readings
Groundwater Elevation (ft MSL)
2
0
-2
-4
-6
-8
-10
-12
8/20/2008 6:00:00 AM
8/20/2008 12:00:00 PM
8/20/2008 6:00:00 PM
8/21/2008 12:00:00 AM
8/21/2008 6:00:00 AM
8/21/2008 12:00:00 PM
8/21/2008 6:00:00 PM
Time


S-50 Observation Well Hydrograph (10 feet from Extraction Well S-230)
Aquifer Testing 8/18/08 Through 8/21/08
Groundwater Elevation (ft MSL)
-0.5
-0.6
-0.7
-0.8
-0.9
-1
-1.1
-1.2
-1.3
-1.4
-1.5
Step Test Start
Constant Rate Test Start
Constant Rate Test Stop
GW Elevation
8/19/2008 6:00:00 AM
8/19/2008 12:00:00 PM
8/19/2008 6:00:00 PM
8/20/2008 12:00:00 AM
8/20/2008 6:00:00 AM
8/20/2008 12:00:00 PM
8/20/2008 6:00:00 PM
8/21/2008 12:00:00 AM
8/21/2008 6:00:00 AM
8/21/2008 12:00:00 PM
8/21/2008 6:00:00 PM
Time



WELL TEST ANALYSIS

Data Set: Z:\...\S-50 All Data.aqt
Date: 09/16/08 Time: 22:27:37

PROJECT INFORMATION

Company: Aquaterra Technologies, Inc
Client: Sunoco, Inc. (R&M)
Project: Philly Refinery AOI-1
Location: 26th South, S-50 Area
Test Well: S-210
Test Date: 8/18/08-8/21/08

