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August 31, 2004

Pennsylvania DEP
Southeast Regional Office
2 East Main Street
Norristown, PA 19401

Attn: Mr. David Burke

**Re: Progress Report (January 1, 2003 through March 31, 2004)
26th Street Border, Sunoco Philadelphia Refinery
Point Breeze Processing Area**

Dear David:


Attached is the Progress Report (January 1, 2003 through March 31, 2004) for the 26th Street Border of Sunoco's Point Breeze Processing Area. Sunoco Inc (R&M) retained Secor International, Inc. (SECOR) to perform investigative activities during the reporting period and to prepare this progress report.

Activities performed during the reporting period included the installation of monitoring wells along the 26th Street perimeter of the refinery and to the east of 26th Street, installation of a horizontal utility conduit beneath 26th Street, groundwater sampling and analyses, liquid level gauging, pilot testing, and aquifer testing.

As recommended in the attached report, SECOR and Sunoco are currently working on the re-design of the RW-400 series recovery well system to include additional recovery wells along the 26th Street perimeter of the refinery. The re-designed system will also have the ability to recover LNAPL to the east of 26th Street in the vicinity of monitoring well S-98 when LNAPL is detected in that area.

We look forward to discussing the findings and recommendations of this report with you. Please call Jim Oppenheim (Sunoco, Inc.) at (610) 859-1881 or me at (484) 875-3075 with any questions or comments.

Sincerely,
SECOR International Incorporated


Steve Baggett, PG
Principal Hydrogeologist

Enclosure

Cc: James R. Oppenheim, Sunoco, Inc.
Frank Aceto, SECOR
Project File

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SUNOCO, INC.

**26TH STREET BORDER
POINT BREEZE PROCESSING AREA
PHILADELPHIA REFINERY
PHILADELPHIA, PENNSYLVANIA**

PROGRESS REPORT (January 1, 2003 through March 31, 2004)


August 31, 2004

Prepared for:

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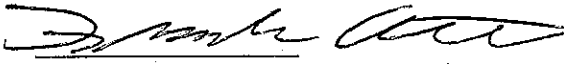

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Table of Contents

1.0 INTRODUCTION.....	1
1.1 Objectives.....	1
1.2 Report Organization	4
2.0 SITE SETTING.....	5
2.1 Site Location and Description	5
2.2 Geology and Hydrogeology	5
2.3 RW-400 Series Recovery System	8
3.0 SITE INVESTIGATIVE ACTIVITIES.....	9
3.1 Well Installation	9
3.2 Liquid Level Gauging.....	10
3.3 Groundwater Sampling and Analyses	10
3.4 Site Survey	10
3.5 Pilot Testing and Aquifer Characterization	11
3.5.1 Utility Conduit Installation.....	11
3.5.2 S-98 Pumping Test.....	12
3.5.3 S-193 Pumping Test.....	12
3.5.4 S-195 Pumping Test.....	12
3.5.5 Slug Testing	13
4.0 SITE CHARACTERIZATION RESULTS	14
4.1 Site Geology	14
4.2 Site Hydrogeology.....	15
4.2.1 Groundwater Elevation	15
4.2.2 Aquifer Characterization.....	16
4.2.2.1 Aquifer Testing/Pilot Testing	16
4.2.2.2 Slug Test Analyses.....	17
4.3 Light Nonaqueous Phase Liquids (LNAPL) Occurrence	17
4.4 Groundwater Analytical Results.....	19
4.5 RW-400 Series Recovery System Operation.....	20
5.0 REMEDIAL APPROACH.....	21
5.1 LNAPL along the 26th Street Border of the Point Breeze Processing Area	21
5.1.1 General Area of the RW-400 Series Recovery Wells	21
5.1.2 Areas of S-50 and S-124	22
5.2 LNAPL to the East of 26th Street (Area of S-98 and S-100)	22
6.0 SUMMARY AND RECOMMENDATIONS.....	25
6.1 Summary	25
6.2 Recommendations	28
7.0 REFERENCES.....	31

List of Tables

- 2-1 RW-400 Series Recovery Well Construction Summary
- 3-1 Monitoring Well Construction Specifications
- 4-1 Liquid Level Measurements – January 29, 2004
- 4-2 Liquid Level Measurements – March 17, 2004
- 4-3 Groundwater Analytical Results – March 17 and 18, 2004

List of Figures

- 1-1 Site Location Map
- 1-2 General Area of Investigation
- 2-1 Generalized Stratigraphic Column
- 2-2 RW-400 Series Recovery Wells Area
- 3-1 Site Monitoring Well Locations
- 4-1 Groundwater Elevation Contour Map – January 29, 2004
- 4-2 S-98 Aquifer Test Hydrograph (12/18/03)
- 4-3 S-193 Aquifer Test Hydrograph (12/22/03)
- 4-4 S-195 Aquifer Test Hydrograph (12/22/03)
- 4-5 Apparent LNAPL Thickness – January 29, 2004
- 4-6 Groundwater Analytical Results – March 17 and 18, 2004
- 4-7 Cumulative LNAPL Recovery 26th Street Recovery System – 2001 and 2003
- 5-1 Proposed Well Locations

List of Appendices

- A Hydrogeologic Cross Sections (from the January 2003 RI Report prepared by SECOR)
- B Summary of 2002 Aquifer Testing (from the January 2003 RI Report prepared by SECOR)
- C Monitoring Well Logs
- D Monitoring Well Survey Data
- E Monitoring Well Hydrographs
- F Slug Test Data Graphs
- G Extent of Measurable LNAPL Thickness Maps for September 3, 2002 and October 22, 2002 (from the January 2003 RI Report prepared by SECOR)
- H Groundwater Analytical Results – March 17 and 18, 2004

1.0 INTRODUCTION

This Progress Report was prepared for Sunoco, Inc. (R&M) (Sunoco) in order to summarize activities performed along the eastern portion of the Point Breeze Processing Area of the Philadelphia Refinery located in Philadelphia, Pennsylvania (refer to **Figure 1-1**) during the period of January 1, 2003 through March 31, 2004 (reporting period). Site investigation activities were previously performed to characterize the occurrence of light non-aqueous phase liquids (LNAPL) along the eastern perimeter of the Point Breeze Processing Area (refer to **Figure 1-2**) which borders 26th Street (also referred to as PA Route 291). These activities were documented in *Remedial Investigation Report, 26th Street Border Point Breeze Processing Area Philadelphia Refinery Philadelphia Pennsylvania* (RI Report) prepared by SECOR International, Inc. (SECOR) and dated January 31, 2003. In the RI Report, specific recommendations were presented to address LNAPL along the eastern perimeter of the refinery and to the east of 26th Street from the refinery, as well as a recommendation to prepare a summary report for the Year 2003 activities.

1.1 Objectives

As indicated above, this Progress Report has been prepared to provide a summary of activities performed along the eastern perimeter of the Point Breeze Processing Area during the period January 1, 2003 through March 31, 2004. The investigations documented in the RI Report were performed to address issues relating to the occurrence of LNAPL along the eastern perimeter of the refinery which were identified in a September 26, 2002 letter from the Pennsylvania Department of Environmental Protection (PADEP) to Sunoco. In their letter, PADEP requested a report of actions taken to investigate and prevent off-site migration of LNAPL along the 26th Street border of the refinery. The RI Report concluded that the occurrence of LNAPL during 2002 in specific wells (monitoring wells S-50, S-51, S-81, and S-98) as well as increased LNAPL thickness detected in wells along 26th Street resulted from a decline in the water table elevation during 2002 (under the prevailing drought conditions) rather than from a new release or the expansion of an existing LNAPL plume.

In response to issues presented in the PADEP September 26, 2002 letter, the results of activities and specific recommendations were presented in the RI Report to address LNAPL along the eastern perimeter of the refinery. Recommendations presented in the RI Report included:

- Operation of the total fluids recovery equipment installed in the RW-400 series recovery wells during November/December 2002.
- Evaluation of the need for additional recovery wells in order to control off-site LNAPL migration. If necessary a more expansive permanent system will be developed.

- In order to address the occurrence of LNAPL in the vicinity of monitoring well S-98 (located to the east of 26th Street from the refinery) either a utility/product conveyance conduit under 26th Street or a horizontal well under 26th Street will be installed. The utility conduit would be used to power recovery equipment and route recovered fluids to the refinery from vertical recovery well(s) across 26th Street. After installation, pilot testing of the selected configuration will be performed. Upon completion of the well installations and testing, recommendations for site remediation will be developed.
- Additional monitoring wells will be installed in the vicinity of S-98 and S-100 to provide further delineation of the extent of LNAPL. Site constraints such as the 26th Street ramp to the Schuylkill Expressway, traffic on 26th Street (during installation and future access to wells installed in the roadway), underground and aboveground utilities, and the steep slope of the hillside east of S-98 and S-100, may not allow access to the optimum drilling locations. As a result, monitoring wells may be installed along the top of the embankment and west of the railroad tracks and/or other areas accessible for monitoring well installation.
- A new base map will be prepared and a new survey will be performed for monitoring wells along the eastern portion of the Point Breeze Processing Area, the Belmont Terminal, and the area immediately east of 26th Street/west of the CSX railroad tracks. The monitoring wells will be surveyed by a Pennsylvania licensed professional surveyor relative to NAD 83 (horizontal datum) and NGVD 88 (vertical datum). The location of utilities along 26th Street will also be placed on the base map for use in the design of recovery systems that may include drilling horizontally under 26th Street.
- Once the new base map has been prepared, extent of LNAPL maps prepared for the Point Breeze Processing Area will also include the Belmont Terminal in order to provide a complete depiction of conditions along 26th Street.
- Monitoring wells installed during this investigation will be incorporated into the ongoing facility groundwater monitoring program as appropriate.
- Initiate periodic manual LNAPL skimming from select wells in the RW-400 series wells area (RW-400, RW-405, and RW-406), to the east of 26th Street (S-98, S-100, CSX-MW-5), S-50, and S-124. Periodic manual LNAPL recovery will be terminated in these areas when the current recovery systems are activated (RW-400 series area).
- Provide a status of the progress of Year 2003 activities in an annual summary report to be submitted to PADEP.

The RI Report also recommended additional characterization and remedial testing to address the occurrence of LNAPL in the vicinity of monitoring wells S-50 and S-124. Investigations in these areas were not performed during 2003 but will be performed as part of site-wide investigations as defined in the 2003 Consent Order & Agreement and Phase 1 Remedial Plan.

This Progress Report presents the status of the activities that were recommended in the RI Report and implemented during the reporting period. The operation of the RW-400 series recovery wells and other site LNAPL recovery and monitoring efforts are summarized in quarterly progress reports submitted to PADEP by Sunoco. The activities documented in this Progress Report include:

- Installation of 19 wells, 5 wells were installed on CSX Transportation, Inc. (CSXT) property to the east of 26th Street (in the general vicinity of monitoring wells S-98) and 14 wells were installed inside the refinery along 26th Street.
- Liquid level gauging and evaluation of historic liquid level data,
- Collection and analyses of groundwater samples from monitoring wells in the vicinity of the RW-400 series recovery wells and to the east of 26th Street which did not have LNAPL.
- Installation of a horizontal utility conduit beneath 26th Street. This conduit was used to route fluids extracted from S-98 (located on CSXT property) during a pumping test to the refinery.
- Performance of well capacity/aquifer tests and slug tests in existing and newly installed wells on CSXT property, and
- Completion of a site-wide survey including all monitoring wells in the Point Breeze Processing Area, the Belmont Terminal, and the area immediately east of 26th Street/west of the CSX railroad tracks. The monitoring wells were surveyed by a Pennsylvania licensed professional surveyor relative to NAD 83 (horizontal datum) and NGVD 88 (vertical datum).

This Progress Report also provides recommendations for site remediation activities that were developed on investigative and operational data

1.2 Report Organization

The remainder of this Progress Report has been divided into the following sections:

Section 2.0 – Summarizes the site setting including location and description, geology and hydrogeology, and provides a description of the 400 series recovery well system.

Section 3.0 – Provides a description of the field investigations performed during the reporting period.

Section 4.0 – Provides a discussion of the results of the activities performed during the reporting period.

Section 5.0 – Presents a discussion of approach to obtain hydraulic control and recover LNAPL along portions of the 26th Street perimeter of the Point Breeze Processing Area and to recover LNAPL to the east of 26th Street.

Section 6.0 – Presents the conclusions of the activities documented in this Progress Report and recommendations for future remedial activities.

2.0 SITE SETTING

This section provides a brief description of the project area. Included is a discussion of the project location, the regional geology and hydrogeology (based investigations documented in the RI Report), and the 400 series recovery well remedial system.

2.1 Site Location and Description

The Point Breeze Processing Area of the Philadelphia Refinery is located in south Philadelphia, Pennsylvania (refer to **Figure 1-1**). The Point Breeze Processing Area is bounded to the north by Sunoco's Belmont Terminal and Passyunk Avenue; to the west by the Schuylkill River and the Girard Point Processing Area of the Philadelphia Refinery; to the south by Penrose Avenue; and to the east by 26th Street.

As indicated on **Figure 1-2**, the area of investigation includes the eastern portion of the Point Breeze Processing Area. Areas also investigated were adjacent to the eastern side of 26th Street and to the west of the railroad tracks, which are properties owned by CSX Transportation, Inc. (CSXT), Steen Company, and Ryder Company. Activities included the testing and gauging new and previously existing wells on the CSXT property (refer to **Figure 1-2**).

As indicated on **Figure 1-1**, to the east of the railroad tracks that parallel 26th Street, are the Defense Support Center Philadelphia (DSCP) and a former residential area owned by the Philadelphia Housing Authority (the former PHA property). A LNAPL plume on the water table occurs to the east of the Point Breeze Processing Area and encompasses the central and southern portion of the DSCP property, the northern portion of the Philadelphia Housing Authority Property, and the Steen Property. The DSCP is working under an order from PADEP to address this area.

2.2 Geology and Hydrogeology

The Point Breeze Processing Area is located within the Coastal Plain Physiographic Province approximately one mile southeast of the Fall Line. The topographic elevation of the study area generally ranges from 15 to 30 feet above mean sea level with a gentle slope to the west and south. The Coastal Plain is characterized by gently southeastern dipping, unconsolidated marine and fluvial deposits of clay, silt, sand, and gravel of late Cretaceous and Tertiary Age.

Previous investigations in the area indicate that the surficial geology consists of localized fill, Quaternary Alluvium and Pleistocene-age Trenton Gravel. The Quaternary Alluvium in the area is reported to consist predominantly of sandy silt and sandy micaceous clay. This unit generally ranges in thickness from 0 to 20 feet. The Trenton Gravel underlies the Quaternary Alluvium.

The Trenton Gravel is described as gray or pale reddish-brown, very gravelly sand interstratified with semi-consolidated limonite cemented sand and clayey silt beds; and includes areas of alluvium and swamp deposits. The sediments are poorly sorted (Balmer and Davis, 1996). The thickness of the Trenton Gravel is underlain by a sequence of Upper Cretaceous Age sand and clay units which overlie the crystalline bedrock of the Wissahichon Formation (a well foliated schist and gneiss). A generalized stratigraphic column for the Coastal Plain is presented as **Figure 2-1**, although the wedge of Coastal Plain sediments thin to the northwest towards the Fall Line.

The RI Report presented a discussion of the site-specific geology and geologic cross-sections based on monitoring well and recovery well drilling logs. These cross-sections (cross-sections A-A' through D-D') and a site plan displaying the lines of geologic-cross sections are presented in **Appendix A**. Also presented on these cross-sections are depths to liquid measurements recorded on October 22, 2002.

The RI Report also presented an evaluation of the site hydrogeology. The evaluation was based on review of historic liquid level data (through hydrographs), an aquifer test at recovery well RW-406, slug tests, and short duration capacity testing of the RW-400 series wells (with the exception of RW-400). A review of the findings of these activities is presented below.

As described in the RI Report, an aquifer/LNAPL recovery test was performed during 2002 when RW-406 was pumped for 3,300 minutes at a discharge rate ranging from 1.85 to 2.74 gpm. **Table B-1 (Appendix B)** summarizes the liquid level data collected in RW-406, observation wells RW-401, RW-402, PZ-401, PZ-402, S-82, and S-125 during the test. The observed drawdown from the pumping ranged from approximately 0.14 feet at S-82 (approximately 56 feet from RW-406) to 0.87 feet at PZ-402 (approximately 10 feet from RW-406). A change in water level elevation of approximately 0.08 feet was observed at RW-402 (approximately 110 feet from RW-406) although it is not conclusive that this change resulted from the pumping of RW-406 or from background groundwater level fluctuations. As will be discussed, this data was used to guide the installation of wells along the 26th Street perimeter of the refinery which may be used as perimeter recovery wells. The data from the test suggested that if a lowered water level in RW-406 is maintained, LNAPL can be recovered at improved rates. However, under conditions of a rising water table, the ability to recover LNAPL may be decreased. Results of the RW-406 aquifer testing are included in **Appendix B**.

Transmissivity values estimated from the RW-406 aquifer test ranged from 252 ft²/day (RW-406) to 554 ft²/day (RW-401) with a geometric mean of 357 ft²/day. Assuming an aquifer thickness for the aquifer test of 12.5 feet (based the depth of RW-406 minus the static corrected depth to water), the estimated hydraulic conductivity values ranged from 20 feet/day (RW-406) to 44

feet/day (RW-401) with a geometric mean of 28.5 feet/day (hydraulic conductivity is equal to the transmissivity divided by the aquifer thickness).

Recovery data recorded at RW-406 was also analyzed to provide an estimate of aquifer transmissivity. The recovery data was analyzed using the Theis (1935) method for the analyses of recovery data with the correction for unconfined aquifer conditions. An average flow rate of 2.18 gpm was assumed for the duration of pumping. The transmissivity values ranged from 200 ft²/day (PZ-402) to 427 ft²/day (RW-406) with a geometric mean of 301 ft²/day. Estimated hydraulic conductivity values ranged from 16 feet/day (PZ-402) to 34 feet/day (RW-406) with a geometric mean of 24 feet/day.

A review of historical liquid level gauging data was prompted by the Spring 2002 occurrence of LNAPL in monitoring wells S-50, S-51, S-81, and S-98. The data reviewed suggested that the 2002 occurrence of LNAPL in these wells as well as increased LNAPL thickness detected in wells along 26th Street result from a decline in the water table elevation during 2002 (under the prevailing drought conditions) rather than from a new release or the expansion of an existing LNAPL plume. Liquid level data collected during 2002 depicted an overall southerly direction of groundwater movement. Recent liquid level gauging data from these wells is discussed in Sections 4.2. and 4.3.

Slug tests were performed in seven wells in order to estimate the saturated aquifer hydraulic conductivity in the vicinity of the well tested. Hydraulic conductivity values ranged from 0.29 ft/day (S-127) to 12.6 feet/day (S-122). The highest hydraulic conductivity values were reported near the southern boundary of 26th Street perimeter of the refinery at S-122 (12.6 ft/day) and S-120 (11.7 feet/day). Significantly lower hydraulic conductivity values were reported north of this area at S-127, S-86 (0.30 feet/day), and S-43 (0.76 feet/day). The estimated hydraulic conductivity at RW-406 was 7.22 feet/day, although the values estimated from the aquifer test drawdown and recovery data were 20 feet/day and 34 feet/day, respectively. Data obtained from slug tests are considered estimates and representative only of materials in the immediate vicinity of the well tested.

Short-duration capacity tests were performed on RW-402, RW-403, RW-404, and RW-405 in order to evaluate LNAPL recovery and sustainable flow rates for future systems operation. These wells were redeveloped using a surge block and vacuum truck prior to testing. Groundwater Discharge rates for the tests ranged from approximately 0.88 gpm to 2.74 gpm. Results of the capacity testing are summarized in **Appendix B**. Based on the testing performed, it is anticipated that product can be recovered from the RW-400 series wells if a lowered water level can be maintained. Under a low water table elevation, similar to the elevation of the test period, an increased product recovery rate as compared to previous well performance can be accomplished.

Individual well groundwater extraction rates of approximately 0.5 to 2.5 gpm are anticipated for system operation.

2.3 RW-400 Series Recovery System

As described in the RI Report, a groundwater/LNAPL recovery system was installed in 1995 on the northern portion of the 26th Street perimeter of the Point Breeze Processing Area and the southern portion of the Belmont Terminal (RW-400) as part of the work conducted under the 1993 Consent Order between Sunoco and PADEP. The recovery system consists of RW-400, RW-402, RW-403, RW-404, RW-405, and RW-406 (RW-401 was replaced by RW-406 during 2000 because of excess silt in the bottom of RW-401). These wells were installed to recover LNAPL along the 26th Street perimeter of the refinery. The locations of the RW-400 series recovery wells are depicted on **Figure 2-2** and well construction specifications are presented on **Table 2-1**.