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
S-210	0	0

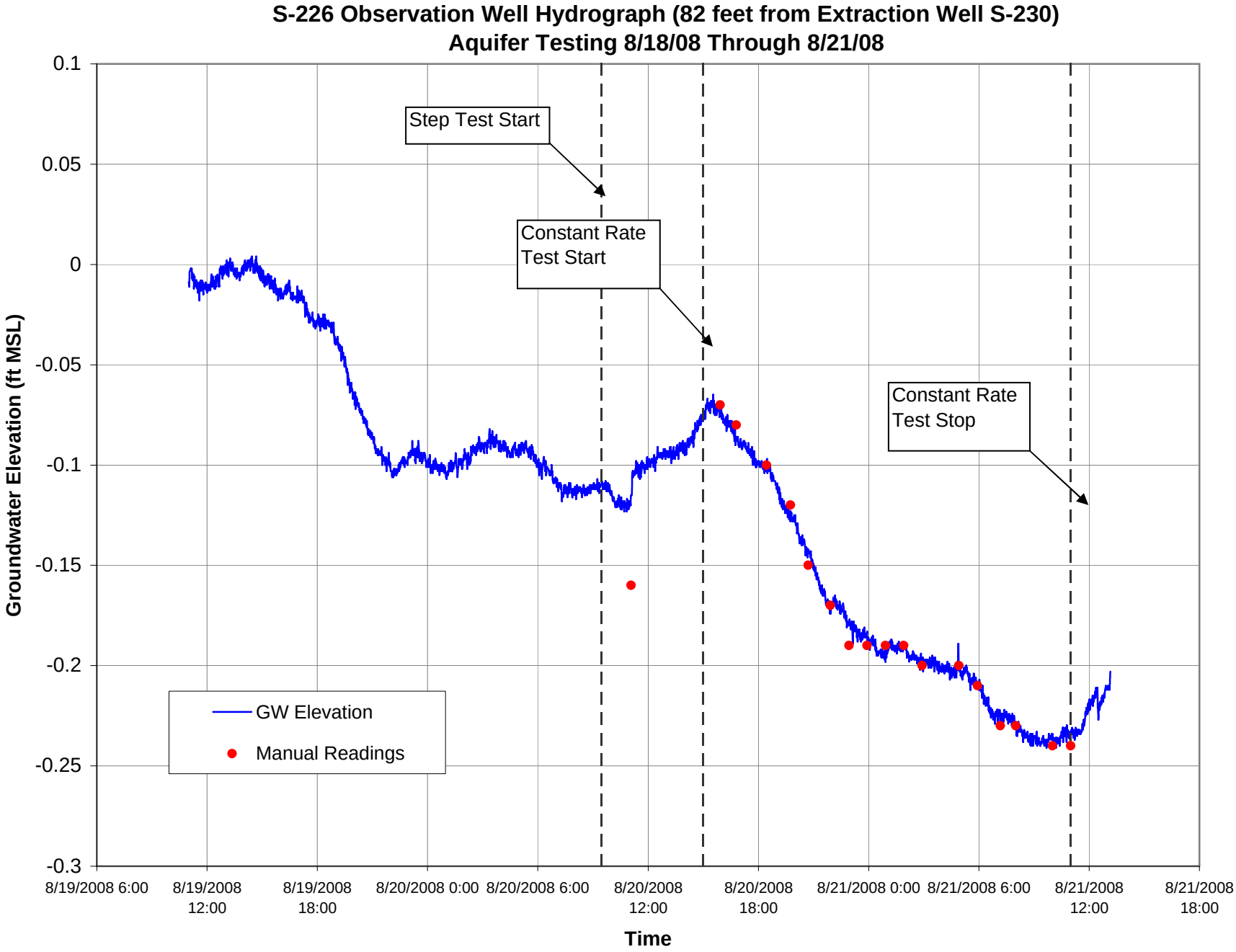
Observation Wells

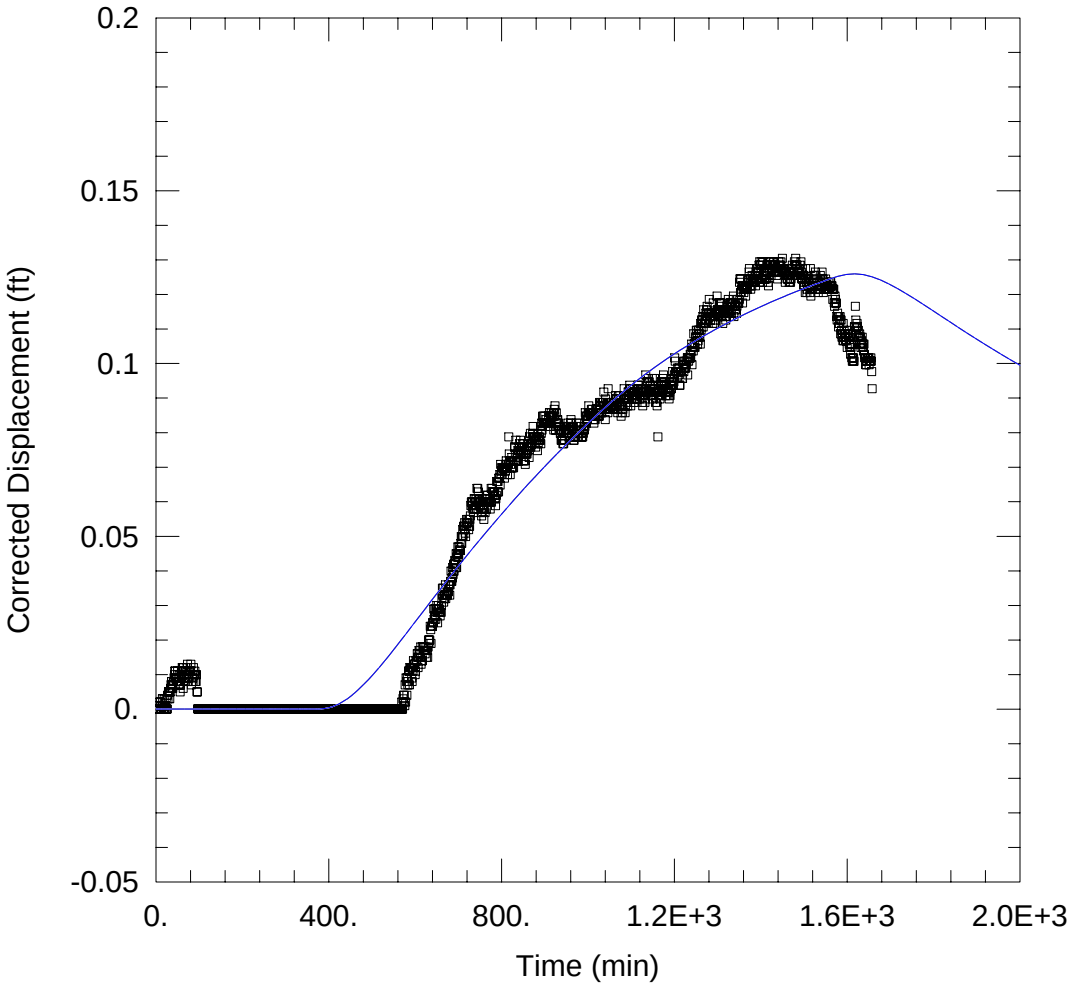
Well Name	X (ft)	Y (ft)
▫ S-50	3	-10

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 417.4 ft^2/day
S = 0.03175
Kz/Kr = 1.
b = 15. ft


S-226 Observation Well Hydrograph (82 feet from Extraction Well S-230)
Aquifer Testing 8/18/08 Through 8/21/08
Groundwater Elevation (ft MSL)
0.1
0.05
0
-0.05
-0.1
-0.15
-0.2
-0.25
-0.3
Step Test Start
Constant Rate Test Start
Constant Rate Test Stop
GW Elevation
Manual Readings
8/19/2008 6:00
8/19/2008 12:00
8/19/2008 18:00
8/20/2008 0:00
8/20/2008 6:00
8/20/2008 12:00
8/20/2008 18:00
8/21/2008 0:00
8/21/2008 6:00
8/21/2008 12:00
8/21/2008 18:00
Time



WELL TEST ANALYSIS

Data Set: Z:\...\S-226 Constant Rate Data.aqt
Date: 09/16/08 Time: 22:25:49

PROJECT INFORMATION

Company: Aquaterra Technologies, Inc
Client: Sunoco, Inc. (R&M)
Project: Philly Refinery AOI-1
Location: 26th South, S-50 Area
Test Well: S-210
Test Date: 8/20/08-8/21/08

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
S-210	0	0

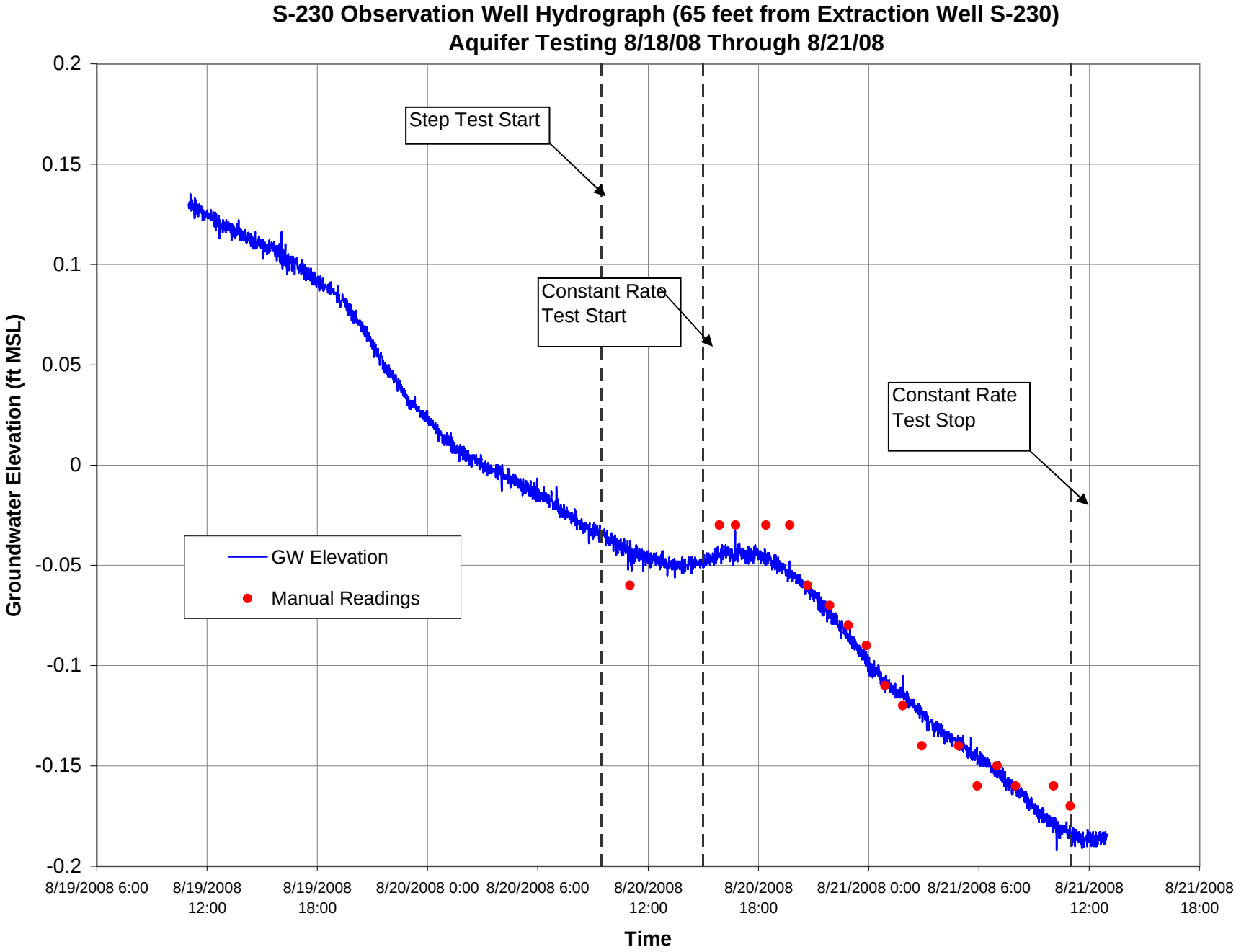
Observation Wells

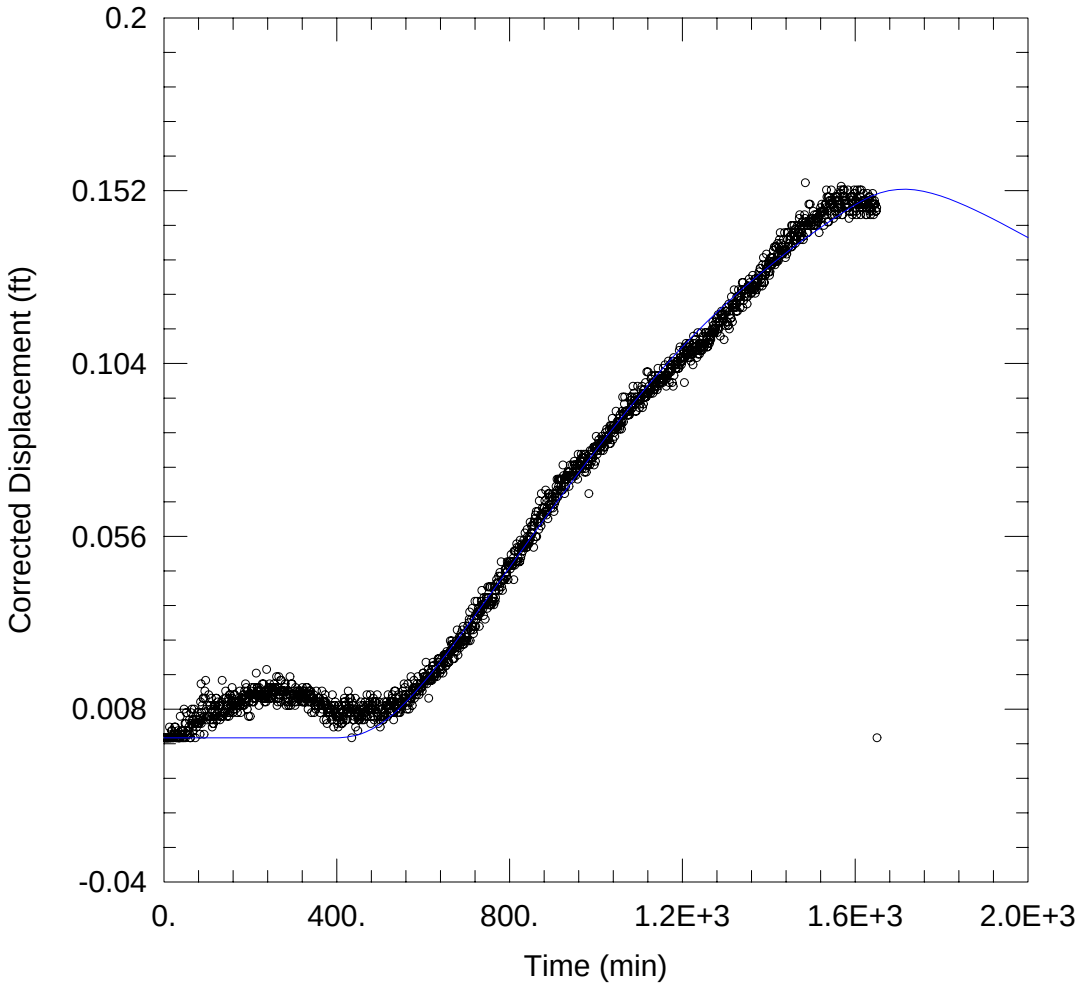
Well Name	X (ft)	Y (ft)
▫ S-226	-82	10

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 412.8 ft^2/day
S = 0.04695
Kz/Kr = 1.
b = 15. ft


S-230 Observation Well Hydrograph (65 feet from Extraction Well S-230)
Aquifer Testing 8/18/08 Through 8/21/08
Groundwater Elevation (ft MSL)
0.2
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
-0.2
Step Test Start
Constant Rate Test Start
Constant Rate Test Stop
GW Elevation
Manual Readings
8/19/2008 6:00
8/19/2008 12:00
8/19/2008 18:00
8/20/2008 0:00
8/20/2008 6:00
8/20/2008 12:00
8/20/2008 18:00
8/21/2008 0:00
8/21/2008 6:00
8/21/2008 12:00
8/21/2008 18:00
Time



WELL TEST ANALYSIS

Data Set: Z:\...\S-230 Constant Rate Data.aqt
Date: 09/16/08 Time: 22:25:15

PROJECT INFORMATION

Company: Aquaterra Technologies, Inc
Client: Sunoco, Inc. (R&M)
Project: Philly Refinery AOI-1
Location: 26th South, S-50 Area
Test Well: S-210
Test Date: 8/20/08-8/21/08