The evaluation of the previously existing dual pump recovery system indicated that the reconfiguration of the system to a total fluids recovery system would likely enhance LNAPL recovery. To accomplish this, the existing pumps were removed and replaced with total fluids (water and LNAPL) pumps. It is anticipated that this system will allow more effective LNAPL recovery.

Total fluids pneumatic recovery pumps were placed in RW-400, RW-402, RW-403, RW-404, RW-405, and RW-406 between November 2002 and January 2003. A remediation trailer that contains an air compressor and an oil/water separator was placed adjacent to RW-400. The air compressor and the oil/water separator are appropriately sized for the six recovery wells based on the results of the capacity testing. An compressed air supply line has been connected from the air compressor to each total fluids pump. The existing HDPE discharge line has also been reconfigured to route fluids from each recovery well to the oil/water separator. Recovered LNAPL from the oil/water separator gravity drains to the existing recovery tank adjacent to RW-400. Water from the oil/water separator is routed to the refinery NPDES-permitted wastewater treatment facility.

A discussion of the LNAPL recovery rates for the RW-400 series wells during 2003 is presented in Section 4.5.

3.0 SITE INVESTIGATIVE ACTIVITIES

This section describes the field activities performed during the reporting period. Activities performed included well installation, liquid level measurements, aquifer/well capacity testing, and slug testing.

3.1 Well Installation

A total of 19 wells (designated S-179 through S-197) were installed between November 20, 2003 and January 14, 2004. Fourteen of the wells (S-179 through S-192) were installed along the eastern perimeter of the Point Breeze Processing Area in order to monitor the occurrence of LNAPL and may be used as recovery wells for the expansion of the RW-400 series wells system (also referred to as the 26th Street area recovery system). These wells were placed along the perimeter fence-line at a spacing of approximately 50 feet (based on the influence observed during the RW-406 aquifer test). Five wells (S-193 through S-197) were installed on the CSXT property east of 26th Street. S-193 and S-194 were installed as observation wells for aquifer testing of monitoring well S-98. Wells S-195, S-196, and S-197 were installed for the additional delineation of LNAPL to the east of 26th Street. Well locations are displayed on **Figure 3-1**.

Monitoring well installation was initiated on November 20, 2002 by Parratt-Wolffe, Inc. under the supervision of a SECOR geologist. Soil borings were advanced at each location using continuous flight hollow-stem auger drilling techniques. During drilling, continuous soil samples were collected for lithologic description to the target depth with a split-barrel sampling device. Organic vapors in the headspace of soil samples were monitored with a photoionization detector (PID). The subsurface lithology and PID measurements were recorded by the supervising geologist on a lithologic log (refer to **Appendix C**).

Once the termination depth of each soil boring was reached, the well casing and screen was inserted into the boring through the center of the hollow-stem auger. The monitoring wells were constructed of 4-inch diameter schedule 40 polyvinyl chloride (PVC) well screen and solid PVC riser. Lengths of pipe were joined using threaded flush joint couplings. The well screen was pre-constructed, commercially slotted, with a slot size of 0.020 inches. The bottom of each screen was provided with a slip-on cap. A well sorted silica filter sand (#2 grade) was poured through the augers from the bottom of the boring to a level above the top of the screened interval to fill the annular space. In the remaining annular space above the sand pack, a bentonite seal was placed and then it was filled with a bentonite grout to the surface. Soil cuttings were placed in the vicinity of the wellheads and subsequently placed into roll-off containers for appropriate off-site disposal (drill cuttings for wells installed on CSXT property were relocated to the Sunoco refinery pending proper off-site disposal). Monitoring well construction specifications are summarized on **Table 3-1**. As indicated on **Table 3-1**, monitoring wells were completed to

depths ranging from 30 to 55.7 feet below bgs. The depths of the wells installed on refinery property ranged from 33.4 to 35 feet. Monitoring wells S-196 and S-197 were installed at the top of the embankment on CSXT property and are 55 feet and 55.7 feet deep, respectively.

Monitoring wells were developed to provide efficient hydraulic communication between the well and the surrounding aquifer using a surge block and/or vacuum truck equipped with a surging device. No water was added to the wells during development. All well development water was routed to the refinery's NPDES permitted wastewater treatment facility.

3.2 Liquid Level Gauging

Depths to liquids were gauged in monitoring wells within the area of investigation on January 29, 2004. The depth to groundwater and the depth to LNAPL (if present) in each well were measured using an electronic oil/water interface probe. This instrument is capable of measuring the depth to liquids to an accuracy of 0.01 foot. The depth to water was measured from the top of the PVC well casing (TOC). Several flush-mount wells within the study area were not accessible during this event due to snow cover. Data collected during these and other gauging events conducted as part of other facility activities were used to evaluate water table fluctuations and LNAPL occurrence.

3.3 Groundwater Sampling and Analyses

During March 2004, groundwater samples were collected from LNAPL free monitoring wells in the vicinity of the RW-400 series recovery wells and to the east of 26th Street. On March 17, 2004, the depths to liquids were recorded in 36 wells to the west of 26th Street. Subsequently, groundwater samples were collected from 20 monitoring wells.

On March 17 and 18, 2004 groundwater samples were collected from 14 wells along the 26th Street border of the refinery and from 6 wells to the east of 26th Street. Wells were purged of at least three well volumes prior to sample collection. Purge water was routed through granular activated carbon (GAC) and discharged to the ground surface. Groundwater samples were analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX) per USEPA Method 624.

3.4 Site Survey

A survey of the well locations and well and ground surface elevations in the Point Breeze Processing area, Belmont Terminal, and Sunoco wells to the east of 26th Street was performed during April and May 2003. The site survey was performed by James Stewart, Inc. of Philadelphia, Pennsylvania (a professional surveyor registered in Pennsylvania). The well horizontal locations were surveyed relative to the North American Datum of 1983 (NAD 83).

The well elevations were referenced to Mean Sea Level, North American Vertical Datum, 1988 Adjustment (NAVD 88). A revised corrected planometric site map was prepared using previous aerial photography for the site. The April/May 2003 survey data has previously been provided to PADEP. Well location and elevation data is tabulated in **Appendix D**.

3.5 Pilot Testing and Aquifer Characterization

Pilot testing and aquifer characterization activities were focused on the area to the east of 26th Street in the vicinity of monitoring well S-98 which reported up to 1.14 feet of LNAPL during 2002. As described in the RI Report, the apparent LNAPL thickness in S-98 recovered more quickly than the other wells in which product bail-down tests were performed during 2002. The test bail-down test performed at S-98 indicated greater than 100% recovery of the static apparent LNAPL thickness within 45 minutes with an apparent LNAPL thickness of 0.62 feet at the end of the test. This suggested that LNAPL recovery efforts to the east of 26th Street be focused in this area. As a result, activities performed during the reporting period (January 2003 through January 2004) included the installation of a utility conduit beneath 26th Street, pumping tests at monitoring wells S-98, S-123, and S-125, and three slug tests. These activities are described below.

3.5.1 Utility Conduit Installation

In order to perform a pumping test at S-98 and to manage liquids generated during future remedial efforts, it was necessary to install a horizontal utility conduit beneath 26th Street extending from on the Point Breeze Processing Area to the CSXT property adjacent to the refinery (an Access Agreement was executed between Sunoco and CSXT for conduit and well installation). The horizontal utility conduit was installed to route fluids (water and recovered LNAPL) back to the refinery and provide power for down-well pumps, as necessary. Before installing the conduit, the necessary City of Philadelphia permits were obtained which included acknowledgements from utility companies with potential underground facilities in the area that they were aware of the project. The PA-one-call underground utility locating service was also contacted as required by state law.

The horizontal conduit was installed using horizontal drilling techniques. The drill rig setup on refinery property and drilled a horizontal a borehole approximately 400 feet long with a maximum depth of approximately 15 to 20 feet below ground surface (bgs). The conduit was completed by pulling 6-inch diameter HDPE piping through the borehole. The conduit extends from the vicinity of RW-406 (on refinery property) to the CSXT property in the vicinity of existing monitoring well S-98. Three HDPE pipes were installed within the conduit (two 2-inch and one 1-inch diameter pipes). The location of the conduit is depicted on **Figure 3-1**.

3.5.2 S-98 Pumping Test

A pumping test was performed at monitoring well S-98 (refer to **Figure 3-1** for well location) in order to evaluate potential LNAPL recovery and the extent of influence from pumping. Prior to conducting the test, S-98 was redeveloped using a surge block and vacuum truck. S-98 is a 4-inch diameter well approximately 35 feet deep (PVC well screen extends from 15 to 35 feet bgs).

The test was performed December 18, 2003 and consisted of pumping S-98 for 480 minutes at pumping rates between 3.5 and 5.6 gpm with an electric submersible pump (powered by a generator) and monitoring depth to liquids in nearby observation wells. The extraction rate from S-98 was monitored using an in-line electronic flow meter. Fluids evacuated during the test were routed through the utility conduit to the RW-400 series wells recovery system oil/water separator. The liquid levels in the pumping well and nearby observation wells were monitored using an electronic data logger and a hand held interface probe capable of detecting water and LNAPL. The flow rate was adjusted during the test in order to evaluate the sustainable yield of the well and to evaluate the influence on groundwater/LNAPL elevations in nearby observation wells.

Water levels in S-98 and nearby observation wells were monitored for approximately 600 minutes following the cessation of active pumping. The results of the S-98 pumping test data will be described in Section 4.2.2.1. As will be discussed in Section 4.2.2.1, minimal influence was observed at the observation wells. As a result, pumping tests were performed at monitoring wells S-123 and S-125 in order to further evaluate the hydraulic properties of aquifer materials in the general vicinity of S-98.

3.5.3 S-193 Pumping Test

On December 22, 2003, monitoring well S-193 was pumped at rate of approximately 0.5 gpm for approximately 25 minutes. Water levels were monitored in observation wells S-98 and S-194. The test was terminated after approximately 25 minutes because the well dewatered (over eight feet of drawdown was recorded).

3.5.4 S-195 Pumping Test

Also on December 22, 2003, monitoring well S-195 was pumped at a rate from approximately 1 gpm to 6.6 gpm (the maximum capacity of the pump) for approximately 135 minutes. Water levels were monitored in observation wells S-98 and S-194. The results of the S-193 and S-195 pumping tests are discussed in Section 4.2.2.1.

3.5.5 Slug Testing

During December 2003, three slug tests were performed to approximate the hydraulic conductivity of the saturated unconsolidated material in the vicinity of the well tested. Slug tests were performed in newly installed wells to the east of 26th Street (S-193, S-194, and S-195).

A slug test is a single well test that consists of rapidly changing the water level in the well and recording the response of the aquifer. The slug test involves placing a cylindrical object (a "slug") in the well. When water levels stabilized following insertion, the object was removed resulting in an increasing water level (rising head) in the well. Care was taken to ensure that adequate water was displaced so that the test was measuring aquifer properties rather than the properties of the sand pack. Following removal of the slug, the change in water level was monitored using a pressure transducer and data logger. The data logger was set to record at intervals of seconds or fractions of a second to obtain the necessary data.

Slug test data were reduced and analyzed using the Bouwer and Rice (1976) method for determining the hydraulic conductivity of unconfined water-bearing zones. Slug test data is presented in **Appendix F** and results of the slug testing program are discussed in Section 4.2.2.2.

4.0 SITE CHARACTERIZATION RESULTS

This section presents the results of the site investigation activities described in Section 3.0. Also included, is a discussion of the operation of the RW-400 series wells recovery system.

4.1 Site Geology

A total of 19 were installed between November 20, 2003 and January 14, 2004. Fourteen of the wells (S-179 through S-192) were installed along the eastern perimeter of the Point Breeze Processing Area in the general area of the RW-400 series recovery wells. These wells were placed along the perimeter fence-line at a spacing of approximately 50 feet (based on the influence observed during the RW-406 aquifer test) and the maximum depth of exploration was 35 feet bgs. Five wells (S-193 through S-197) were installed on the CSXT property east of 26th Street. Lithologic descriptions and the results of the photoionization detector (PID) headspace screening of the soils collected from continuous split-spoon samples are presented on the well logs (refer to **Appendix C**).

Review of the well log data for wells installed in the general area of the RW-400 series recovery wells (wells S-179 and S-192) indicate that the near-surface materials typically consist of fill, clay, and silt, and silty sands, to depths generally ranging from 17 to 25 feet bgs (note that the upper 8 feet of each borehole was "soft dug" using hydraulic jetting to identify and locate potential subsurface utilities, therefore lithologic data for this interval is not available). At wells located inside the AST 26 berm (monitoring wells S-189 through S-192), the surficial fill/clay/silt extends only to a depth of approximately 10 feet bgs (this may be attributed to a ground surface elevation difference and/or the reworking of subsurface materials prior to AST construction). Beneath the surficial deposits, the materials encountered were predominantly well graded medium grained sand and poorly-graded sand and gravel with less frequent clay and silt horizons.

On the CSXT property, wells were installed near the bottom of the embankment (S-193, S-194, and S-195) and along the top of the embankment (S-196 and S-197). At wells S-193 and S-194, the near-surface materials consist of fill, clay, and silt with some sand to a depth of 25 feet bgs. In S-193, mostly gravelly sand was encountered between 25 and 35 feet bgs, while at S-194 clay, fine-grained sand and gravelly sand was encountered from 25 to 32 feet bgs. At S-195, silt was encountered from 0 to 4 feet bgs, and the remainder of the borehole was sand and alternating clay silt/silty clay. Gravel was encountered at the bottom of the S-195 borehole (35 to 36 feet bgs).

At the locations of the two wells installed near the top of the CSXT embankment, S-196 and S-197, fill, silt and clay was encountered to depths of 24 and 31.5 feet bgs, respectively. Beneath this material, intervals of sand and silt in S-196 (24 to 37 feet bgs) and sand in S-197 (31.5 to 34

feet bgs) were encountered. The material in the lower portion of this zone was wet and may be perched above the underlying clay. At S-196, clay was encountered from 37 feet bgs to 48 feet bgs with sand and sandy gravel from 48 to 58 feet bgs. At S-197 clay was encountered from 34 feet bgs to 45 feet bgs with sandy gravel from 45 to 54 feet bgs.

As previously mentioned, the wells installed during this well drilling event have not yet been surveyed. Once these wells are surveyed, additional geologic cross-sections may be prepared if determined necessary (cross-sections presented in the RI Report are presented in **Appendix A**).

4.2 Site Hydrogeology

Data was collected during the reporting period to further assess the hydrogeologic conditions in the study area. Activities included depth to liquids measurements (study area-wide) and pilot/aquifer testing performed to the east of 26th Street on CSXT property.

4.2.1 Groundwater Elevation

Depth to liquids measurements and the 2003 site survey data were used to prepare a groundwater elevation maps for the January 29, 2004 gauging event (**Figures 4-1**). Liquid level measurements recorded during the January 29, 2004 well gauging event are presented on **Table 4-1**. As previously mentioned, some flush-mount wells were not gauged during this event do to snow cover.

Figure 4-1 depicts a general overall southerly direction of groundwater movement. The groundwater elevations generally range from approximately 4.5 feet in general area of the Belmont Terminal/Point Breeze Processing Area border to the north, to -2.98 at monitoring well S-44 (located near the 26th Street border and south of Pollock Street Sewer). Along the southern boundary of the study area (near Penrose Avenue), the groundwater elevation ranged from 0.17 feet to 0.29 feet (wells S-25, S-26, and S-124). The ground surface elevations range from 28 feet near the Belmont Terminal/Point Breeze Processing Area border to 18 feet near Penrose Avenue.

Hydrographs for select monitoring wells hydrographs are included in **Appendix E** for the general period of late 1995 through 2003 (not all wells were gauged during each gauging event). The 2003 survey data was used to construct these hydrographs. Seasonal water table fluctuations are depicted on these hydrographs (additional discussion will be presented in Section 4.5 in the context LNAPL occurrence). These hydrographs indicate an overall decrease in the water table elevation of approximately 2 to 3 feet from spring 2001 through late summer/early fall 2002. The lowest water table elevations in the time period depicted in the hydrographs occurred during through summer/early fall 2002. This decline in water table elevation is attributed to regional drought conditions during the period. Liquid levels elevations recorded from late October 2002

through the Fall of 2003 depict a general increase in the water table elevation of approximately 3 feet. Water levels near the end of 2003 were approximately 2.5 to feet higher than during the summer of 2003 (refer to hydrographs for S-50, S-51, S-81, S-98 and S-100 in **Appendix E**).

4.2.2 Aquifer Characterization

The following is a discussion of aquifer/pilot testing and slug tests performed to the east of 26th Street on CSXT property. These tests were performed to address PADEP's concern with the occurrence of LNAPL to the east of 26th Street expressed in the September 26, 2001 letter to Sunoco. As described in Section 3.0, testing was focused on the vicinity of S-98 based on the results of previous liquid level measurements and LNAPL bail-down testing.

4.2.2.1 Aquifer Testing/Pilot Testing

As described in Section 3.4.2, an aquifer test was performed at monitoring well S-98 in order to evaluate LNAPL recovery and assess the extent of influence from the pumping. S-98 was pumped for 480 minutes at rates ranging from approximately 3.5 gpm to 5.6 gpm.

Figure 4-2 presents a hydrograph of S-98 and nearby observation wells during the pumping portion of the test. Depth to liquids were monitored in nearby wells S-193 (22 feet from S-98), S-194 (12 feet from S-98), S-195 (approximately 130 feet from S-98), and S-197 (approximately 150 feet from S-98). As indicated, only minor influence on the water levels in the observation wells was observed during the test (less than 0.2 feet of drawdown at S-194). No LNAPL was detected in any wells during the testing (as described in Section 4.2.1, the water table was approximately 3 feet higher than during the summer of 2002 when LNAPL was observed in S-98) (refer to Section 4.3).

As indicated on **Figure 4-2**, approximately 6 feet of drawdown was measured at S-98 during the test (no LNAPL entered the well during the test). The water level in the well recovered to near static conditions within 15 minutes of the termination of pumping. Based on the available drawdown in the well, the data suggests that the sustainable yield from S-98 is on the order of 3 gpm.

Since influence from the pumping of S-98 was not observed at any of the observation wells, additional pumping tests were performed at S-193 and S-195 (S-194 was not tested because of the extremely slow recovery rate observed during slug testing, refer to Section 4.2.2.2). These tests were performed in order to estimate potential pumping rates in the event that these wells were used as recovery wells in the future and to determine if there was any influence in nearby observation wells.

On December 22, 2003, S-193 was pumped at rate of approximately 0.5 gpm for approximately 25 minutes. Water levels were monitored in S-98 and S-194. The test was terminated after approximately 25 minutes because the well dewatered (over eight feet of drawdown was recorded). **Figure 4-3** presents a hydrograph of S-98 and nearby observation wells. As indicated, no influence from the pumping was recorded during the test. In addition, LNAPL was observed in any wells during the test during the test.

Also on December 22, 2003, S-195 was pumped at rates from approximately 1 gpm to 6.6 gpm (the maximum capacity of the pump) for approximately 135 minutes. Water levels were monitored in S-98 and S-194. **Figure 4-4** presents a hydrograph of S-98 and nearby observation wells. As indicated, no influence from the pumping was recorded during the test. **Figure 4-4** also indicates that the water level in the pumping in the well stabilized during the 1 gpm, 2 gpm, and 4 gpm pumping intervals. The water level returned to near-static conditions within one minute after termination of pumping. LNAPL was not observed in any wells during the test during the test.

4.2.2.2 Slug Test Analyses

Slug tests were performed in three wells (S-193, S-194, and S-195) in order to estimate the saturated aquifer hydraulic conductivity in the vicinity of the well tested. Slug test rising head (S-193 and S-195) data or falling head data (S-194) was analyzed using the Bouwer and Rice (1976) method for unconfined water bearing zones (data graphs are presented in **Appendix F**). Falling head data ("slug-in") was used for S-194 because of the slow water level recovery rate.

A significant range in the hydraulic conductivity values was determined. The estimated hydraulic conductivity values were 0.009 ft/day at S-194, 0.12 ft/day at S-193, and 27.1 ft/day at S-195. This data depicts a significant variability in the water-bearing capacity of aquifer materials in the immediate vicinity of well S-98.

4.3 Light Nonaqueous Phase Liquids (LNAPL) Occurrence

Figure 4-5 presents the apparent LNAPL thickness measured in study area wells during the January 29, 2004 gauging event. Liquid level measurements recorded during the January 29, 2004 well gauging event is presented on **Table 4-1**. As previously mentioned, some flush-mount wells were not gauged during this event do to snow cover.

Figure 4-5 indicates LNAPL occurrence along 26th Street in the general area of the RW-400 series recovery wells. However, LNAPL was only detected in two of the newly installed wells along the 26th Street perimeter of the refinery (S-190 and S-191 with an apparent LNAPL thickness of 0.08 feet and 0.07 feet, respectively). LNAPL was detected to the east of 26th Street

in S-100 but not in S-98, S-99, S-101, S-193, S-194 or S-195 (S-196 and S-197 were not gauged during this event do to snow cover but reported the absence of LNAPL during December 2003 aquifer test data collection).

LNAPL was also detected at S-50 (apparent LNAPL thickness was 0.45 feet) located near the 26th Street perimeter of the refinery. The extent of LNAPL in this area is delineated to the north by S-51, to the west by S-127, and to the south by S-45.

The only perimeter well south of S-50 in which LNAPL was reported was S-124 (apparent LNAPL thickness was 0.69 feet). LNAPL was not detected immediately northeast (S-38) and southeast (S-26) of S-124. As presented in the RI Report wells immediately northeast of S-124, including S-123 and S-197 had apparent LNAPL thickness of 0.66 feet and 1.03 feet, and 1.68 feet and 1.54 feet, respectively, during the September and October 2002 gauging events. During the January 29, 2004 event, these wells reported 0.01 feet of LNAPL.

In general, the apparent LNAPL thicknesses are less and aerial extent of measurable LNAPL (>.01 feet) was less pervasive in January 2004 than during the September 3, 2002 and October 22, 2002 gauging events presented in the RI Report (LNAPL apparent thickness maps for these events are presented in **Appendix G** for comparison purposes). As discussed below, this may be attributed to higher water table during January 2004 than September and October 2002.

Liquid level measurements were also recorded from wells in the vicinity of the RW-400 series recovery wells and to the east of 26th Street on March 17, 2004. The results of this gauging event are presented on **Table 4-2**. LNAPL was not detected in any wells in the vicinity of monitoring wells S-98 (including monitoring wells S-98 and S-193 through S-197).

Hydrographs for wells S-50, S-89, S-98, and S-100 for the general period of late 1995 through 2003 are presented in **Appendix E**. As described previously, these hydrographs indicate an overall decrease in the water table elevation of approximately 2 to 3 feet from spring 2001 through late summer/early fall 2002. The lowest water table elevations in the time period depicted in the hydrographs occurred during through summer/early fall 2002. This decline in water table elevation is attributed to regional drought conditions during the period. Liquid levels elevations recorded from late October 2002 through Fall 2003 depict a general increase in the water table elevation of approximately 3 feet.

Review of the hydrographs indicate the greatest apparent LNAPL thicknesses under lower water table conditions and the apparent LNAPL thicknesses diminish as the water table rises. This is illustrated in the S-98 hydrograph. As indicated, LNAPL was detected in the well during 2002 when the water interface elevation was between 2.5 and 3.0 feet. LNAPL was also detected in the well during 1999 when the water interface elevation was below elevation 3.0 feet. During the

later part of 2003, the water table elevation rose and LNAPL was not detected in the well. LNAPL was last detected in S-98 on April 23, 2003 when the water table elevation was 3.92 feet. The water table elevation in the well was 4.57 feet on January 29, 2004 (the most recent gauging data available). However, LNAPL has been continually detected in wells S-50, S-89, and S-100 between the spring/summer 2002 (low water table conditions) and January 2004 (higher water table conditions). Although, the apparent LNAPL thickness in these wells was generally greater in 2002 than during the January 29, 2004 gauging event. The local geology, volume of LNAPL in the subsurface and LNAPL type in addition to water table elevation may also effect the apparent LNAPL thickness. LNAPL occurrence at these locations will be further evaluated as additional well gauging data is gathered.

As described by USEPA (1996), fluctuations in the water table can result in large differences in the LNAPL thickness even though the volume of LNAPL in the subsurface has not significantly changed. The referenced literature also notes that increasing LNAPL thickness is commonly observed with declining water tables. The increase was attributed to drainage from the unsaturated zone or as the water table falls LNAPL previously trapped in the residual phase (in the zone of water saturation) is mobilized and detected in monitoring wells. Conversely, as the water table elevation rises, residual LNAPL may be trapped below the water table (USEPA, 1995). The increase in LNAPL thickness under a falling water table and the decrease in LNAPL thickness under a rising water table are depicted on the hydrographs from the site wells described above.

4.4 Groundwater Analytical Results

On March 17 and 18, 2004 groundwater samples were collected from 20 monitoring wells for the analyses of BTEX. Groundwater analytical results are summarized on **Table 4-3** and displayed on **Figure 4-6**. The groundwater laboratory data is included in **Appendix H**.

As indicated in **Figure 4-6**, the highest BTEX concentrations were reported in monitoring wells S-125, S-182, and S-183. These wells are located in the vicinity of RW-406 and RW-401. As indicated on **Table 4-3**, all wells sampled along the 26th perimeter of the refinery reported concentrations above PADEP Groundwater Non-Residential Used Aquifer Medium Specific Concentrations (MSCs) with the exception of S-179 and S-180.

To the east of 26th Street, BTEX was detected in wells in the immediate vicinity of monitoring wells S-98 (including S-98, S-193, and S-194). However, BTEX was not detected to the north of S-98 at S-195, or S-196 and S-197 located to east of S-98 on top of the rail embankment. Benzene, toluene, ethylbenzene, and xylenes concentrations in S-98 were 770 ug/l, 53 ug/l, 560 ug/l, and 5,600 ug/l, respectively. As has been described, this well has historically reported the presence of LNAPL.

4.5 RW-400 Series Recovery System Operation

As described in Section 2.3, the RW-400 series recovery wells were redeveloped and the recovery system was modified from dual pump recovery systems to total fluids recovery during November/December 2002. The system was brought on-line on March 20, 2003. In order to provide a general evaluation of the effectiveness of the modified system configuration with respect to LNAPL recovery, the monthly cumulative LNAPL recovery from 2001 was compared to 2003 data (**Figure 4-7**). Recovery data for 2002 was not used in the comparison since the recovery equipment was being tested and modifications to the systems were made during that year.

As indicated in **Figure 4-7**, approximately 2,941 gallons of LNAPL were recovered during 2001 using the dual pump recovery systems and approximately 4,302 gallons of LNAPL were recovered during 2003 using total fluids recovery. In addition to the type of recovery equipment applied, LNAPL recovery rates also depend on such factors as the position of the water table (greater LNAPL recovery is anticipated under low water table conditions), equipment operational "up-time", and volume of LNAPL in the subsurface (LNAPL recovery is expected to diminish as the subsurface LNAPL volume decreases). Review of the hydrographs presented in **Appendix E**, suggest that the water table was generally at a similar elevation during 2001 as in 2003. Based on the review of the dual pump system performance conducted during 2002, it is anticipated that total fluids recovery systems will result in significantly more operational "up-time" than with the previous dual pump systems. However, both system configurations are subject to periodic deactivation during the winter due to freezing of the aboveground water discharge line. System performance will continue to be evaluated in the future.

5.0 REMEDIAL APPROACH

The following is a discussion of the current general strategy for the recovery of LNAPL along the 26th perimeter of the refinery and to the east of 26th Street in the vicinity of S-98 and S-100. This strategy is consistent with the approach presented in the RI Report but considers site data collected during 2003.

The results of the field investigations indicated that apparent LNAPL thickness in site monitoring wells is affected by the water table elevation. Also, to the east of 26th Street in the vicinity of monitoring well S-98, LNAPL was not encountered during recent well gauging events, although historic liquid level data indicate LNAPL occurrence under low water table conditions. Aquifer testing in the vicinity of S-98 suggests that it is not practical to induce LNAPL recovery by hydraulically lowering the water table due to the heterogeneous aquifer conditions. Therefore, a practical approach has been developed that includes the installation of recovery system components (piping, oil/water separator, discharge line, etc.) and monitoring liquid levels to determine when LNAPL is manifested in recovery wells. At that time, total fluids pumps would be installed and recovery would begin while the LNAPL is detected (while the water table is still low). During high water table conditions select pumps may be deactivated and liquid level monitoring be performed until LNAPL is again detected.

5.1 LNAPL along the 26th Street Border of the Point Breeze Processing Area

LNAPL has been detected along the 26th Street border of the Point Breeze Processing Area in three general areas. These areas include the area of RW-400 series recovery wells, the area of S-50, and the area of S-124. Proposed activities in these areas are discussed below.

5.1.1 General Area of the RW-400 Series Recovery Wells

In order to enhance LNAPL recovery, the RW-400 series recovery wells were redeveloped and the recovery system was reconfigured. As described in Section 2.3, the system was reconfigured for total fluids recovery during November 2002 and the system began operating on a full-time basis during March 2003. Comparison of the LNAPL recovery volumes indicated greater LNAPL during 2003 than in 2001 (refer to Section 4.4).

In addition to increasing LNAPL recovery, a remedial goal is to secure hydraulic control of LNAPL and dissolved hydrocarbons (above PADEP MSCs) along the 26th Street perimeter of the refinery. As a result, 14 wells (S-179 through S-192) were installed along the eastern perimeter of the Point Breeze Processing Area between RW-400 and RW-403 and may be used as recovery wells for the expansion of the RW-400 series well system. These wells were installed at spacing

of approximately 50 feet based on the results of the aquifer testing performed at RW-406 (refer to Section 2.2). Liquid level gauging data collected on January 29, 2004 reported LNAPL in only two of these wells (S-190 and S-191 at apparent LNAPL thicknesses of 0.08 feet and 0.07 feet, respectively). However, it is anticipated that LNAPL will be detected in more of these wells as the water table elevation declines. Depths to liquids will be monitored in these wells on an ongoing basis.

It is anticipated that wells S-179 through S-192 will be included in the RW-400 series recovery well total fluids recovery system. Since additional wells are to be added to the system, the appropriate recovery pumps, air compressor, oil/water separator, recovery tank and the location for the recovery equipment will be evaluated. The design of this system will be developed during the 3rd and 4th quarters of 2004.

5.1.2 Areas of S-50 and S-124

As described in the RI Report, LNAPL was detected in S-50 (a two-inch diameter well) during 2002. Liquid level data collected in this well indicated a continual presence of LNAPL in S-50 since 2002. Monitoring well S-124 was installed during 2002 and reported the presence of LNAPL since the installation of the well. Other than liquid level gauging, investigations in these areas were not performed during 2003 but will be performed as part of site-wide investigations as defined in the 2003 CO&A and Phase 1 Remedial Plan.

As detailed in the RI Report, in each area, additional monitoring wells will be installed to provide additional characterization of the extent of LNAPL. After monitoring well installation, pilot testing will be performed. Upon completion of the well installations and testing, recommendations for additional activities will be developed.

5.2 LNAPL to the East of 26th Street (Area of S-98 and S-100)

As described in Section 4.0, activities performed during 2003 to address LNAPL occurrence to the east of 26th Street included, installation of five monitoring wells (S-193 through S-197), installation of a utility conduit beneath 26th Street from refinery to CSXT property, aquifer testing, and liquid level gauging. LNAPL was not detected in S-98 from April 2003 through January 2004. As described in Section 4.3, during the later part of 2003, the water table elevation rose and LNAPL was not detected in the well. LNAPL was last detected in S-98 on April 23, 2003 when the water table elevation was 3.92 feet. The water table elevation in the well was 4.57 feet on January 29, 2004 (the most recent gauging data available). LNAPL was also not detected in any of the newly installed wells (S-193 through S-197) in the general vicinity of S-98.

Influence on the water level was not detected in nearby observation wells during the pumping of S-98. Slug testing (S-193, S-194, and S-195) and capacity testing (S-193 and S-195) indicated significant variability in the aquifer hydraulic conductivity and potential well yield. The data collected suggests heterogeneous and anisotropic subsurface conditions in the vicinity of S-98.

In the vicinity of S-98, LNAPL was not detected in the newly installed wells, potential well yields are variable, and little influence was observed from the test pumping. As a result, in order to recover LNAPL in the area, a practical remedial approach for LNAPL recovery was developed. This approach includes the installation of additional wells where possible (considering overhead and underground utility conflicts, the slope of the embankment, and the guard-rail along 26th Street) and where LNAPL occurrence is likely (when the water table declines), while monitoring liquid levels to detect the occurrence of LNAPL (it is anticipated that LNAPL will be detected when the water table declines), and installation of conveyance piping so that recovery equipment can be easily be installed when the LNAPL is again detected. This is considered a more effective approach than trying to lower the water table by pumping large volumes of water in order to induce LNAPL recovery.

Two wells will be installed between monitoring wells S-98 and S-195 and one well will be installed to the south of monitoring well S-192. A utility trench will be extended from S-195 to the proposed well to the south of monitoring well S-192 and tied into the horizontal utility conduit at the location where it reaches the surface (approximately 30 feet south and 20 feet east of S-98). The proposed additional well and utility trench locations are depicted on **Figure 5-1**. Piping will be placed in the trench to allow total fluids recovery using pneumatic pumps in S-98, S-193, and S-195 as well as the three proposed wells. The number of pumps actually deployed will depend on where LNAPL is detected. The pneumatic pumps will be powered utilizing the horizontal utility conduit to supply compressed air from a compressor located inside the refinery. Recovered water and LNAPL will be routed back to an oil/water separator to be installed for the 26th Street recovery system (refer to Section 5.1). In order to install the systems as described above, a revised Access Agreement between Sunoco and CSXT will be required. The approach described above will allow for equipment to be readily placed when LNAPL is again manifested in wells in the vicinity of S-98 rather than beginning the installation process after LNAPL is detected.

LNAPL has also been detected at monitoring well S-100. Monitoring well S-100 is located east of 26th Street, adjacent to RW-406. S-100 reported an apparent LNAPL thickness of 0.55 feet on January 29, 2004 (the most recent gauging data available). An LNAPL bail-down test was performed in this well during 2002 as part of the investigations documented in the RI Report. After initial LNAPL removal (the static apparent LNAPL thickness was 0.61 feet), the LNAPL thickness recovered to approximately 39% (0.24 feet) of the static apparent LNAPL thickness

after 209 minutes of monitoring. This test suggests that suggest that the potential LNAPL recovery rate from S-100 is relatively low.

Monitoring well S-100 is located near the bottom of the embankment approximately 15 feet east of the curb along 26th Street. Because of the location of this well with respect to the overhead and underground utilities, slope of the embankment, and the guard-rail along 26th Street, additional well installation or the excavation of a utility trench to the vicinity of S-98 is not practical. Therefore, LNAPL recovery at S-100 will consist of passive or manual LNAPL removal.

6.0 SUMMARY AND RECOMMENDATIONS

This Progress Report was prepared for Sunoco in order to summarize activities performed along the eastern portion of the Point Breeze Processing Area of the Philadelphia Refinery located in Philadelphia, Pennsylvania during the period of January 1, 2003 through January 31, 2004. Site investigation activities were previously performed to characterize the occurrence of light non-aqueous phase liquids (LNAPL) along the eastern perimeter of the Point Breeze Processing Area which borders 26th Street. These activities were documented in the RI Report prepared by SECOR, dated January 31, 2003. In the RI Report, specific recommendations were presented to address LNAPL along the eastern perimeter of the refinery and to the east of 26th Street from the refinery, as well as a recommendation to prepare a summary report for the Year 2003 activities.

The investigations documented in the RI Report were performed to address issues relating to the occurrence of LNAPL along the eastern perimeter of the refinery that were identified in the September 26, 2002 letter from the Pennsylvania Department of Environmental Protection (PADEP) to Sunoco. In their letter, PADEP requested a report of actions taken to investigate and prevent off-site migration of LNAPL along the 26th Street border of the refinery. The RI Report documented additional site characterization activities and provided recommendations for additional activities to address LNAPL along the 26th Street border of the refinery and to the east of 26th Street. This Progress Report presents the progress of the implementation of recommendations presented in the RI Report during the period of January 2003 through March 2004. These activities are summarized below. Also provided below are recommendations for additional activities primarily focused on the recovery of LNAPL along the 26th Street border and across (east of) 26th Street from the northern portion of the Point Breeze Processing Area.

6.1 Summary

A summary of the activities performed during the reporting period and the findings of the activities are provided below.

- A total of 19 wells (designated S-179 through S-197) were installed between November 20, 2003 and January 14, 2004. Fourteen of the wells (S-179 through S-192) were installed along the eastern perimeter of the Point Breeze Processing Area in order to monitor the occurrence of LNAPL and for potential use as recovery wells for the expansion of the RW-400 series wells system (also referred to as the 26th Street area recovery system). These wells were placed along the perimeter fence-line at a spacing of approximately 50 feet (based on the influence observed during the RW-406 aquifer test documented in the RI Report). Five wells (S-193 through S-197) were installed on the CSXT property east of 26th Street in order to further define the extent of LNAPL and for use during aquifer testing.

- LNAPL has not been detected in monitoring well S-98 (located to the east of 26th Street) since April 2003 (this well reported an apparent LNAPL thickness of up to 1.07 feet during 2002) or any of the five newly installed monitoring wells in the vicinity of S-98 since their installation in November/December 2003.
- Hydrographs prepared for wells S-50, S-89, S-98, and S-100 indicate an overall decrease in the water table elevation of approximately 2 to 3 feet from spring 2001 through late summer/early fall 2002. The lowest water table elevations in the time period depicted in the hydrographs occurred during through summer/early fall 2002. This decline in water table elevation is attributed to regional drought conditions during the period. Liquid levels elevations recorded from late October 2002 through Fall 2003 depict a general increase in the water table elevation of approximately 3 feet.
- Review of the monitoring well S-98 hydrograph indicates the greatest apparent LNAPL thickness under lower water table conditions and the apparent LNAPL thickness diminishes as the water table rises. LNAPL was historically detected in the well during 2002 when the water interface elevation was between 2.5 and 3.0 feet and LNAPL was also detected in the well during 1999 when the water interface elevation was below elevation 3.0 feet. During 2003, the water table elevation rose and LNAPL was not detected in the well. LNAPL was last detected in S-98 on April 23, 2003 when the water table elevation was 3.92 feet. The water table elevation in the well was 4.57 feet on January 29, 2004.
- LNAPL has been continually detected in wells S-50, S-89, and S-100 between the spring/summer 2002 (low water table conditions) and January 2004 (higher water table conditions) indicating the local geology, LNAPL volume in the subsurface and LNAPL type in addition to water table elevation may also effect the apparent LNAPL thickness. However, the apparent LNAPL thickness in these wells was generally greater in 2002 than during the January 29, 2004 gauging event.
- A horizontal utility conduit was installed beneath 26th Street from the Sunoco refinery to CSXT property. The conduit was installed to route fluids (water and recovered LNAPL) extracted from wells to the east of 26th Street back to the refinery and provide power for down-well pumps, as necessary, during pilot testing or future remedial activities. Horizontal drilling techniques were used to advance a borehole 400 feet long with a maximum depth of approximately 15 to 20 feet below ground surface (bgs). The borehole was completed as a 6-inch diameter HDPE conduit. Three HDPE pipes were installed within the conduit (two 2-inch and one 1-inch diameter pipes).

- In order to evaluate LNAPL recovery options to the east 26th Street, pumping tests and slug tests were performed to the east of 26th Street in the vicinity of monitoring well S-98. Efforts were focused on the vicinity of monitoring well S-98 based on the results of bail-down testing and liquid level measurements recorded during 2002. As indicated below, the aquifer testing data suggest heterogeneous and anisotropic conditions in the vicinity of S-98.
 - A pumping test was performed at S-98 by pumping the well for 480 minutes at rates between 3.5 and 5.6 gpm. Fluids evacuated during the test were routed through the utility conduit to the RW-400 series wells oil/water separator. Only minor influence was observed (less than 0.2 feet at a distance of 12 feet from S-98) and no influence was observed at wells 22 feet, approximately 130 feet, and approximately 150 feet from S-98. LNAPL was not detected in the pumping well or any of the observation wells during the test.
 - Short duration pumping tests were also performed at monitoring wells S-193 and S-195. S-193 was pumped at rate of approximately 0.5 gpm for approximately 25 minutes (the test was terminated after approximately 25 minutes because the well dewatered - over 8 feet of drawdown was recorded in the pumping well). No influence from the pumping was recorded during the test at wells approximately 22 feet and 25 feet from S-193. LNAPL was not observed in any wells during the test during the test.
 - S-195 was pumped at rates from approximately 1 gpm to 6.6 gpm (the maximum capacity of the pump) for approximately 135 minutes. The water level in the well stabilized during the 1 gpm, 2 gpm, and 4 gpm pumping intervals. No influence from the pumping was recorded during the test (the nearest wells were at a distance of approximately 130 feet) and LNAPL was not observed in any wells during the test during the test.
 - Slug tests were performed in three wells to the east of 26th Street. A significant range in the aquifer hydraulic conductivity values was calculated. The estimated hydraulic conductivity was 0.009 feet/day at S-194, 0.12 feet/day at S-193, and 27.1 feet/day at S-195.