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
S-210	0	0

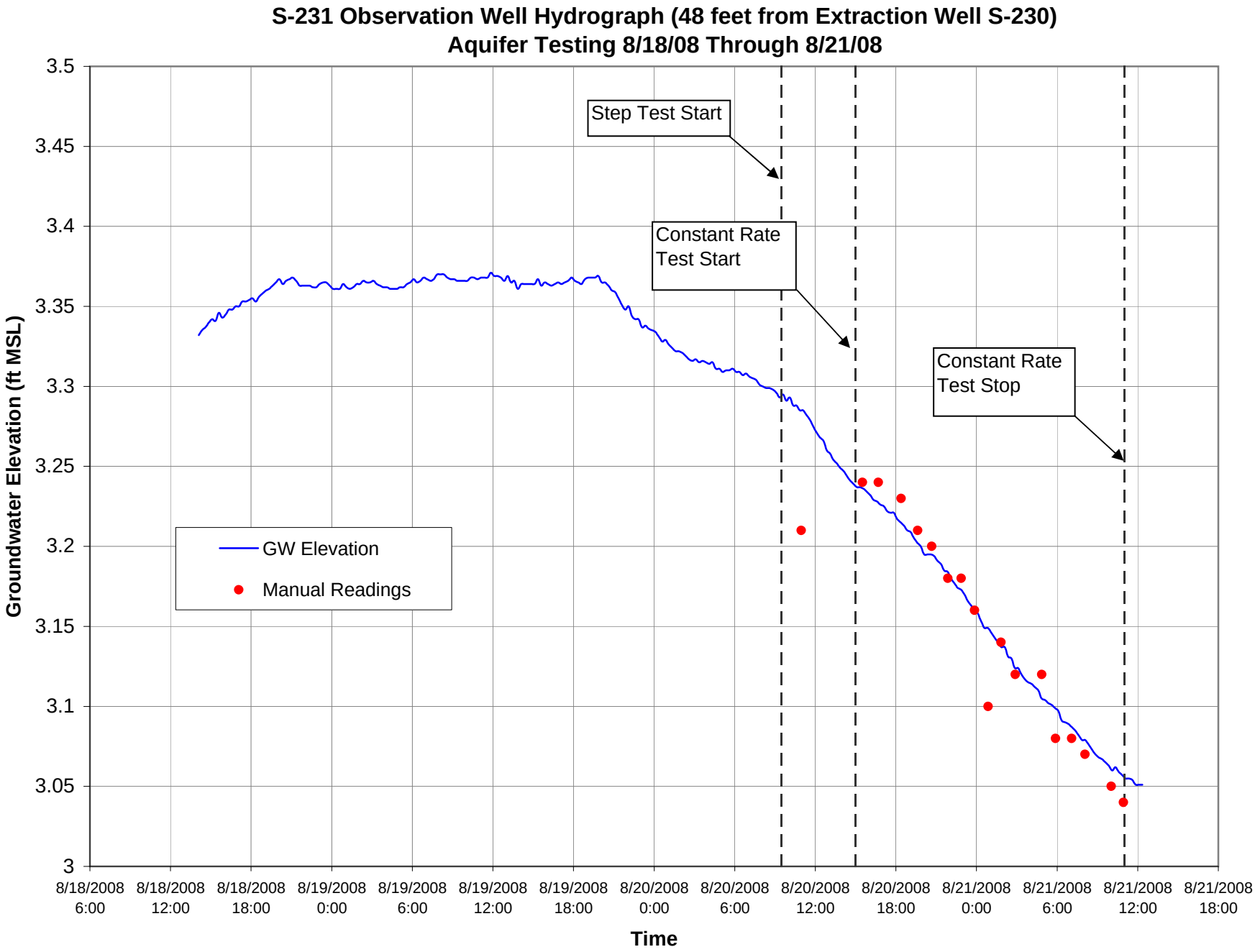
Observation Wells

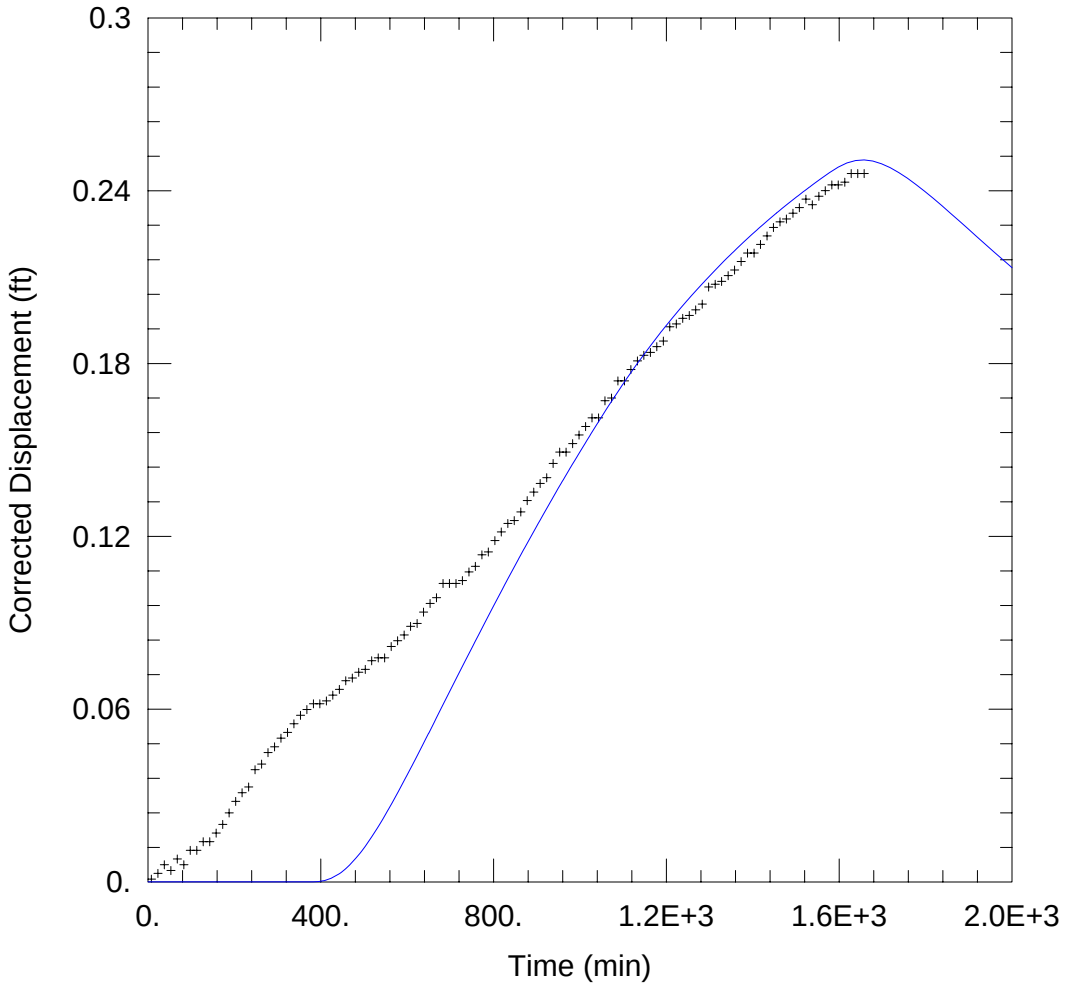
Well Name	X (ft)	Y (ft)
○ S-230	39	55

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 242.3 ft^2/day
S = 0.06823
Kz/Kr = 1.
b = 15. ft