- Groundwater samples collected from monitoring wells to the west of 26th Street reported BTEX in the vicinity of S-98 (S-98, S-193, and S-194) while no BTEX was detected to the north (S-195) and west (S-196 and S-197) of this area. All wells sampled on the 26th Street border of the refinery in the vicinity of the RW-400 series recovery wells reported concentrations above PADEP MSCs with the exception of S-179 and S-180.
- The RW-400 series recovery wells were redeveloped and the recovery system was modified from dual pump recovery systems to total fluids recovery during beginning November/December 2002. The system was brought on-line on March 20, 2003. In order to perform a general evaluation of the effectiveness of the modified system configuration with respect to LNAPL recovery, LNAPL recovery from 2001 was compared to 2003 recovery data. Approximately 2,941 gallons of LNAPL were recovered during 2001 using the dual pump recovery systems and approximately 4,302 gallons of LNAPL were recovered during 2003 using total fluids recovery.

6.2 Recommendations

Data collected during the reporting period and previous site investigations was evaluated to develop proposed activities for the recovery of LNAPL along the 26th Street perimeter of the refinery and to the east of 26th Street in the vicinity of S-98 and S-100. The following recommendations are presented for the recovery of LNAPL and to establish hydraulic control of LNAPL along the perimeter of the northern portion of the Point Breeze Processing Area.

The results of the field investigations indicated that apparent LNAPL thickness in site monitoring wells is affected by the water table elevation and the current water table elevation is higher than during 2002 when LNAPL was detected in several wells for the first time or for the first time in several years. To the east of 26th Street in the vicinity of monitoring well S-98, LNAPL was not encountered during recent well gauging events, although historic liquid level data indicate LNAPL occurrence under low water table conditions. Aquifer testing in the vicinity of S-98 suggests that it is not practical to induce LNAPL recovery by hydraulically lowering the water table due to the heterogeneous aquifer conditions. Therefore, a practical approach has been developed for LNAPL recovery that includes the installation of recovery system components (piping, oil/water separator, discharge line, etc.) and monitoring liquid levels to determine when LNAPL is manifested in recovery wells. At that time, total fluids pumps would be operated while the LNAPL is detected (while the water table is still low). During high water table conditions, select pumps may be deactivated and liquid level monitoring be performed until LNAPL is again detected.

- Additional recovery wells should be added to RW-400 series recovery well (26th Street Area) total fluids recovery system. The 14 newly installed wells (S-179 through S-192)

will be considered to supplement the existing system in order to enhance LNAPL recovery and obtain hydraulic control of LNAPL and dissolved hydrocarbons (at concentrations above PADEP MSCs). Since additional wells are to be added to the system, the appropriate recovery pumps, air compressor, oil/water separator and recovery tank as well as the location for the recovery equipment will be evaluated. The re-design of this system will be developed during 2004.

- LNAPL was detected at two locations along the 26th Street perimeter of the Point Breeze Processing Area to the south of the RW-400 series wells recovery system. These locations consist of S-50 (located approximately 300 feet north of the Pollock Street Sewer) and S-124 (near the intersection of Penrose Avenue and 26th Street). These areas will be addressed as part of on going site-wide investigations in accordance with the 2003 CO&A.
- Although recent liquid level measurements have not detected LNAPL in the vicinity of S-98 (to the east of 26th Street), LNAPL is anticipated that LNAPL will be detected when the water table elevation declines. Considering the heterogenous nature of the aquifer materials, a practical approach has been developed to recover LNAPL when the LNAPL is again manifested in wells located in the vicinity of S-98. Three additional wells will be installed and positioned considering overhead and underground utility conflicts and where LNAPL occurrence is likely. A utility trench will be extended from S-195 to a proposed well to the south of monitoring well S-193 and tied in the horizontal utility conduit where it reaches the surface (approximately 30 feet south and 20 feet east of S-98). Piping will be placed in the trench to allow total fluids recovery using pneumatic pumps in S-98, S-193, and S-195 as well as the three proposed wells. The number of wells in which pumps will be installed will depend on future liquid level monitoring. The pneumatic pumps will be powered utilizing the horizontal utility conduit to supply compressed air from a compressor located inside the refinery. Recovered water and LNAPL will be routed back to an oil/water separator to be installed for the 26th Street (RW-400 series wells) recovery system. In order to install the system described above, a revised Access Agreement between Sunoco and CSXT will be required. This approach will allow for equipment to be readily placed when LNAPL is again manifested in wells in the vicinity of S-98. The system will be operated periodically/seasonally based on the detection of LNAPL in the wells (the system will be operated when the water table is low and LNAPL is detected).
- LNAPL has also been detected at monitoring well S-100 (east of 26th Street). However, additional well installation near S-100 or the excavation of a utility trench to the vicinity of S-98 is not practical because of the location of S-100 well with respect to slope of the embankment, overhead and underground utilities, and the guard-rail along 26th Street.

LNAPL bail-down testing performed during 2002 indicated a low LNAPL recovery rate for the well. Therefore, LNAPL recovery at S-100 will consist of passive or manual LNAPL removal.

- An additional monitoring well will be installed north of S-195 (east of 26th Street) in order to verify the absence of LNAPL to east of 26th Street from Belmont Terminal (refer to **Figure 5-1**).

7.0 REFERENCES

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TABLES

TABLE 2-1

RW-400 Series Recovery Well Construction Summary

**26th Street Area Investigation
Sunoco Philadelphia Refinery**

Well No.	Well Completion Date	Ground Elevation (see Note 1)	Top of Casing Elevation (see Note 1)	Well Screen Diameter (inches) (see Note 2)	Reported Depth of Screen Interval (feet bgs) (see Note 2)	Measured Well Depth (feet bgs) (see Note 3)
RW-400	5/26/94	29.12	30.19	6	22 - 37	36
RW-401	9/9/93	26.23	26.78	6	15 - 50	29.5
RW-402	5/24/94	25.59	23.69	6	23 - 33	30.5
RW-403	7/01/94	25.42	26.02	6	15 - 50	49
RW-404	8/25/94	24.87	25.62	6	22 - 32	34
RW-405	5/20/94	25.33	26.08	6	25.5 - 35.5	38
RW-406	11/20/00	25.94	28.59	8	16 - 36	34.5

Notes:

Note 1: Survey is relative to existing monitoring well network

Note 2: Based on available well log and DRBC (1994) permit application data

Note 3: Based on field measurements recorded by SECOR during October and November 2002

bgs = below ground surface

TABLE 3-1**Monitoring Well Construction Summary****26th Street Area Investigation
Sunoco Philadelphia Refinery**

Well No.	Well Completion Date	Ground Elevation (see Note 1)	Top of Casing Elevation (see Note 1)	Well Screen Diameter (in)	Depth of Screen Interval (feet bgs)
S-179	12/19/03	TBD	TBD	4	15 - 35
S-180	12/18/03	TBD	TBD	4	15 - 35
S-181	12/18/03	TBD	TBD	4	15 - 35
S-182	12/11/03	TBD	TBD	4	15 - 35
S-183	12/12/03	TBD	TBD	4	15 - 35
S-184	12/12/2003	TBD	TBD	4	15 - 35
S-185	12/16/2003	TBD	TBD	4	15 - 35
S-186	12/1/6/03	TBD	TBD	4	15 - 35
S-187	12/16/2003	TBD	TBD	4	15 - 35
S-188	12/17/2003	TBD	TBD	4	15 - 35
S-189	1/14/2004	TBD	TBD	4	14.5 - 34.5
S-190	1/14/2004	TBD	TBD	4	13.5 - 33.5
S-191	1/1/3/04	TBD	TBD	4	14 - 34
S-192	1/13/2004	TBD	TBD	4	13.4 - 33.4
S-193	12/4/2003	TBD	TBD	4	15 - 35
S-194	12/4/2003	TBD	TBD	4	15 - 30
S-195	12/3/2003	TBD	TBD	4	20 - 37
S-196	12/1/2003	TBD	TBD	4	40.7 - 55.7
S-197	11/20/2003	TBD	TBD	4	40 - 55

Notes:

Note 1: Survey is to be performed after remedial system modifications are completed

bgs = below ground surface

TABLE 4-1

**LIQUID LEVEL MEASUREMENTS
JANUARY 29, 2004**

**26th STREET AREA INVESTIGATION
PHILADELPHIA REFINERY**

Well	TOC Elevation (Feet)	Depth To		NAPL Data	Corrected Groundwater Elevation (FAMSL)
		NAPL (Feet)	Water (Feet)	Apparent Thickness (Feet)	
S-25	14.94	-	14.66	-	0.28
S-26	20.76	-	20.47	-	0.29
S-27	26.84	-	26.64	-	0.20
S-28	25.74	-	23.09	-	2.65
S-29	23.30	21.40	28.70	7.30	0.15
S-33	21.45	NM	NM	NM	NM
S-34	23.30	23.70	24.68	0.98	-0.64
S-35	24.69	25.05	26.00	0.95	-0.59
S-38	18.95	-	18.72	-	0.23
S-39	22.88	-	22.47	-	0.41
S-40	24.46	-	24.57		-0.11
S-42	25.72	-	26.18		-0.46
S-43	23.22	NM	NM	NM	NM
S-44	23.34	-	26.32		-2.98
S-45	21.57	NM	NM	NM	NM
S-46	22.56	-	21.91		0.65
S-48	21.03	NM	NM	NM	NM
S-50	22.48	22.80	23.25	0.45	-0.43
S-51	23.36	-	23.52		-0.16
S-52	23.54	NM	NM	NM	NM
S-55	15.98	-	16.10		-0.12
S-56	15.00	15.01	15.32	0.31	-0.08
S-74	30.09	NM	NM	NM	NM
S-75	31.23	26.71	26.73	0.02	4.52
S-76	31.04	26.63	27.52	0.89	4.20
S-77P	33.04	-	28.93		4.11
S-78	30.93	26.34	26.35	0.01	4.59
S-79P	30.42	-	26.29		4.13
S-80	32.13	-	27.95		4.18
S-81	27.85	NM	NM	NM	NM
S-82	27.29	22.99	23.12	0.13	4.27
S-83	23.33	NM	NM	NM	NM
S-84P	23.26	NM	NM	NM	NM
S-85	25.13	NM	NM	NM	NM
S-86	27.05	-	26.40		0.65
S-87	25.87	25.62	25.64	0.02	0.25
S-88	24.10	-	25.06		-0.96
S-88A	25.72	-	25.29		0.43
S-89	25.99	26.72	27.03	0.31	-0.80
S-95	22.99	-	23.18		-0.19

TABLE 4-1

**LIQUID LEVEL MEASUREMENTS
JANUARY 29, 2004**

**26th STREET AREA INVESTIGATION
PHILADELPHIA REFINERY**

Well	TOC Elevation (Feet)	Depth To		NAPL Data	Corrected Groundwater Elevation (FAMSL)
		NAPL (Feet)	Water (Feet)	Apparent Thickness (Feet)	
S-96	19.77	-	19.88		-0.11
S-97	30.31	30.11	30.12	0.01	0.20
S-98	28.80	-	24.23		4.57
S-99	25.40	-	25.65		-0.25
S-100	26.95	22.85	23.40	0.55	3.97
S-101	49.12	NM	NM	NM	NM
S-104	18.11	17.65	18.53	0.88	0.25
S-116	26.36	NM	NM	NM	NM
S-117	18.41	NM	NM	NM	NM
S-118	17.90	NM	NM	NM	NM
S-119	26.60	-	26.65		-0.05
S-120	19.82	-	19.43		0.39
S-121	21.12	-	20.55		0.57
S-122	25.71	-	25.30		0.41
S-123	22.13	21.93	21.94	0.01	0.20
S-124	23.20	22.86	23.55	0.69	0.17
S-125	25.99	-	22.11		3.88
S-126	28.48	-	13.75		14.73
S-127	17.10	-	16.85		0.25
S-179		-	20.41		
S-180		-	20.94		
S-181		-	22.52		
S-182		-	22.30		
S-183		-	22.66		
S-184		-	22.07		
S-185		-	23.05		
S-186		-	22.67		
S-187		-	23.61		
S-188		-	23.85		
S-189		-	25.09		
S-190		24.95	25.03	0.08	
S-191		24.55	24.62	0.07	
S-192		-	24.88		
S-193		-	23.77		
S-194		-	24.59		
S-195		-	25.80		
S-196		NM	NM	NM	NM
S-197		NM	NM	NM	NM
PZ-400	28.19	23.64	23.66	0.02	4.55
PZ-401	23.97	NM	NM	NM	NM

TABLE 4-1

**LIQUID LEVEL MEASUREMENTS
JANUARY 29, 2004**

**26th STREET AREA INVESTIGATION
PHILADELPHIA REFINERY**

Well	TOC Elevation (Feet)	Depth To		NAPL Data	Corrected Groundwater Elevation (FAMSL)
		NAPL (Feet)	Water (Feet)	Apparent Thickness (Feet)	
PZ-402	23.62	NM	NM	NM	NM
PZ-403	24.41	NM	NM	NM	NM
PZ-404	26.01	26.75	26.77	0.02	-0.74
RW-400	28.19	-	24.40		3.79
RW-401	24.77	20.58	20.83	0.25	4.13
RW-402	20.05	NM	NM	NM	NM
RW-403	24.10	21.70	21.71	0.01	2.40
RW-404	23.74	-	22.95		0.79
RW-405	24.11	25.45	25.98	0.53	-1.47
RW-406	26.92	22.59	23.10	0.51	4.21

NOTES:

TOC = Top of casing

NAPL = Non aqueous phase liquid

FAMSL = Feet above mean sea level (NAVD 88)

Corrected groundwater elevation = TOC - (Depth to groundwater - (Product thickness * specific gravity))

NM = Not measured due to snow cover

Assumed NAPL specific gravity = 0.76

Wells S-179 through S-197 have not yet been surveyed

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TABLE 4-2

LIQUID LEVEL MEASUREMENTS
March 17, 2004

26th STREET AREA INVESTIGATION
PHILADELPHIA REFINERY

Well	TOC Elevation (Feet)	Depth To		LNAPL Data	Corrected Groundwater Elevation (FAMSL)
		NAPL (Feet)	Water (Feet)	Apparent Thickness (Feet)	
RW-400's Area					
S-75	31.23	26.94	27.03	0.09	4.27
S-81	29.82	21.31	21.82	0.51	8.39
S-83	25.37	20.36	20.96	0.60	4.87
S-84		NL	14.63	--	
S-84P	24.89	NL	18.43	--	6.46
S-85	26.93	24.48	24.50	0.02	2.45
S-88	24.10	25.17	25.36	0.19	-1.12
S-88A	26.78	NL	25.77	--	1.01
S-89	27.99	27.53	27.61	0.08	0.44
S-125	25.99	NL	22.60	--	3.39
S-179		NL	20.83	--	
S-180		NL	21.18	--	
S-181		NL	23.15	--	
S-182		NL	22.84	--	
S-183		NL	23.35	--	
S-184		NL	22.45	--	
S-185		NL	23.44	--	
S-186		NL	22.96	--	
S-187		NL	23.90	--	
S-188		NL	24.12	--	
S-189		NL	25.36	--	
S-190		25.14	25.65	0.51	
S-191		24.77	25.06	0.29	
S-192		NL	25.15	--	
PZ-400	30.20	23.91	24.05	0.14	6.26
PZ-401	25.89	20.46	20.53	0.07	5.41
PZ-402	25.38	NL ¹	20.20	--	5.18
PZ-403	28.27	NM ¹	NM ¹	--	--
PZ-404	28.02	27.45	28.03	0.58	0.43
RW-400	30.19	NP	30.26	--	-0.07
RW-401	26.78	21.19	21.25	0.06	5.58
RW-402	23.69	NL	22.50	--	1.19

TABLE 4-2

LIQUID LEVEL MEASUREMENTS
March 17, 2004

26th STREET AREA INVESTIGATION
PHILADELPHIA REFINERY

Well	TOC Elevation (Feet)	Depth To		LNAPL Data	Corrected Groundwater Elevation (FAMSL)
		NAPL (Feet)	Water (Feet)	Apparent Thickness (Feet)	
RW-403	26.02	NL	22.15	--	3.87
RW-404	25.62	NL	23.17	--	2.45
RW-405	26.08	27.60	27.91	0.31	-1.59
RW-406	28.59	NL	27.20	--	1.39
CSXT AREA					
S-98	28.80	NL	24.60	--	
S-100	26.95	23.28	23.62	0.34	3.59
S-193		NL	23.89	--	
S-194		NL	25.29	--	
S-195		NL	26.12	--	
S-196		NL	45.63	--	
S-197		NL	45.05	--	

NOTES:

TOC = Top of casing.

FAMSL = Feet above mean sea level.

NL = No LNAPL.

NL¹ = PZ-402 did not have any measurable LNAPL in it on March 17. On March 18, a sheen was found in PZ-402.NM¹ = Not measured - unable to get accurate reading because of high LNAPL viscosity.

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TABLE 4-3

**Groundwater Analytical Results
March 17-18, 2004**

**26th STREET AREA INVESTIGATION
PHILADELPHIA REFINERY**

Philadelphia Refinery 26th Street Perimeter

Sample ID	S-84	S-98	S-125	S-179	S-180	S-181	S-182	S-183	S-184	S-185	S-186	S-187	S-188	S-189	S-192	PADEP MSCs	
Date Collected	03/18/04	03/17/04	03/17/04	03/18/04	03/18/04	03/18/04	03/17/04	03/18/04	03/18/04	03/18/04	03/18/04	03/17/04	03/17/04	03/18/04	03/18/04	Used Aquifer	Nonuse Aquifer
Units	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	Non-Residential	Non-Residential
Benzene	74	770	14000	5	< 5	5100	14000	14000	700	160	89	450	990	3400	990	5	500
Toluene	< 10	53	200	< 5	< 5	250	160	130	20	16	8	37	15	25	28	700	70,000
Ethylbenzene	440	560	230	13	< 5	480	130	170	41	40	7	46	320	180	1200	1,000	10,000
Xylenes (total)	5000	5600	720	89	18	2200	270	650	98	78	15	100	660	490	2700	10,000	180,000

Well S-98 Area (CSXT Property east of 26th Street)

Sample ID	S-193	S-194	S-195	S-196	S-197	PADEP MSCs	
Date Collected	03/17/04	03/17/04	03/17/04	03/18/04	03/18/04	Used Aquifer	Nonuse Aquifer
Units	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	Non-Residential	Non-Residential
Benzene	170	7	< 5	< 5	< 5	5	500
Toluene	< 5	< 5	< 5	< 5	< 5	700	70,000
Ethylbenzene	51	33	< 5	< 5	< 5	1,000	10,000
Xylenes (total)	68	120	< 5	< 5	< 5	10,000	180,000

NOTES:

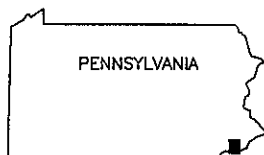
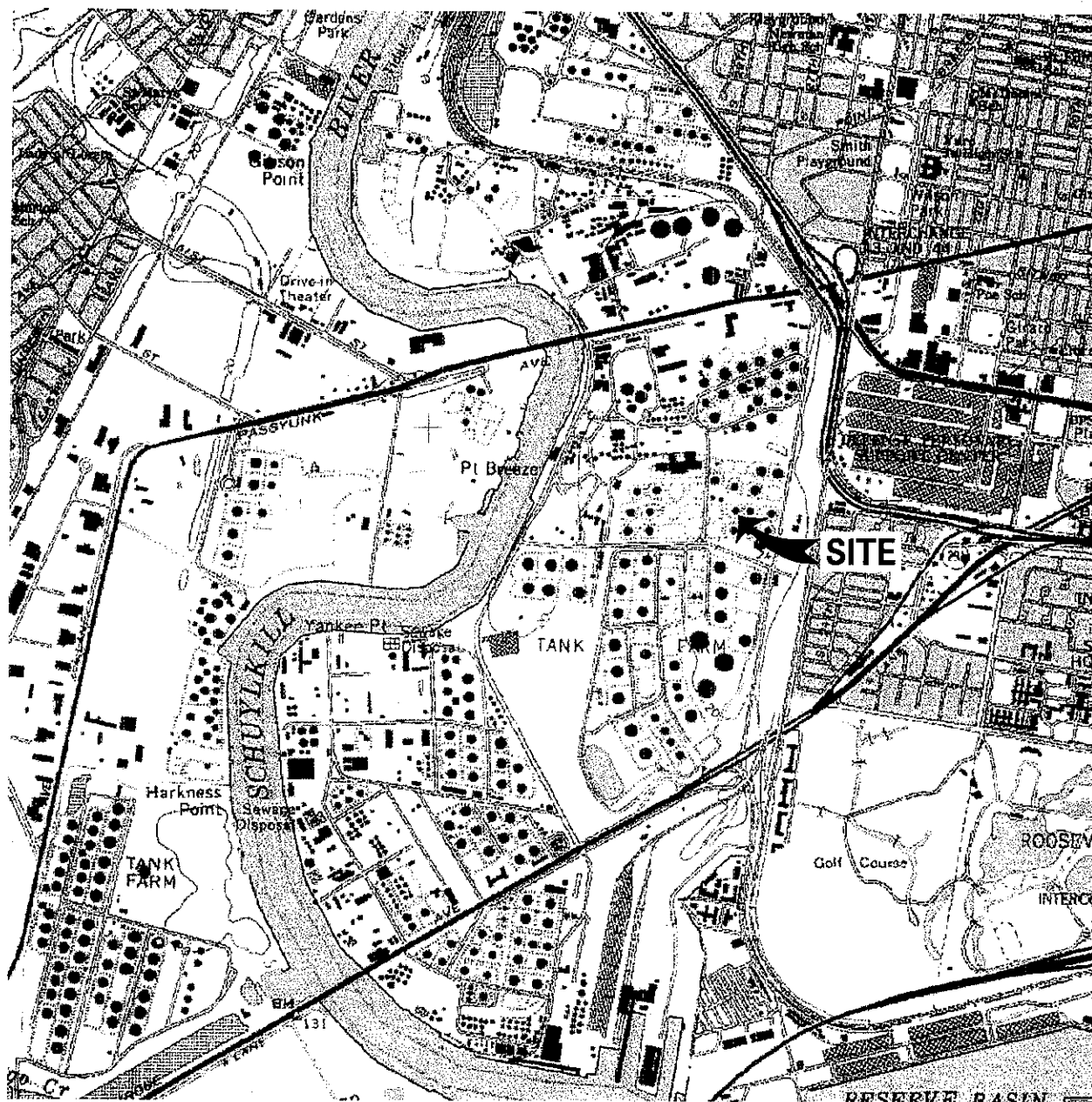
Benzene, toluene, ethylbenzene and xylenes analyzed by US EPA Method 624.

ug/l = micrograms per liter.

PADEP = Pennsylvania Department of Environmental Protection.

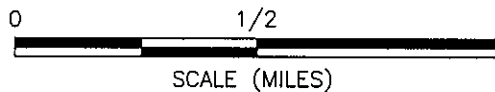
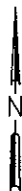
MSCs = Medium Specific Concentrations.

FIGURES



PENNSYLVANIA

QUADRANGLE LOCATION



REFERENCE: USGS 7.5 MINUTE QUADRANGLE; PHILADELPHIA, PENNSYLVANIA-NEW JERSEY; 1995

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SITE LOCATION MAP
26th STREET AREA / POINT BREEZE PROCESSING AREA
SUNOCO PHILADELPHIA REFINERY
PHILADELPHIA, PENNSYLVANIA

FIGURE:

1-1

JOB #: 62SU.01017.02

APPR:

DWN: KPM

DATE: 01/08/03

N:/OFFICE-062

DWG: 62SU-1017-2-6(1-1)




NOTE
LOCATIONS OF WELLS S-179 THROUGH S-197 ARE APPROXIMATE. SURVEY TO BE PERFORMED AFTER RECOVERY SYSTEM MODIFICATIONS ARE COMPLETE


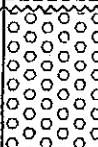

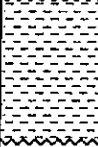
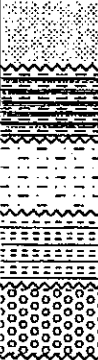

THE HORIZONTAL CONTROL IS BASED ON PENNSYLVANIA PLAN COORDINATES SOUTH ZONE NAD 83, THE VERTICAL DATUM IS NAVD 88

- LEGEND
- x— FENCE LINE
 - SS— SANITARY SEWER LINE
 - UT— UTILITY CONDUIT LOCATION
 - ⊕ SHALLOW MONITORING WELL
 - ⊕ INTERMEDIATE MONITORING WELL
 - ⊕ DEEP MONITORING WELL
 - ⊕ RECOVERY WELL
 - PIEZOMETER

REFERENCE: Basemap is provided by James M. Stewart, Inc.; 3028-01.dwg; 06/08/03

0 500 1000
SCALE (FEET)

 SECOR 102 PICKERING WAY, STE 200 EXTON, PENNSYLVANIA 19341 PHONE (484) 875-3075/875-9286 (FAX)	PREPARED FOR: SUNOCO PHILADELPHIA REFINERY 26TH STREET AREA PHILADELPHIA, PENNSYLVANIA		GENERAL AREA OF INVESTIGATION 26TH STREET AREA SUNOCO PHILADELPHIA REFINERY		FIGURE: 1-2
	JOB NUMBER: 62SU.01019.02.0006	DRAWN BY: KAM	CHECKED BY:	APPROVED BY:	DATE: 03/01/04
	N/SECOR-002				

SYSTEM	SERIES	GEOHYDROLOGIC UNIT							RANGE OF THICKNESS (ft)	SYMBOL			
		Paulachok (1991)		Greenman and others (1961)									
Quaternary	Holocene	Alluvium		Alluvium					0-78	Qal			
	Pleistocene	"Trenton gravel" (informal usage)		Cape May Formation					0-80	Qp			
				Pensauken Formation					0-80				
Tertiary	Miocene	Bridgeton Formation								0-10	Tb		
Cretaceous	Upper Cretaceous	Potomac-Raritan Magothy aquifer system	Upper clay unit		Magothy Formation					0-35	Ku		
					Upper Clay member					0-35			
			Upper sand unit		Raritan Formation	Old Bridge Sand Member					0-50	Ko	
			Middle clay unit			Middle Clay member					0-60	Km	
			Middle sand unit			Sayreville Sand Member					0-40	Ks	
			Lower clay unit			Lower Clay Member					0-61	Kl	
			Lower sand unit			Farrington Sand Member					0-90	Kf	
	Pre-Cretaceous		Lower Cretaceous	Crystalline rocks, includes Chickies Formation and Wissahickon Formation of Glenarm Group		Crystalline rocks of Glenarm Series (former usage)						Wa	

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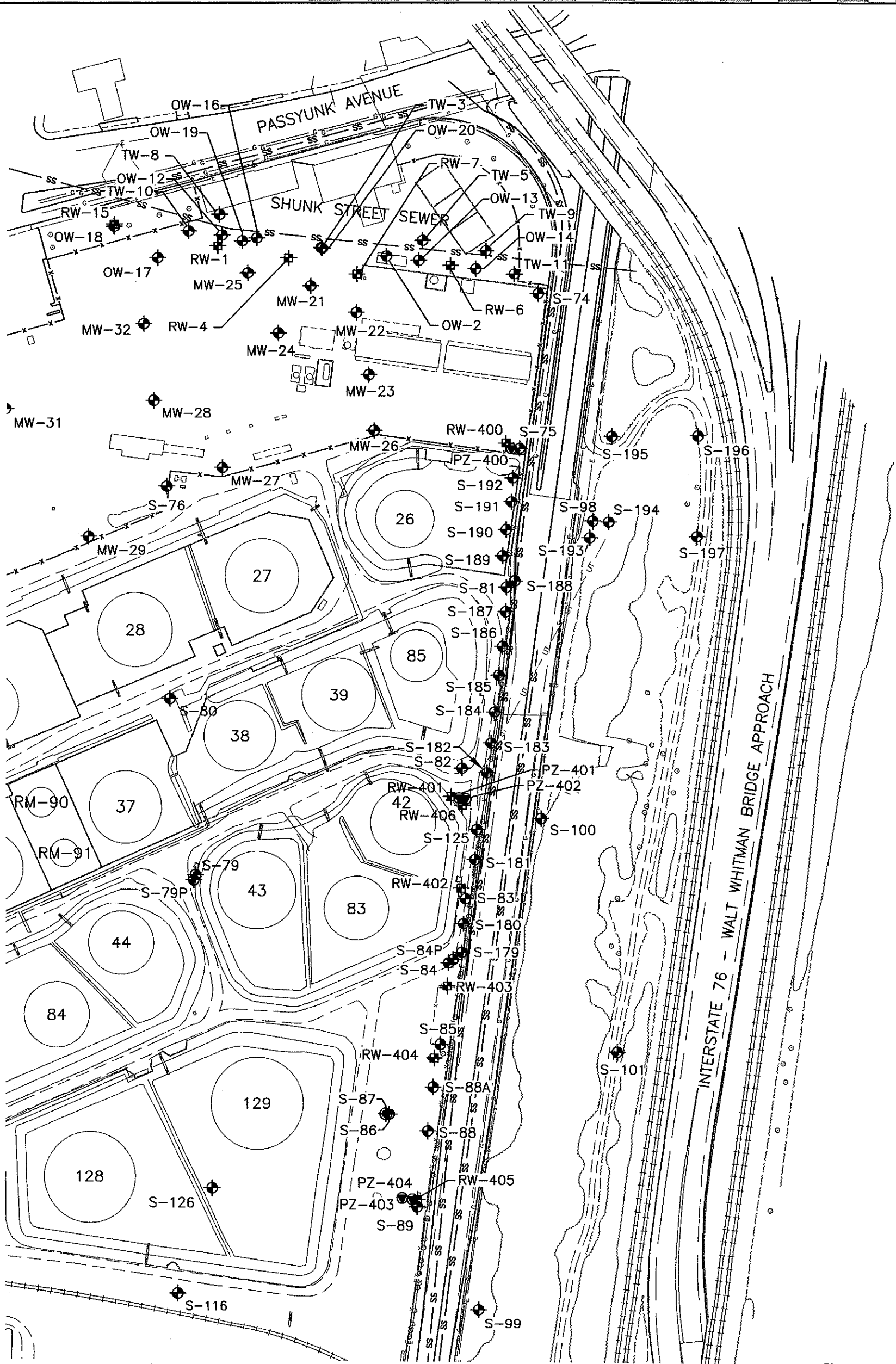
GENERALIZED STRATIGRAPHIC COLUMN

**SUNOCO PHILADELPHIA REFINERY
 PHILADELPHIA, PENNSYLVANIA**

FIGURE:

2-1

JOB#: 62SU.01017.02.0008 APPR: DWN: KPM DATE: 01/10/03



NOTE

LOCATIONS OF WELLS S-179 THROUGH S-197 ARE APPROXIMATE. SURVEY TO BE PERFORMED AFTER RECOVERY SYSTEM MODIFICATIONS ARE COMPLETE

IT'S THE LAW PA Act 287 requires 3 Working Days Notice before you Excavate
Call 1 800 242 1776

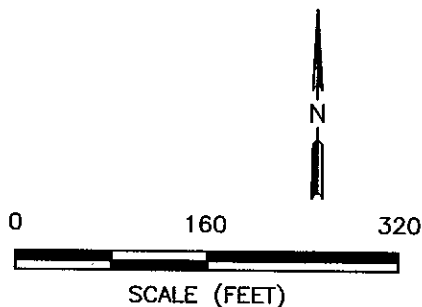
Note: All Underground utilities EXCEPT the Pollack & Shunk Street Sewers were scaled from plans provided by the utility companies and the locations are approximate and NOT from an As-Built survey.
James M. Stewart, Inc. can not certify the location of any underground objects or utility lines. This map shows only those utilities that are plottable.


THIS MAP WAS PREPARED FROM NEW AERIAL PHOTOGRAPHY FLOWN APRIL 6, 2003 AND COMPILED BY PROMAPS OF MOORESTOWN, NEW JERSEY.
THE HORIZONTAL CONTROL IS BASED ON PENNSYLVANIA PLANE COORDINATES SOUTH ZONE NAD 83
THE VERTICAL DATUM IS NAVD 88

REFERENCE: Basemap is provided by James M. Stewart, Inc.; 3028-01.dwg; 06/08/03

LEGEND

- X— FENCE LINE
- SS— SANITARY SEWER LINE
- UT— HORIZONTAL UTILITY CONDUIT
- ⊕ SHALLOW MONITORING WELL
- ⊗ INTERMEDIATE MONITORING WELL
- ⊙ DEEP MONITORING WELL
- ⊕ RECOVERY WELL
- ⊙ PIEZOMETER



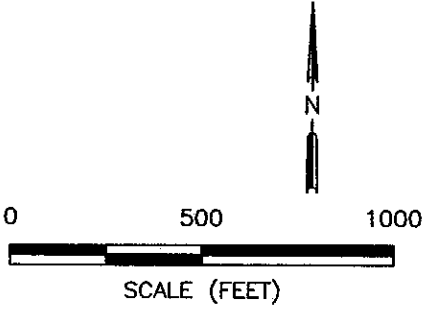
 SECOR 102 PICKERING WAY, STE 200 EXTON, PENNSYLVANIA 19341 PHONE (484) 875-3075/(484) 875-9286 (FAX)	PREPARED FOR: SUNOCO PHILADELPHIA REFINERY 26TH STREET AREA PHILADELPHIA, PENNSYLVANIA		RW-400 SERIES RECOVERY WELLS AND UTILITY CONDUIT LOCATIONS		FIGURE: 2-2
	JOB NUMBER: 62SU.01019.02.0006	DRAWN BY: KAM	CHECKED BY:	APPROVED BY:	DATE: 03/01/04

N/SECOR-062

62SU-1019-2-6-22(RW-400).dwg




NOTE
LOCATIONS OF WELLS S-179 THROUGH S-197 ARE APPROXIMATE. SURVEY TO BE PERFORMED AFTER RECOVERY SYSTEM MODIFICATIONS ARE COMPLETE



THE HORIZONTAL CONTROL IS BASED ON PENNSYLVANIA PLAN COORDINATES SOUTH ZONE NAD 83, THE VERTICAL DATUM IS NAVD 88

- LEGEND**
- x— FENCE LINE
 - SS— SANITARY SEWER LINE
 - UT— UTILITY CONDUIT LOCATION
 - ⊕ SHALLOW MONITORING WELL
 - ⊗ INTERMEDIATE MONITORING WELL
 - ⊙ DEEP MONITORING WELL
 - ⊕ RECOVERY WELL
 - PIEZOMETER

REFERENCE: Basemap is provided by James M. Stewart, Inc.; 3028-01.dwg; 06/08/03

 SECOR 102 PICKERING WAY, STE 200 EXTON, PENNSYLVANIA 19341 PHONE (484) 875-3075/875-9286 (FAX)	PREPARED FOR: SUNOCO PHILADELPHIA REFINERY 26TH STREET AREA PHILADELPHIA, PENNSYLVANIA		SITE PLAN WITH GROUNDWATER MONITORING WELL LOCATIONS		FIGURE: 3-1
	JOB NUMBER: 62SU.01019.02.0006	DRAWN BY: KAM	CHECKED BY:	APPROVED BY:	DATE: 03/01/04

N:\SECOR-062

62SU-1019-2-6-31SP.DWG



NOTE
LOCATIONS OF WELLS S-179 THROUGH S-197 ARE APPROXIMATE. SURVEY TO BE PERFORMED AFTER RECOVERY SYSTEM MODIFICATIONS ARE COMPLETE
CONTOUR INTERVAL = 2.0 FT
GROUNDWATER ELEVATIONS IN FEET ABOVE MEAN SEA LEVEL

THE HORIZONTAL CONTROL IS BASED ON PENNSYLVANIA PLAN COORDINATES SOUTH ZONE NAD 83, THE VERTICAL DATUM IS NAVD 88

- LEGEND**
- x— FENCE LINE
 - SS— SANITARY SEWER LINE
 - UT— UTILITY CONDUIT LOCATION
 - SHALLOW MONITORING WELL
 - ⊕ INTERMEDIATE MONITORING WELL
 - ⊙ DEEP MONITORING WELL
 - ⊕ RECOVERY WELL
 - ⊙ PIEZOMETER
 - (0.69) RELATIVE GROUNDWATER ELEVATION (FEET)
 - INFERRED GROUNDWATER ELEVATION CONTOUR (FEET)
 - (NM) NOT MEASURED


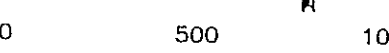

  SCALE (FEET)	 SECOR 102 PICKERING WAY, STE 200 EXTON, PENNSYLVANIA 19341 PHONE (484) 875-3075/875-9286 (FAX)	PREPARED FOR: SUNOCO PHILADELPHIA REFINERY 26TH STREET AREA PHILADELPHIA, PENNSYLVANIA		GROUNDWATER ELEVATION CONTOUR MAP (JANUARY 29, 2004)		FIGURE: 4-1
		JOB NUMBER: 62SU.01019.02.0006	DRAWN BY: KAM			
N:\SECOR\062		82SU.01019-2-6-41-0104.dwg				

FIGURE 4-2
S-98 Aquifer Test Hydrograph
26th Street Area Investigation
Sunoco Philadelphia, Refinery

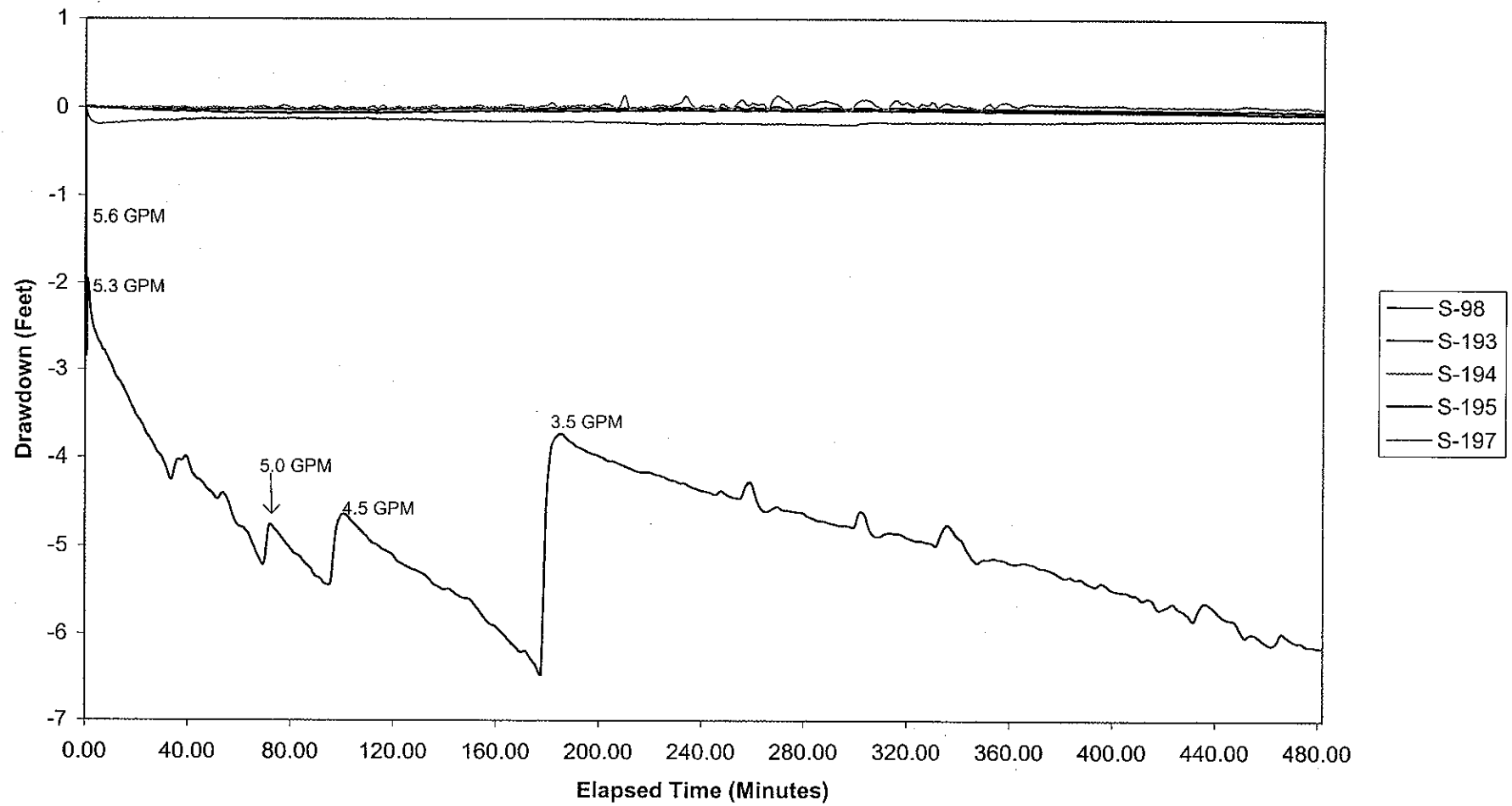


FIGURE 4-3
S-193 Aquifer Test Hydrograph
26th Street Area Investigation
Sunoco Philadelphia Refinery