S-231 Observation Well Hydrograph (48 feet from Extraction Well S-230)
Aquifer Testing 8/18/08 Through 8/21/08
Groundwater Elevation (ft MSL)
3.5
3.45
3.4
3.35
3.3
3.25
3.2
3.15
3.1
3.05
3
Step Test Start
Constant Rate Test Start
Constant Rate Test Stop
GW Elevation
Manual Readings
8/18/2008 6:00
8/18/2008 12:00
8/18/2008 18:00
8/19/2008 0:00
8/19/2008 6:00
8/19/2008 12:00
8/19/2008 18:00
8/20/2008 0:00
8/20/2008 6:00
8/20/2008 12:00
8/20/2008 18:00
8/21/2008 0:00
8/21/2008 6:00
8/21/2008 12:00
8/21/2008 18:00
Time



WELL TEST ANALYSIS

Data Set: Z:\...\S-231 Constant Rate Data.aqt
Date: 09/16/08 Time: 22:24:37

PROJECT INFORMATION

Company: Aquaterra Technologies, Inc
Client: Sunoco, Inc. (R&M)
Project: Philly Refinery AOI-1
Location: 26th South, S-50 Area
Test Well: S-210
Test Date: 8/20/08-8/21/08

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
S-210	0	0

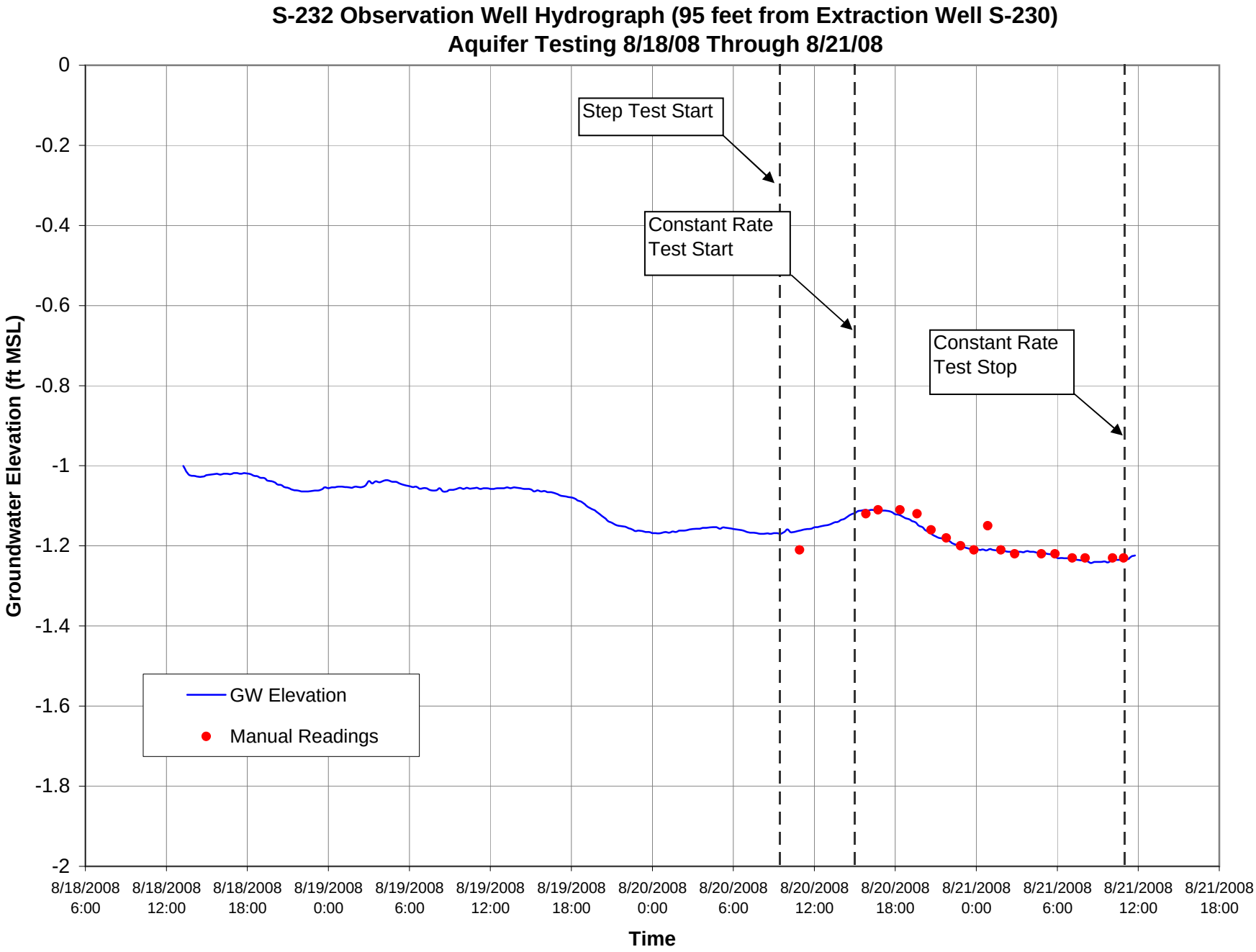
Observation Wells

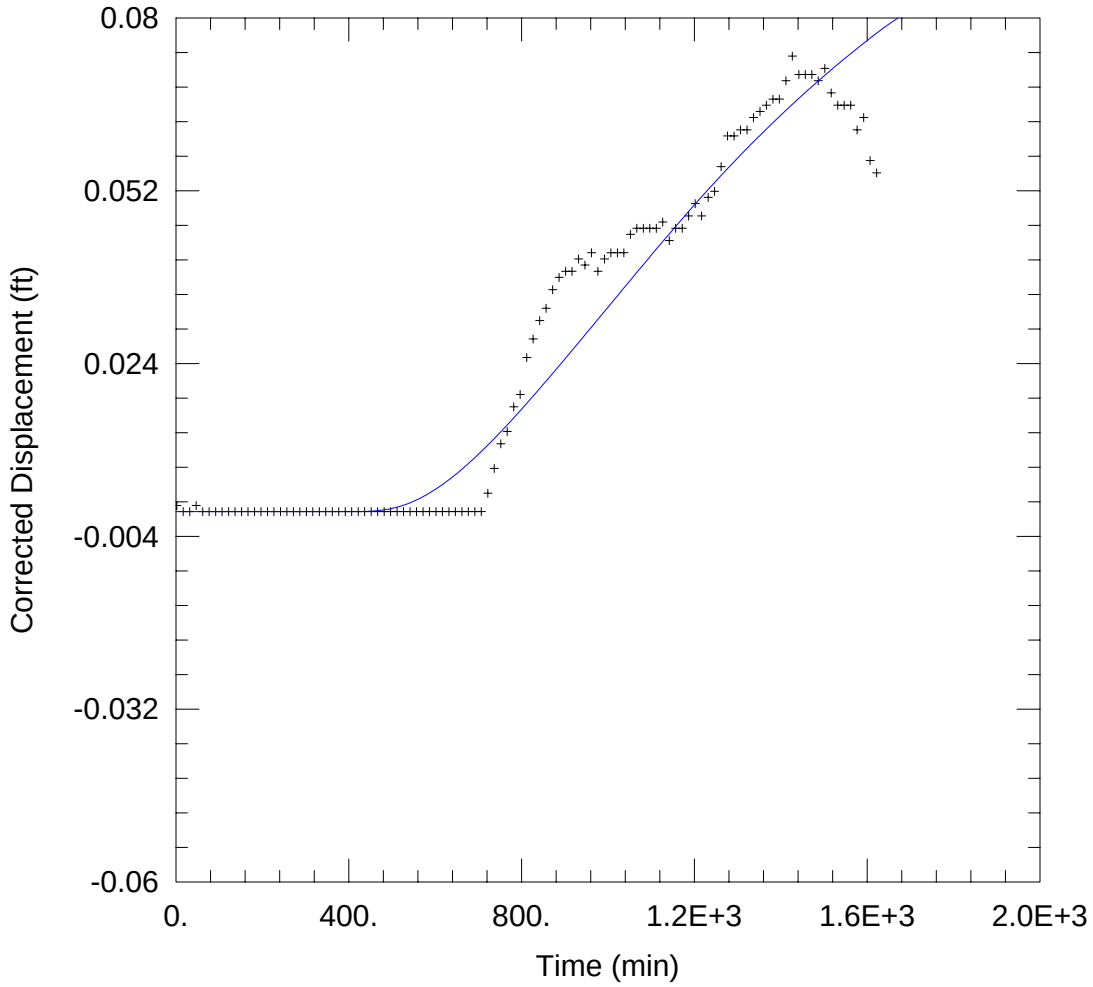
Well Name	X (ft)	Y (ft)
+ S-231	30	-38

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 176.7 ft^2/day
S = 0.0748
Kz/Kr = 1.
b = 15. ft


S-232 Observation Well Hydrograph (95 feet from Extraction Well S-230)
Aquifer Testing 8/18/08 Through 8/21/08
Groundwater Elevation (ft MSL)
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
-1.4
-1.6
-1.8
-2
Step Test Start
Constant Rate Test Start
Constant Rate Test Stop
GW Elevation
Manual Readings
8/18/2008 6:00
8/18/2008 12:00
8/18/2008 18:00
8/19/2008 0:00
8/19/2008 6:00
8/19/2008 12:00
8/19/2008 18:00
8/20/2008 0:00
8/20/2008 6:00
8/20/2008 12:00
8/20/2008 18:00
8/21/2008 0:00
8/21/2008 6:00
8/21/2008 12:00
8/21/2008 18:00
Time