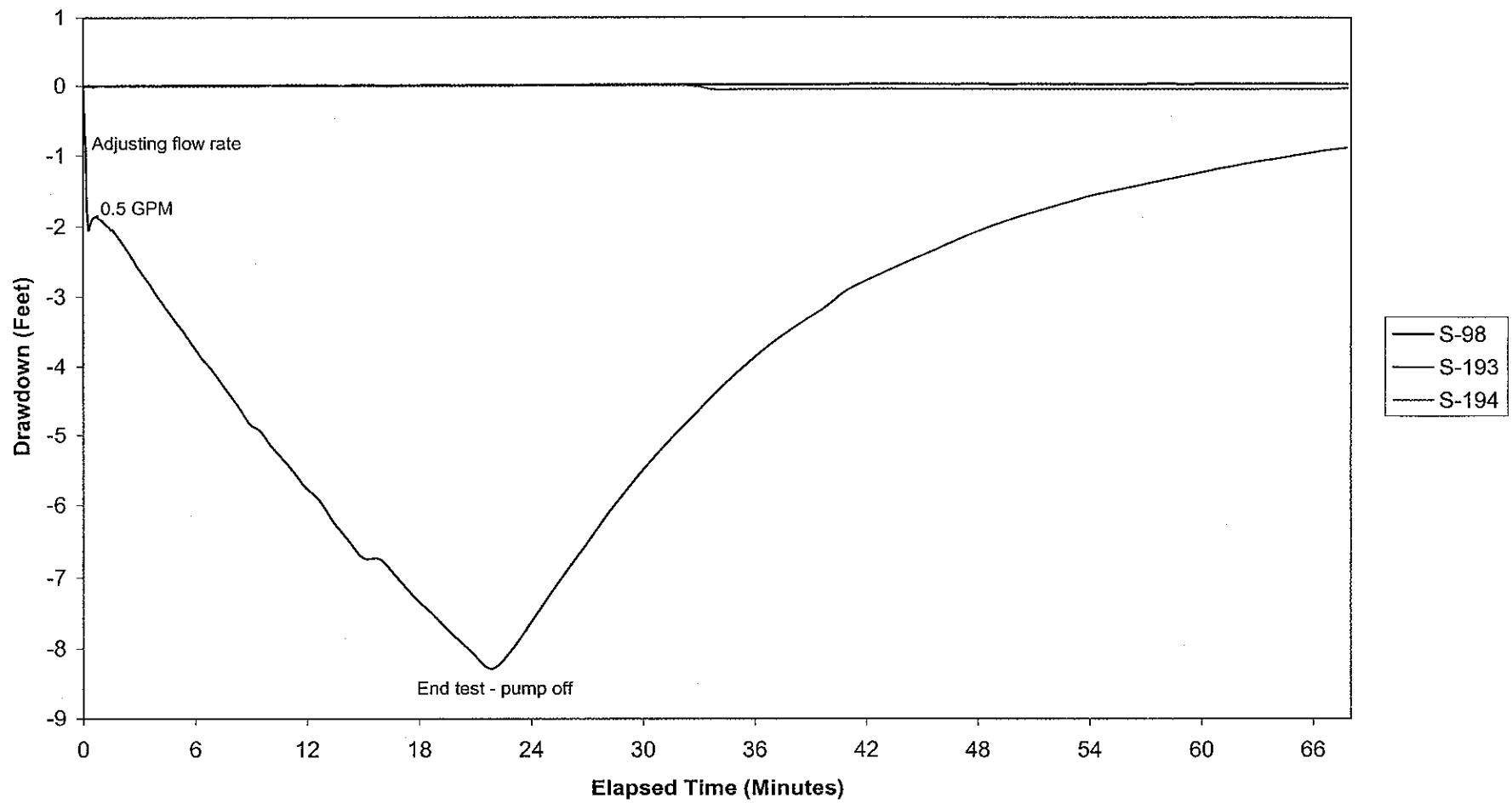
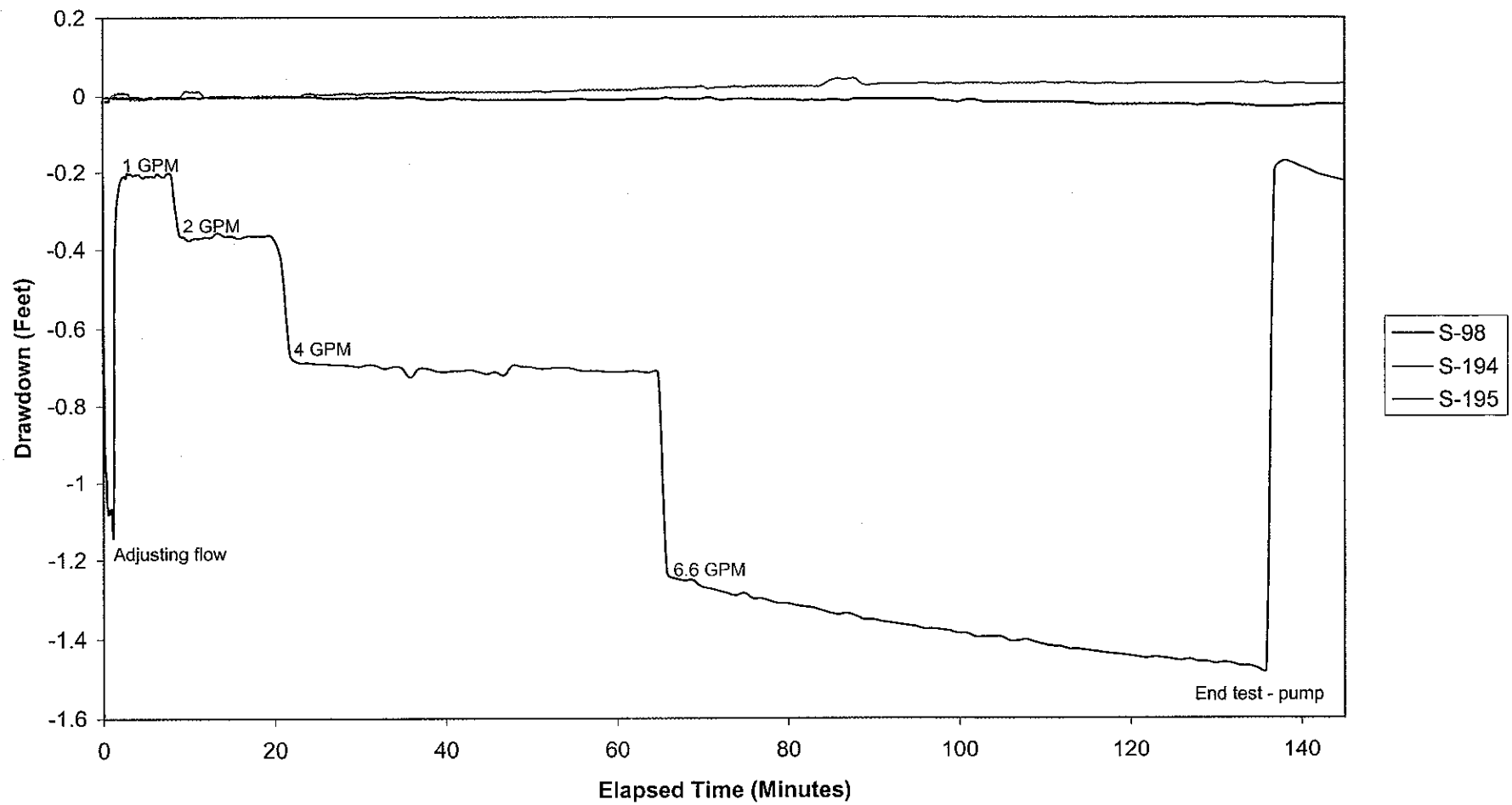
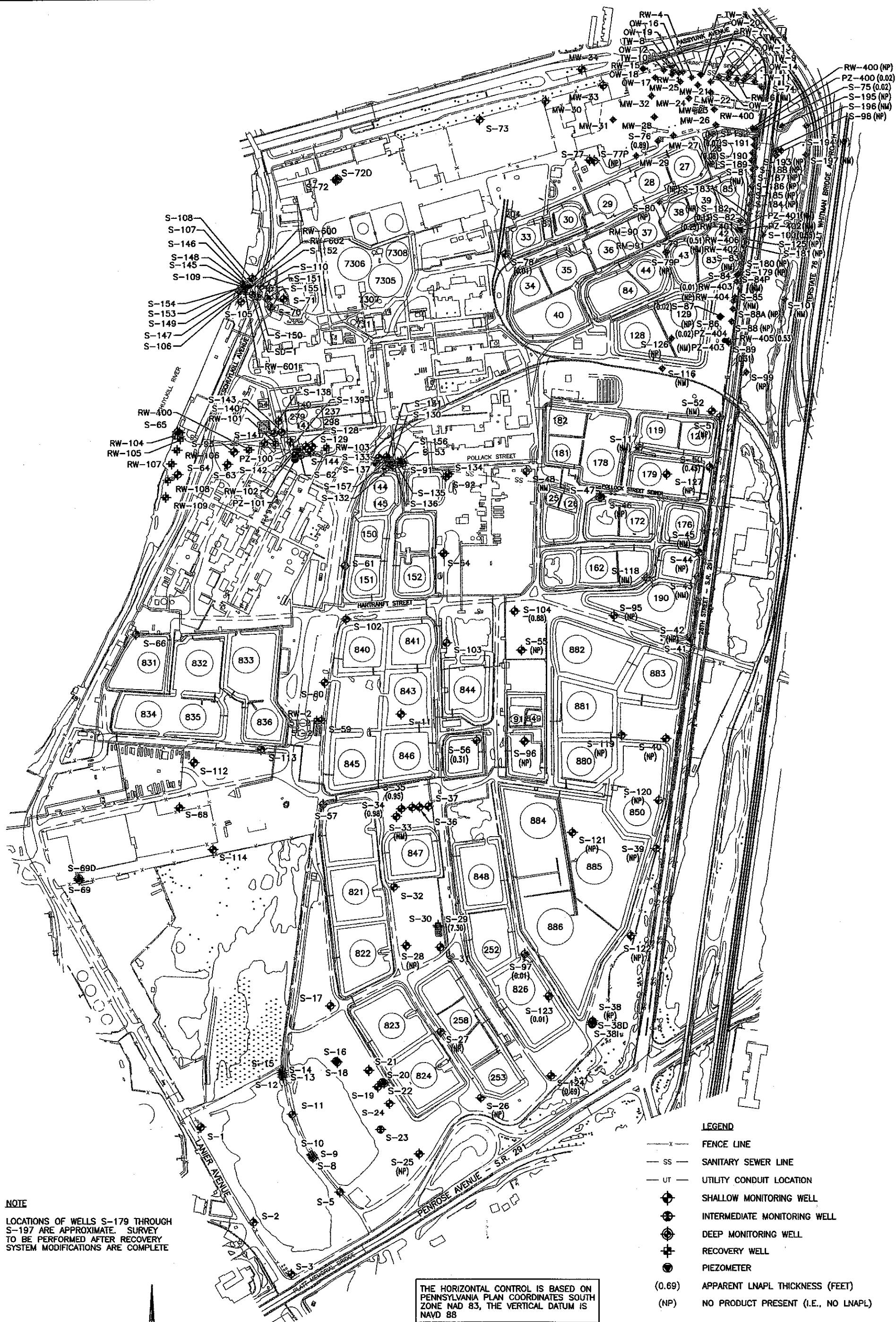


FIGURE 4-4
S-195 Aquifer Test Hydrograph
26th Street Area Investigation
Sunoco Philadelphia Refinery

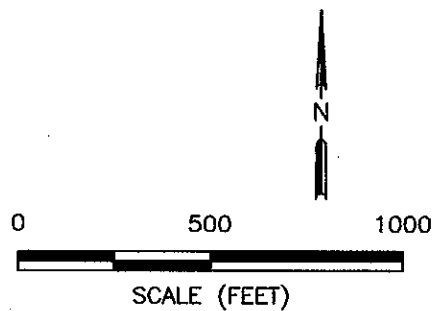




NOTE
LOCATIONS OF WELLS S-179 THROUGH S-197 ARE APPROXIMATE. SURVEY TO BE PERFORMED AFTER RECOVERY SYSTEM MODIFICATIONS ARE COMPLETE

THE HORIZONTAL CONTROL IS BASED ON PENNSYLVANIA PLAN COORDINATES SOUTH ZONE NAD 83, THE VERTICAL DATUM IS NAVD 88

REFERENCE: Basemap is provided by James M. Stewart, Inc.; 3028-01.dwg; 06/08/03




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PHONE (484) 875-3075/875-9288 (FAX)

PREPARED FOR:

SUNOCO PHILADELPHIA REFINERY
26TH STREET AREA
PHILADELPHIA, PENNSYLVANIA

JOB NUMBER:
62SU.01019.02.0006

DRAWN BY: KAM

**APPARENT LNAPL THICKNESS
(JANUARY 29, 2004)**

CHECKED BY:

APPROVED BY:

FIGURE:

4-5

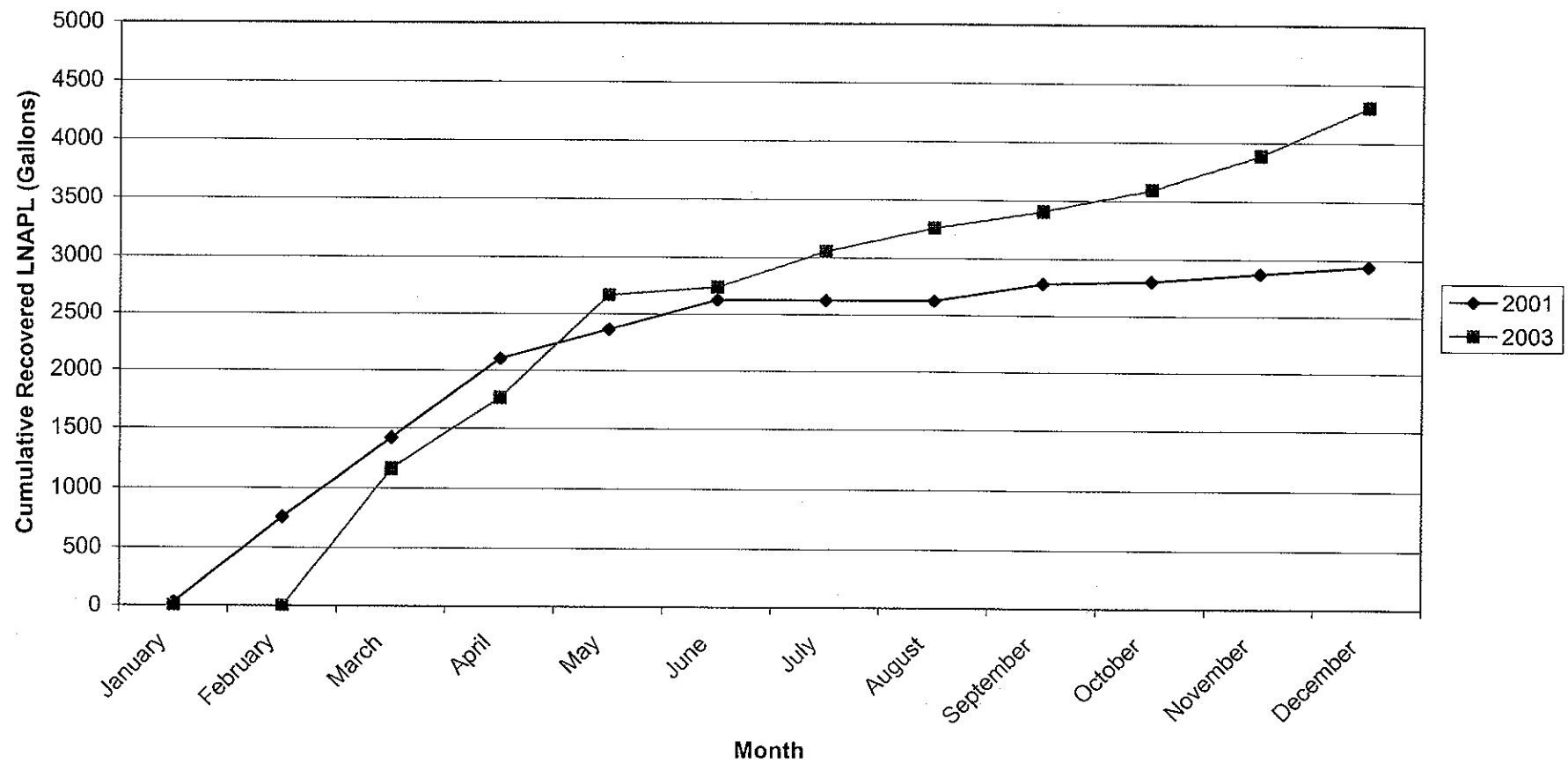
DATE:

03/01/04

N/SFCOR-067

82SI 1-1019-2-6-43 (THICKNESS) rlvn

FIGURE 4-7
Cumulative LNAPL Recovery
26th Street Sewer Area
Recovery Systems
26th Street Area Investigation
Sunoco Philadelphia Refinery



APPENDIX A



LEGEND

- CPT BORING LOCATION
- ◆ SHALLOW MONITORING WELL
- ◆ INTERMEDIATE MONITORING WELL
- ◆ DEEP MONITORING WELL
- ◆ RECOVERY WELL
- ⊗ ABANDONED WELL
- PIEZOMETER

NOTE

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

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LINES OF GENERALIZED HYDROGEOLOGIC CROSS-SECTIONS

FIGURE:

SUNOCO PHILADELPHIA REFINERY
 PHILADELPHIA, PENNSYLVANIA

4-1

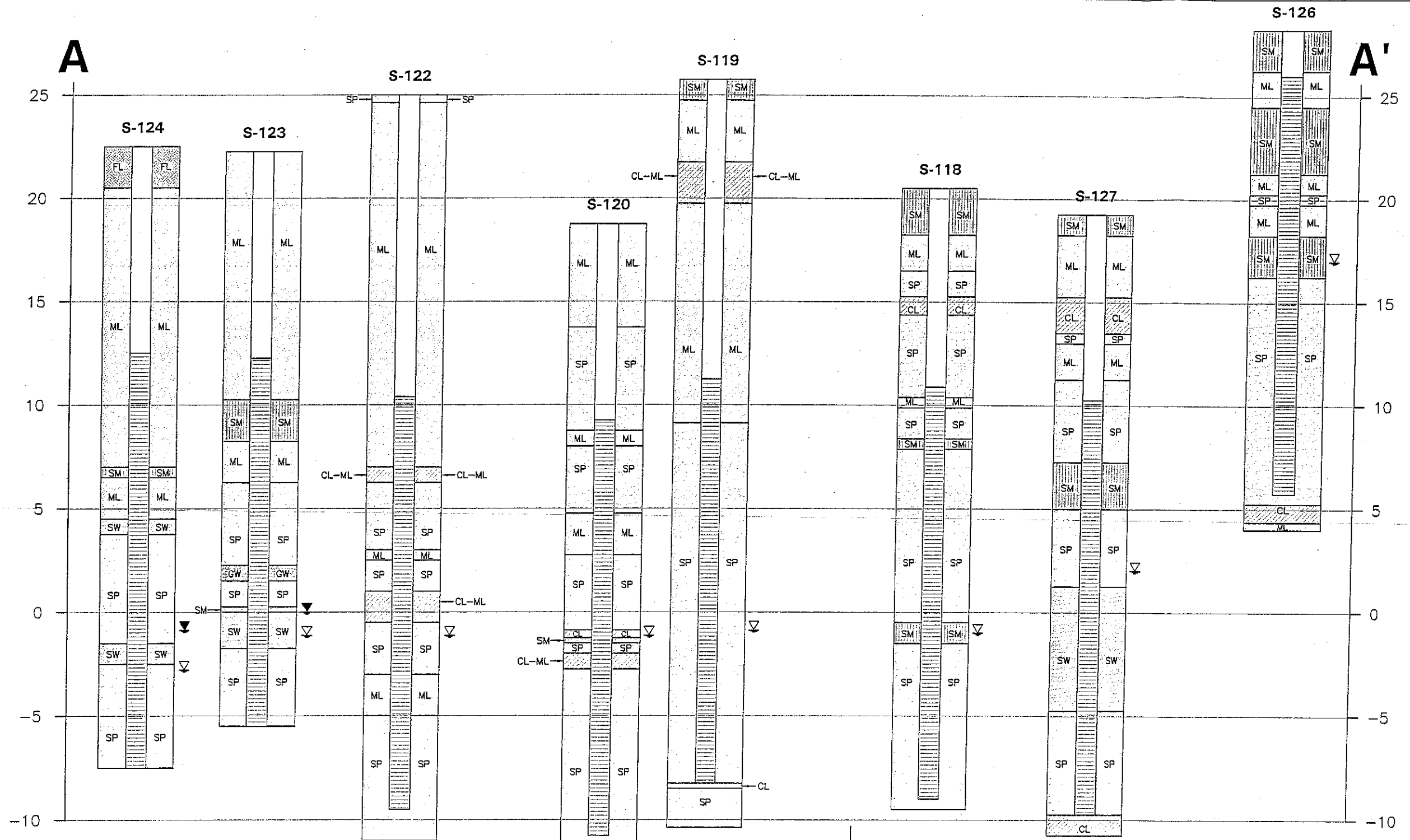
JOB#: 62SU.01017.02.0006

APPR:

DWN: KPM

DATE: 01/29/03

DWG: 62SU-1017-2-6SX(4-1)



LEGEND

- | | | | |
|--|---------------------|-------------------------|-------------------------|
| LNAPL ELEVATION (OCTOBER 22, 2002) | FILL (FL) | SANDY SILT (MLS) | SILT & SAND (ML/SW) |
| GROUNDWATER ELEVATION (OCTOBER 22, 2002) | CLAYEY SAND (SW-CL) | SILTY SAND (SM) | CLAY & SAND (CL/SW) |
| WELL SCREEN | GRAVEL & SAND (GWS) | WELL-GRADED SAND (SW) | POORLY-GRADED SAND (SP) |
| CLAY (CL) | CLAYEY SILT (ML-CL) | WELL-GRADED GRAVEL (GW) | GRAVEL (GP) |
| SAND & GRAVEL (SWG) | SILT & CLAY (ML/CL) | SILT (ML) | |
| SILTY CLAY (CL-ML) | | | |
| CLAY & PEAT (CL/PT) | | | |

1" = 5'

1" = 400'

VERTICAL EXAGGERATION: 80X

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HYDROGEOLOGIC CROSS-SECTION A-A'

SUNOCO PHILADELPHIA REFINERY
 PHILADELPHIA, PENNSYLVANIA

FIGURE:

4-2

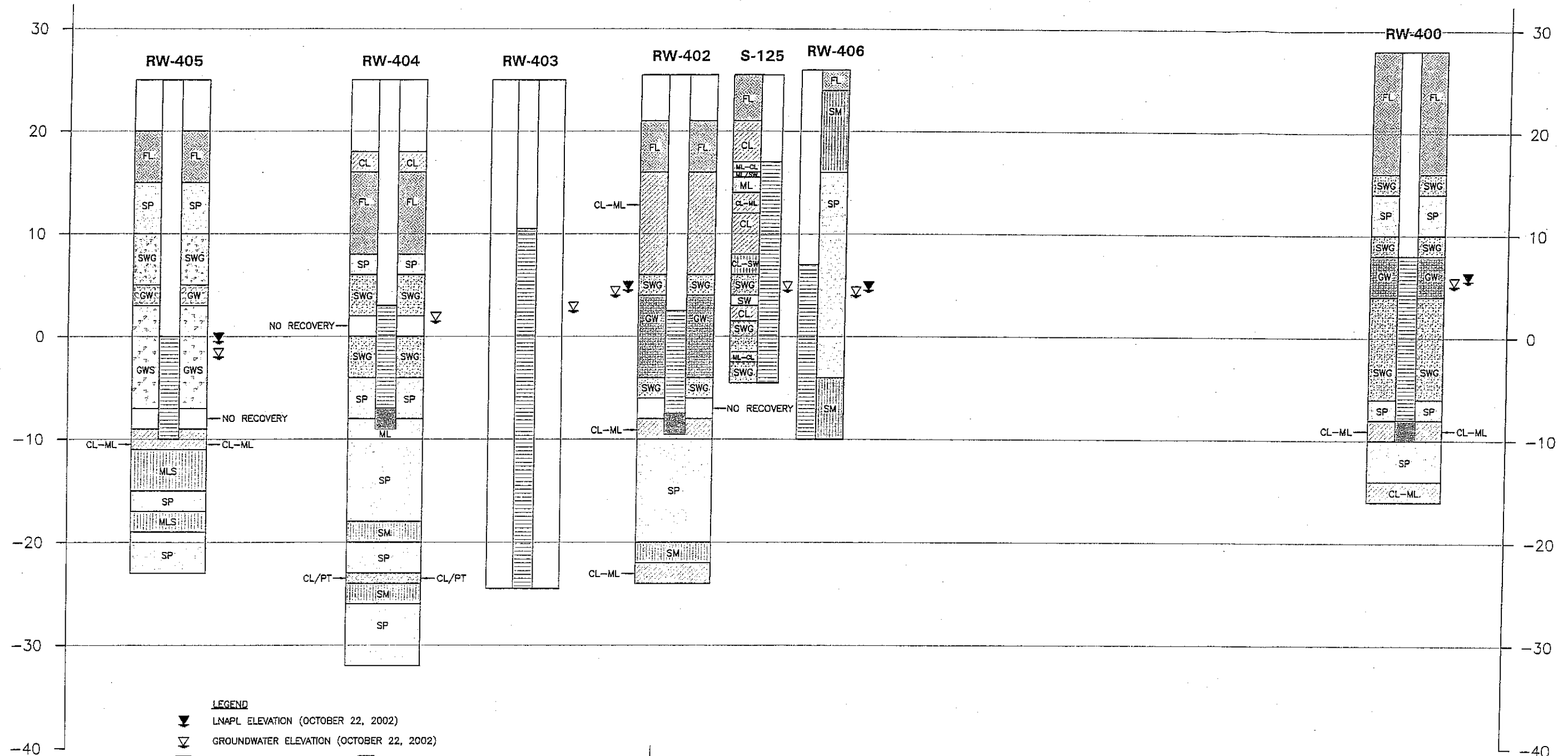
JOB #: 62SU.01017.02.0006 APPR: DWN: KPM DATE: 01/10/03

N:\SECOR-082

DWG: 62SU-1017-2-6(4-2).DWG

B

B'



- LEGEND**
- ▼ LNAPL ELEVATION (OCTOBER 22, 2002)
 - ▽ GROUNDWATER ELEVATION (OCTOBER 22, 2002)
 - WELL SCREEN
 - CLAY (CL)
 - SAND & GRAVEL (SWG)
 - SILTY CLAY (CL-ML)
 - CLAY & PEAT (CL/PT)
 - SANDY SILT (MLS)
 - SANDY CLAY (CL-SW)
 - WELL-GRADED SAND (SW)
 - WELL-GRADED GRAVEL (GW)
 - SILT (ML)
 - FILL (FL)
 - CLAYEY SAND (SW-CL)
 - GRAVEL & SAND (GWS)
 - CLAYEY SILT (ML-CL)
 - SILT & CLAY (ML/CL)
 - SILT & SAND (ML/SW)
 - CLAY & SAND (CL/SW)
 - POORLY-GRADED SAND (SP)
 - GRAVEL (GP)
 - SILTY SAND (SM)

1" = 10'
1" = 100'
VERTICAL EXAGGERATION: 10X

NOTES
WELL SCREEN NOT SHOWN WHERE
DATA IS NOT AVAILABLE

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HYDROGEOLOGIC CROSS-SECTION B-B'

SUNOCO PHILADELPHIA REFINERY
PHILADELPHIA, PENNSYLVANIA

FIGURE:

4-3

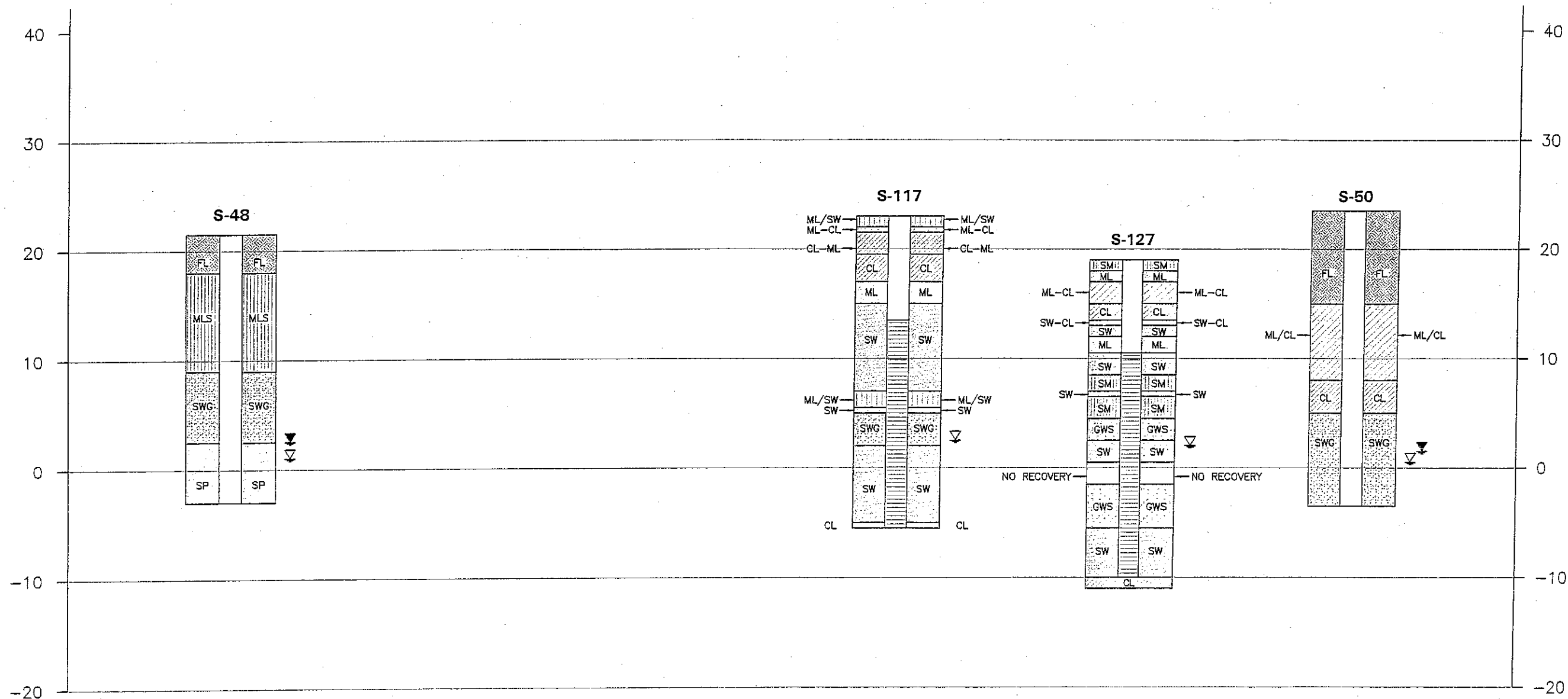
JOB#: 62SU.01017.02.0006 APPR: DWN: KPM DATE: 01/10/03

NY/SECOR-062

DWG: 62SU-1017-2-643(B-B).DWG

C

C'



LEGEND

- | | | |
|--|-------------------------|---------------------|
| ▼ LNAPL ELEVATION (OCTOBER 22, 2002) | WELL SCREEN | FILL (FL) |
| ▽ GROUNDWATER ELEVATION (OCTOBER 22, 2002) | CLAY (CL) | CLAYEY SAND (SW-CL) |
| | SAND & GRAVEL (SWG) | GRAVEL & SAND (GWS) |
| | SILTY CLAY (CL-ML) | CLAYEY SILT (ML-CL) |
| | CLAY & PEAT (CL/PT) | SILT & CLAY (ML/CL) |
| | SANDY SILT (MLS) | SILT & SAND (ML/SW) |
| | SILTY SAND (SM) | CLAY & SAND (CL/SW) |
| | POORLY-GRADED SAND (SP) | SILT (ML) |
| | WELL-GRADED SAND (SW) | |

1" = 10'

1" = 100'

VERTICAL EXAGGERATION: 10X

NOTES

WELL SCREEN NOT SHOWN WHERE DATA IS NOT AVAILABLE

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HYDROGEOLOGIC CROSS-SECTION C-C'

SUNOCO PHILADELPHIA REFINERY
PHILADELPHIA, PENNSYLVANIA

FIGURE:

4-4

JOB#: 62SU.01017.02.0006

APPR:

DWN: KPM

DATE: 01/10/03

N:/SECOR-062

DWG: 62SU-1017-2-644(C-C').DWG

APPENDIX B

TABLE B-1

RW-406 Aquifer Test Liquid Level Measurement Data Summary

26th Street Area Investigation
Philadelphia Refinery

Well No.	Distance From RW-406 (feet)	Static Liquid Level Measurements			Liquid Level Measurements at End of Test			Corrected Change in Water Level (feet)
		Depth to Water (feet btoc)	Depth to LNAPL (feet btoc)	Product Thickness (feet)	Depth to Water (feet btoc)	Depth to LNAPL (feet btoc)	Product Thickness (feet)	
RW-406	NA	24.60	24.16	0.44	29.36	27.58	1.78	3.74
RW-401	21	22.14	22.02	0.12	23.91	22.24	1.67	0.59
RW-402	110	21.19	21.15	0.04	21.29	21.23	0.06	0.08
PZ-401	12	21.22	--	--	22.02	--	--	0.80
PZ-402	10	20.93	--	--	21.80	--	--	0.87
S-125	38	23.44	--	--	24.00	--	--	0.56
S-82	56	23.63	23.42	0.21	23.76	23.56	0.20	0.14

Notes:

btoc = below top of casing

LNAPL specific gravity assumed to be 0.76

TABLE B-2

RW-406 Aquifer Test Data Analyses Summary

**26th Street Area Investigation
Philadelphia Refinery**

Well No.	Distance From RW-406 (feet)	Drawdown Data (1)		Recovery Data (2)	
		Estimated Transmissivity (ft ² /day)	Estimated Hydraulic Conductivity (ft/day) (3)	Estimated Transmissivity (ft ² /day)	Estimated Hydraulic Conductivity (ft/day) (3)
RW-406	NA	252	20.13	427	34.11
RW-401	21	554	44.25	394	31.47
PZ-401	12	330	26.36	251	20.05
PZ-402	10	258	20.61	200	15.97
S-125	38	492	39.30	292	23.32
Geometric Mean		357	28.56	301	24.04

Notes:

- (1) Drawdown data analyzed using Cooper-Jacob Straight-Line Approximation Method adjusted for unconfined aquifers
- (2) Recovery data analyzed using Theis Recovery Method adjusted for unconfined aquifers
- (3) Saturated aquifer thickness assumed to be 12.52 feet (based on RW-406 static liquid level measurements)

TABLE B-3

**Summary of Hydraulic Conductivity Values
from Rising Head Slug Tests
October 2002**

**26th Street Area Investigation
SUNOCO Philadelphia Refinery**

Well No.	Hydraulic Conductivity (K)	
	ft/day	cm/sec
S-43	0.78	2.75E-04
S-86	0.30	1.06E-04
S-116	2.11	7.45E-04
S-120	11.70	4.13E-03
S-122	12.60	4.45E-03
S-127	0.29	1.02E-04
RW-406	7.22	2.55E-03

Note: Bouwer and Rice (1976) method used for slug test analyses

TABLE B-4

RW-400 Series Recovery Well Capacity Test Summary

26th Street Area Investigation
Philadelphia Refinery

Well No.	Total Pumping Duration (minutes)	Maximum Pumping Rate Interval (gpm)	Static Liquid Level Measurements			Liquid Level Measurements at End of Pumping			Corrected Drawdown (feet)	Comments
			Depth to Water (feet btoc)	Depth to LNAPL (feet btoc)	Product Thickness (feet)	Depth to Water (feet btoc)	Depth to LNAPL (feet btoc)	Product Thickness (feet)		
RW-400	NA	--	--	--	--	--	--	--	--	Not tested; water pump not operable. DRBC permit application (June 1995) indicates that the well yield is 1 gpm with a specific capacity of 0.08 gpm/ft
RW-401	NA	--	--	--	--	--	--	--	--	Not tested, RW-406 was installed as a replacement well
RW-402	158	2.00	19.25	19.10	0.15	21.86	21.55	0.31	2.49	Maximum pumping rate was at the capacity of the pump
RW-403	122	0.88	22.36	--	--	31.42	31.37	0.05	9.10	
RW-404	59	1.20	24.21	--	--	29.85	--	--	5.64	
RW-405	367	1.20	27.92	26.67	1.25	31.89	27.69	4.20	1.73	Maximum pumping rate was at the capacity of the pump, 7.5 gallons of product removed during testing
RW-406	3300	2.74	24.60	24.16	0.44	29.36	27.58	1.78	3.74	116 gallons of product removed during test, refer discussion of test

Notes:

btoc = below top of casing

maximum pumping rate intervals are average rates during the highest flow rate interval

TABLE B-5

**Product Bail-down
Test Summary**

**26th Street Area Investigation
Philadelphia Refinery**

Well No.	Well Diameter (inches)	Static Product Thickness (feet)	Length of Test (minutes)	Volume of Product Removed (gallons)	Product Thickness at End of Test (feet)	Recovery Attained During Test	Estimated Inflection Point Time (1) (minutes)	Estimated Inflection Point Product Thickness (feet)
S-50	2	1.03	50	0.75	0.43	42%	18	0.37
S-98 (2)	4	0.57	45	3	0.62	109%	(3)	(3)
S-100 (2)	4	0.61	209	2	0.24	39%	5	0.24
CSX-MW-5	2	0.63	41.5	0.13	0.31	49%	14	0.28

Notes:

- (1) Estimated using methodology presented in Gruszewski (1987) and as described in Testa and Paczkowski (1989)
- (2) Sorbent removed from well prior to product bailing
- (3) Inflection point not clearly indicated from graph

APPENDIX C

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/18/03 12/19/03	Drilling Contractor: Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-179	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 17.73	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
			Soft dig interval; no samples.					
	5							
			No sample; HSA only.					
	10		CLAYEY SILT, low plasticity, saturated, light gray (very stained), up to 3/4" gravel (sub-angular), petroleum odor, (ML).				1.1	720
			CLAYEY SILT, low plasticity, saturated, light gray to black (very stained), up to 3/4" gravel (sub-angular), petroleum odor, (ML).				0.8	392
			CLAYEY SILT, low plasticity, saturated, light gray to black (very stained), up to 3/4" gravel (sub-angular), petroleum odor, (ML).				0.8	674
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>								

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 1 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/18/03 12/19/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-179	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 17.73	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
20 Slot PVC Screen, Circumslot			CLAYEY SILT, low plasticity, saturated, light gray to black (very stained), up to 3/4" gravel (sub-angular) and inclusions of concrete (approx. 1") fill, petroleum odor, (ML).				1.0	7048
			CLAYEY SILT, low plasticity, wet, light gray to black (very stained), up to 3/4" gravel (sub-angular) and inclusions of red brick and wood fill fragments, petroleum odor, (ML).				1.3	553
			SILTY CLAY, slight plasticity, wet, black, no odor, (CL-ML).					
			CLAYEY SILT, low plasticity, wet, light gray to black, approx. 1% to 3% 1/4" gravel inclusions, no odor, (ML).					
	20		SAND, non-plastic, moist, brown, coarse grained, up to 1/2" gravel (sub-rounded) present, no odor, (SW).				0.8	9741
			CLAY, low plasticity, moist, gray to black, up to 1/2" gravel (sub-angular) present, no odor, (CL).					
			CLAYEY SAND, slight plasticity, saturated, brown, fine grained gravel (angular), petroleum odor, (SC).					
			SANDY CLAY, low plasticity, saturated, brown, petroleum odor, (CL).				1.3	6022
			CLAYEY SAND, slight plasticity, saturated, brown, fine grained gravel (angular) present at approx. 50% to 70%, petroleum odor, (SC).					
			SAND, non-plastic, saturated, brown, medium grained, petroleum odor, (SP).					
		SAND, non-plastic, saturated, brown, coarse grained, rounded to sub-rounded inclusions of red brick, petroleum odor, (SW).						
		CLAYEY GRAVEL, slight plasticity, saturated, light gray, rounded to sub-rounded inclusions of red brick, petroleum odor, (GC).				0.3	0.0	
25		SAND, non-plastic, saturated, light gray, fine grained, petroleum odor, (SP).						
		FILL, red brick and wood fragments plugged sampler resulting in minimal recovery.						
		CLAYEY SAND, slight plasticity, saturated, dark green to gray, fine grained (approx. 1" on edge) gravel (sub-angular), strong petroleum odor, (SC).				2.0	9998	
		FILL, dark reddish brown brick.						
		SAND, non-plastic, saturated, brown, medium grained, up to 1" gravel (sub-rounded), strong petroleum odor, (SW).						
		SAND, non-plastic, saturated, multi-colored green, red, and gray, medium grained, up to 1" gravel (sub-rounded to well-rounded), strong petroleum odor, (SW).				1.8	9999+	