WELL TEST ANALYSIS

Data Set: Z:\...\S-232 Constant Rate Data.aqt
Date: 09/16/08 Time: 22:23:51

PROJECT INFORMATION

Company: Aquaterra Technologies, Inc
Client: Sunoco, Inc. (R&M)
Project: Philly Refinery AOI-1
Location: 26th South, S-50 Area
Test Well: S-210
Test Date: 8/20/08-8/21/08

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
S-210	0	0

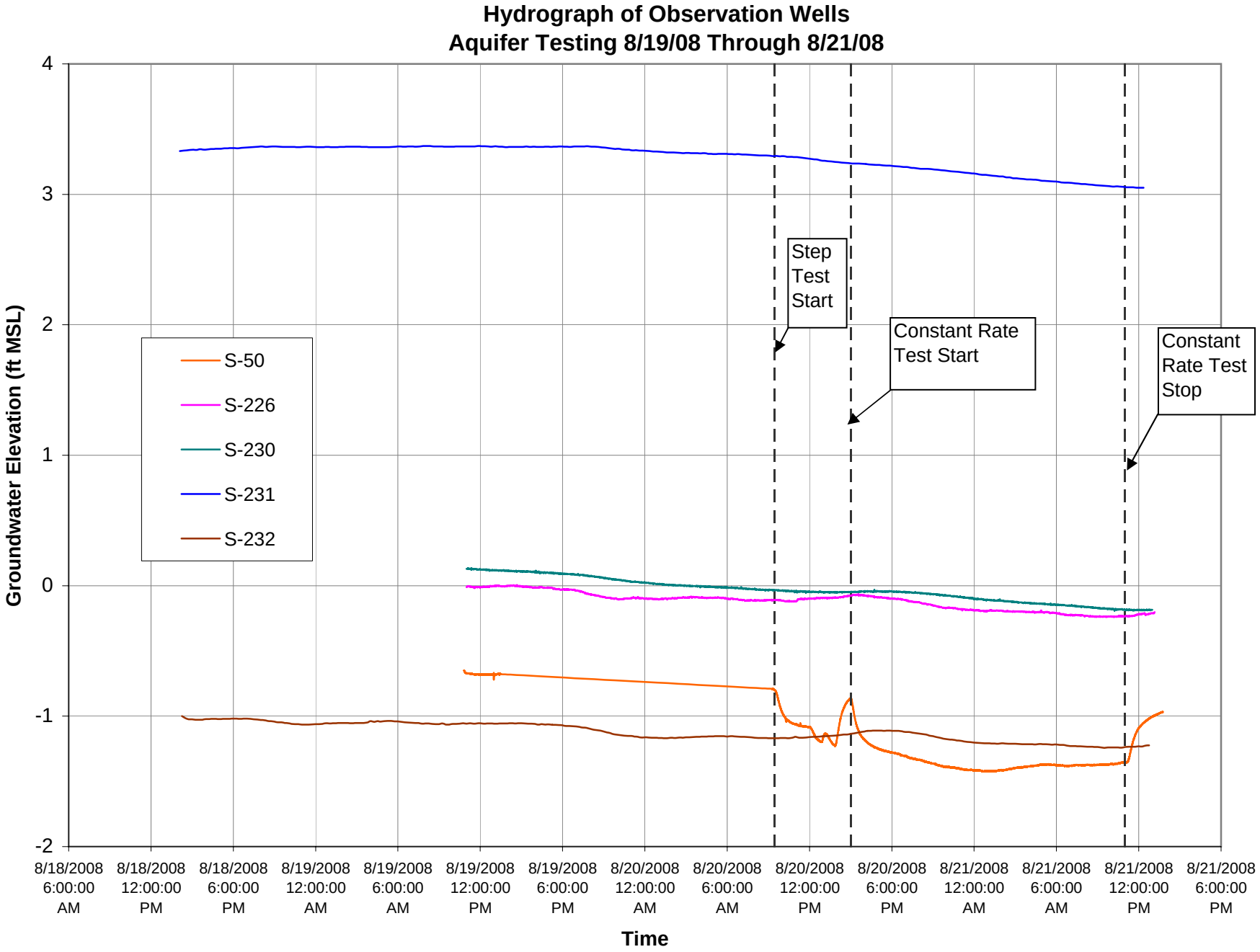
Observation Wells

Well Name	X (ft)	Y (ft)
+ S-232	22	-98

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 318. ft^2/day
S = 0.06053
Kz/Kr = 1.
b = 15. ft


Hydrograph of Observation Wells
Aquifer Testing 8/19/08 Through 8/21/08
Groundwater Elevation (ft MSL)
4
3
2
1
0
-1
-2
S-50
S-226
S-230
S-231
S-232
Step Test Start
Constant Rate Test Start
Constant Rate Test Stop
8/18/2008 6:00:00 AM
8/18/2008 12:00:00 PM
8/18/2008 6:00:00 PM
8/19/2008 12:00:00 AM
8/19/2008 6:00:00 AM
8/19/2008 12:00:00 PM
8/19/2008 6:00:00 PM
8/20/2008 12:00:00 AM
8/20/2008 6:00:00 AM
8/20/2008 12:00:00 PM
8/20/2008 6:00:00 PM
8/21/2008 12:00:00 AM
8/21/2008 6:00:00 AM
8/21/2008 12:00:00 PM
8/21/2008 6:00:00 PM
Time