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01019.02

Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

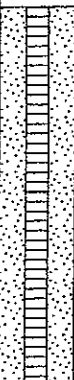
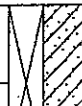


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Figure

(sheet 2 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/18/03 12/19/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-179		
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 17.73	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA		
Well Construction	Depth, (ft.)	Sample Type	Description					Recovery (feet)	PID Reading (ppm above background)
			CLAYEY SAND, slight plasticity, saturated, dark green to gray, fine through coarse grained, greater than 1" gravel (sub-rounded) wedged in sampling shoe and red brick fragments (approx. 1/2") also present at less than 1%, petroleum odor, (SC).					1.2	9999+
			SAND, very slight plasticity, saturated, brown, fine grained, trace clay, petroleum odor, (SP).					2.0	1567
			CLAY, low to medium plasticity, saturated, mottled gray and light brown, petroleum odor, (CL).						
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>									

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

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Figure

(sheet 3 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/18/03 12/18/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-180	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 18.78	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
	5		Soft dig interval; no samples.					
			SANDY CLAY, low plasticity, wet, brown, pieces of asphalt present, no odor, (CL).				0.5	409
	10		No recovery.				0.0	
			SAND, non-plastic, wet, brown, medium through coarse grained, no odor, (SP); GRAVEL, non-plastic, wet, brown, angular with median size approx. 1/2", no odor, (GW).				1.0	90.5
			FILL, red brick fragments.					
			CLAYEY GRAVEL, low plasticity, wet, brown, up to 1/2" gravel (angular) present, pieces of rock wedged in sampling shoe yielded low recovery, no odor, (GC).				0.5	476
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>								

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

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Figure (sheet 1 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/18/03 12/18/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-180	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 18.78	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
20 Slot PVC Screen, Circumslot			SANDY GRAVEL, non-plastic, wet, reddish brown, coarse grained sand, petroleum odor, (GWS).				1.3	340
			CLAY, low plasticity, wet, black (stained), petroleum odor, (CL).					
			CLAY, low plasticity, moist, tan, petroleum odor, (CL).					
			GRAVEL, non-plastic, wet, dark gray, coarse grained, up to 1/2" gravel (angular), petroleum odor, (GP).				2.0	9999+
			SAND, non-plastic, wet, dark gray (significantly stained), medium grained, up to 3/4" gravel (sub-rounded) present at base, petroleum odor, (SP).					
	20		CLAYEY GRAVEL, slight plasticity, wet, brown, up to 3/4" gravel (angular), petroleum odor, (GC).				1.0	190
			SAND, non-plastic, wet, brown, coarse grained, petroleum odor, (SP).				0.6	749
			CLAYEY GRAVEL, slight plasticity, wet, brown (significantly stained), up to approx. 1/2" gravel (angular), petroleum odor, (GC).					
			SAND, non-plastic, wet, gray (significantly stained), coarse grained, up to 1/2" sub-rounded and 3/4" sub-angular gravel, petroleum odor, (SP).				0.8	9999+
	25		SAND, non-plastic, wet, multi-colored, coarse grained, petroleum odor, (SP).				1.3	9999+
		CLAYEY GRAVEL, slight plasticity, wet, reddish brown (significantly stained), greater than 1" gravel (sub-rounded), petroleum odor, (GC).						
		SAND, non-plastic, wet, multi-colored, coarse grained, petroleum odor, (SP).				1.5	9999+	
		CLAYEY GRAVEL, slight plasticity, wet, brown (significantly stained), greater than 1" gravel (well-rounded to angular), strong petroleum odor, (GC).						

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01019.02

Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

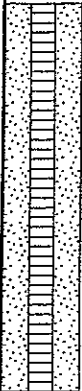



Approved by _____

Figure

(sheet 2 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/18/03 12/18/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-180	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 18.78		Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
			SAND, very slight plasticity, wet, brown (significantly stained), medium grained, some clay and gravel (sub-rounded) up to 3/4", strong petroleum odor, (SW).				1.3	2022
			SAND, very slight plasticity, wet, dark brown (significantly stained), medium grained, some clay and gravel (sub-rounded) up to 3/4", strong petroleum odor, (SW).				2.0	1907
		SANDY CLAY, low plasticity, saturated, tan to brown, fine grained sand present between 30% to 40%, strong petroleum odor, (CL).						
	35							
	40							

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01019.02

Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure

(sheet 3 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/17/03 12/18/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-181	
Sec "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 19.75	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
			Soft dig interval; no samples.					
	5							
			No sample; HSA only.					
	10		CLAY, high plasticity, wet, gray, pieces of red brick wedged in sampling shoe yielded low recovery, petroleum odor, (CH).				0.5	73.2
			SILTY CLAY, slight plasticity, wet, mottled gray and tan, gradational to unit below, no odor, (CL-ML).				2.0	0.0
			SILT, low plasticity, moist, mottled gray and tan, gradational from unit above, no odor, (ML).					
			CLAY, high plasticity, moist, cream with some brown (possibly iron staining) mottling, no odor, (CH).				2.0	0.0
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>								

Project No. 62SU.01019.02

Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure

(sheet 1 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/17/03 12/18/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-181
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.):	Groundwater Depth (ft.): 19.75	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA

Well Construction	Depth, (ft.)	Sample Type	Description	Recovery (feet)	PID Reading (ppm above background)
20 Slot PVC Screen, Circumslot			CLAY, high plasticity, moist, cream with some brown (possibly iron staining) mottling, no odor, (CH).	1.0	0.0
			CLAY, high plasticity, moist, cream with some brown (possibly iron staining) mottling, no odor, (CH).	2.0	69.8
	20		SILTY CLAY, low to medium plasticity, moist, tan to light brown, no odor, (CL-ML).	1.0	108
			SAND, non-plastic, moist, red to yellow, medium grained, pieces of gravel (greater than 1") wedged in sampling shoe yielded low recovery, no odor, (SW).	1.3	9999+
			SAND, non-plastic, wet, red to yellow, medium grained, pieces of gravel (greater than 1") wedged in sampling shoe yielded low recovery, petroleum odor, (SW).		
			SAND, non-plastic, moist, gray and red (stained), medium grained, approx. 1" gravel (sub-rounded) present, product sheen from free water present, petroleum odor, (SW).	0.8	9999+
	25		CLAY, high plasticity, wet, tan to brown, cave-in from units above, petroleum odor, (CH).		
			SAND, non-plastic, saturated, reddish brown, medium grained, abundant gravel (sub-rounded) present up to 1", product soaked, petroleum odor, (SW).		
			CLAY, high plasticity, wet, tan to brown, cave-in from units above, petroleum odor, (CH).	1.3	9999+
			SAND, non-plastic, saturated, reddish brown, medium grained, abundant gravel (sub-rounded) present up to 1", product soaked, petroleum odor, (SW).		
			CLAY, high plasticity, saturated, brown, 1/4" gravel (angular) present, petroleum odor, (CH).	0.8	9999+
			SAND, non-plastic, saturated, reddish brown, medium grained, abundant gravel (sub-rounded) present up to 1", product soaked, petroleum odor, (SW).		

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well





BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 2 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/17/03 12/18/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-181	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 19.75	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
	35		SAND, non-plastic, saturated, reddish brown (stained), medium grained, approx. 50% gravel (angular) present up to 1" on edge, strong petroleum odor, (SW).				1.1	9999+
			SAND, non-plastic, saturated, brown (stained), medium through coarse grained, approx. 50% gravel (rounded to sub-rounded) present less than 1/2" on edge, petroleum odor, (SW).				2.0	9999+
			SAND, non-plastic, wet, brown, fine grained, petroleum odor, (SP).					
	40							

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01019.02

Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure

(sheet 3 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/11/03 12/11/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-182	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 19.86	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
			Soft dig interval; no samples.					
	5							
			CLAYEY SILT, non-plastic, wet, brown, petroleum odor, (ML).				1.9	1371
	10		CLAYEY SILT, non-plastic, wet, brown, no odor, (ML).				2.0	717.8
			CLAYEY SAND, low plasticity, moist, gray, petroleum odor, (SC).					2157.8
			CLAY, high plasticity, moist, tan, petroleum odor, (CH).					
			CLAY, low plasticity, moist, mottled gray and brown, petroleum odor, (CL).				0.8	404.5
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>								

Project No. 62SU.01019.02

Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

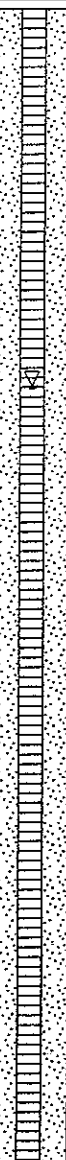
Approved by _____

Figure

(sheet 1 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/11/03 12/11/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-182	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 19.86	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
			CLAY, high plasticity, moist, light tan to gray, petroleum odor, (CH).				2.0	1611
			CLAYEY SAND, low plasticity, moist, gray, strong petroleum odor, (SC). CLAY, high plasticity, moist, light tan to gray, petroleum odor, (CH).					
			CLAY, high plasticity, moist, cream to gray, no odor, (CH).				2.0	767
			CLAYEY GRAVEL, slight plasticity, moist, cream to gray, up to 1" gravel (rounded), petroleum odor, (GC).					
	20		CLAY, low plasticity, moist, light gray, petroleum odor, (CL).				1.5	2713.6
			GRAVELLY SAND, non-plastic, moist, red and gray, up to 1" gravel, petroleum odor, (SW).					
			CLAY, low plasticity, moist, mottled light gray and brown, slightly sandy, petroleum odor, (CL).				2.0	1830
			GRAVELLY SAND, non-plastic, moist, red and gray, up to 1" gravel, petroleum odor, (SW).					
			CLAY, low plasticity, moist, mottled light gray and brown, slightly sandy, petroleum odor, (CL).				0.9	3034.8
	25		GRAVELLY SAND, non-plastic, moist, red and gray, up to 1" gravel, petroleum odor, (SW).					
			SANDY CLAY, low plasticity, moist, brown, petroleum odor, (CL).				2.0	2004.7
			GRAVELLY SAND, non-plastic, moist, red, up to 1" gravel, petroleum odor, (SW).					
		SANDY CLAY, low plasticity, moist, brown, petroleum odor, (CL).				1.3	2757.8	
			GRAVELLY SAND, non-plastic, moist, red, up to 1" gravel, petroleum odor, (SWG).					

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Project No. 62SU.01019.02

Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

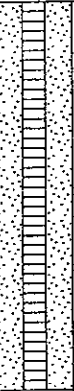

Approved by _____

Figure

(sheet 2 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/11/03 12/11/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-182	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 19.86	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
			CLAYEY SAND, slight plasticity, saturated, red and brown, rock fragments present, petroleum odor, (SC).				0.9	1188
			SANDY CLAY, low plasticity, moist, brown, petroleum odor, (CL).				1.9	2714
			GRAVELLY SAND, non-plastic, moist, red, trace clay and up to 1" gravel, petroleum odor, (SWG).					
	35							
	40							
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>								

Project No. 62SU.01019.02 Date December 2003 through January 2004

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Log of Well

Approved by _____

Figure (sheet 3 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/11/03 12/12/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-183	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 20.61	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
			Soft dig interval; no samples.					
	5							
	10							
			CLAY, high plasticity, wet, gray, no odor, (CH).				2.0	234
			SILTY CLAY, low plasticity, moist, mottled brown and gray, no odor, (CL-ML).					
			CLAY, high plasticity, wet, gray, no odor, (CH).				1.9	466
			SILTY CLAY, low plasticity, moist, mottled brown and gray, no odor, (CL-ML).					
			CLAY, high plasticity, moist, mottled brown and gray, no odor, (CH).				1.5	237.8
			SILTY CLAY, low plasticity, moist, mottled brown and gray, no odor, (CL-ML).					
			CLAY, low plasticity, moist, yellowish orange to tan, no odor, (CL).				2.0	18.2

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01019.02

Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure

(sheet 1 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/11/03 12/12/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-183	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 20.61	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
			CLAY, low plasticity, moist, yellowish orange to tan, no odor, (CL).				1.1	140.5
			CLAY, high plasticity, wet, tan, no odor, (CH).				1.5	15.6
	20		CLAY, high plasticity, wet, brown, no odor, (CH).				2.0	923.6
			CLAYEY SAND, low plasticity, wet, gray, no odor, (SC).					
			CLAYEY SAND, low plasticity, wet, red to brown, no odor, (SC).					
			SAND, non-plastic, wet, gray, medium grained, up to 1/4" fine gravel (sub-rounded), petroleum odor, (SW).				2.0	2045.9
			SAND, non-plastic, wet, reddish brown, medium grained, trace clay and up to 1/4" fine gravel (sub-rounded), petroleum odor, (SW).					
	25		GRAVELLY CLAY, low plasticity, wet, yellowish brown, fine grained gravel and trace sand, petroleum odor, (CLG).				1.6	3212.9
	SAND, non-plastic, wet, reddish brown, medium grained, some gravel (sub-rounded) up to 1/2", petroleum odor, (SW).							
	GRAVELLY SAND, non-plastic, wet, reddish brown, medium grained, top 12" was cave-in, petroleum odor, (SWG).				2.0	2835.6		
	SANDY GRAVEL, non-plastic, saturated, reddish brown, petroleum odor, (GWS).				2.0	2879.8		

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

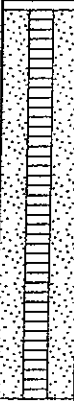


BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 2 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/11/03 12/12/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-183	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.):	Groundwater Depth (ft.): 20.61	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
			GRAVELLY SAND, non-plastic, saturated, brown, medium grained, some gravel (sub-angular) up to 1", petroleum odor, (SWG).				1.3	3189.3
			SAND, non-plastic, saturated, brown, medium grained, petroleum odor, (SP).				0.9	2790.7
	35							
	40							
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>								

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 3 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/12/03 12/12/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-184	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 20.3	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
	5		Soft dig interval; no samples.					
	10		SILTY CLAY, low plasticity, wet, brown to gray, trace sand, petroleum odor, (CL-ML).				1.5	453
			CLAY, low to medium plasticity, moist, brown to gray, petroleum odor, (CL).				1.9	434.5
			CLAY, high plasticity, moist, brown to gray, petroleum odor, (CL).				1.6	1034.5
			CLAY, high plasticity, moist, gray to cream, petroleum odor, (CL).				0.7	90.6

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 1 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/12/03 12/12/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-184
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 20.3	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA

Well Construction	Depth, (ft.)	Sample Type	Description	Recovery (feet)	PID Reading (ppm above background)
20 Slot PVC Screen, Circumslot			SILT, low plasticity, moist, cream, petroleum odor, (ML).		
			SANDY CLAY, low plasticity, moist, light brown, some gravel (sub-rounded) up to 1/4", petroleum odor, (CL).	1.7	207.5
			CLAY, low plasticity, moist, light brown, some medium grained sand and gravel (rounded to sub-rounded) up to 1/4", petroleum odor, (CL).	2.0	148.4
	20		SAND, non-plastic, moist, dark brown, medium through coarse grained, petroleum odor. (SP).	1.5	311.4
			CLAY, high plasticity, moist, brown, petroleum odor, (CL).		
			GRAVELLY SAND, non-plastic, saturated, brown, medium grained, gravel up to 1", petroleum odor, (SWG).		
			No recovery.	0.0	
	25		CLAYEY SAND, non-plastic, wet, reddish brown, greater than 1" gravel wedged in sampling shoe yielded low recovery, petroleum odor, (SC).	0.2	483.5
			SANDY CLAY, low plasticity, saturated, light brown, petroleum odor, (CL).	2.0	1354.3
			CLAYEY SAND, non-plastic, wet, reddish brown, medium grained, gravel (sub-rounded) up to 3/4", petroleum odor, (SC).		
			SANDY CLAY, low plasticity, saturated, light brown, petroleum odor, (CL).	1.0	160.7
			SANDY GRAVEL, non-plastic, saturated, dark brown, large gravel wedged in sampling shoe yielded low recovery, petroleum odor, (GWS).		

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01019.02

Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

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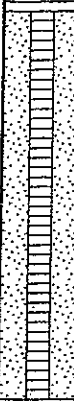
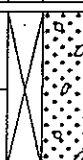
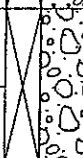
Figure

(sheet 2 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/12/03 12/12/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA	Method/Equipment: Hollow Stem Auger Split Spoon	Well Number: S-184		
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): 20.3	Groundwater Depth (ft.): 20.3	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA

Well Construction	Depth, (ft.)	Sample Type	Description	Recovery (feet)	PID Reading (ppm above background)
			GRAVELLY SAND, non-plastic, wet, brown to yellowish brown, coarse grained, greater than 1" gravel wedged in sampling shoe yielded low recovery, petroleum odor, (SWG).	1.1	2571.3
			SANDY GRAVEL, non-plastic, saturated, yellowish brown, petroleum odor, (SWG).	1.0	2978.7
	35				
	40				

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

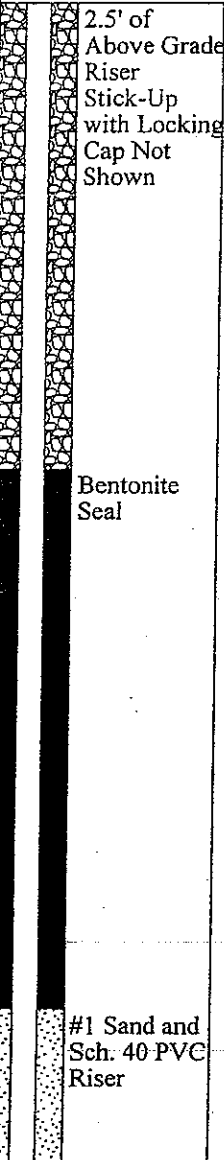
Approved by _____

Figure (sheet 3 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/15/03 12/16/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-185
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 20.78	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA

Well Construction	Depth, (ft.)	Sample Type	Description	Recovery (feet)	PID Reading (ppm above background)
	5		Soft dig interval; no samples.		
	10		No sample; HSA only.		
			SANDY SILT, non-plastic, saturated, dark brown, petroleum odor, (ML).	1.3	439.3
			CLAY, high plasticity, wet, gray to green, petroleum odor, (CH).		
			SANDY SILT, non-plastic, moist, dark brown, petroleum odor, (ML).	1.9	9999+
			CLAY, high plasticity, moist, gray to green, petroleum odor, (CH).		
			FILL, angular rock fragments up to 1/2" on edge, possible cave-in from near surface unit.	0.5	9999+

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 1 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/15/03 12/16/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-185	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 20.78	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description			Recovery (feet)	PID Reading (ppm above background)	
20 Slot PVC Screen, Circumslot			CLAY, high plasticity, moist, green, petroleum odor, (CH).					
			CLAY, high plasticity, moist, green, petroleum odor, (CH). CLAYEY SILT, non-plastic, moist, green, petroleum odor, (ML).			0.8	39.0	
			CLAY, high plasticity, moist, green, petroleum odor, (CH).					
			SANDY CLAY, low plasticity, saturated, gray to green, petroleum odor, (CL).			2.0	238.3	
			SANDY CLAY, low plasticity, saturated, gray to green, up to 1/4" gravel inclusions, petroleum odor, (CL).					
	20		CLAY, high plasticity, moist, green, petroleum odor, (CH).					
			CLAY, high plasticity, moist, green, petroleum odor, (CH).			0.4	27.9	
			CLAY, high plasticity, moist, greenish tan, trace sand, red brick, and up to 1/4" gravel (angular) present, petroleum odor, (CH).			0.8	9999+	
			CLAY, low plasticity, saturated, gray to green, trace fine sand and up to 1/4" gravel present, petroleum odor, (CL).			0.5	295	
25								
		GRAVELLY SAND, slight plasticity, saturated, gray to green, some clay present, petroleum odor, (SWG).			1.0	6448.3		
		GRAVELLY SAND, slight plasticity, saturated, gray to green, some clay present, petroleum odor, (SWG).			0.9	234.7		

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 2 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/15/03 12/16/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-185	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 20.78	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
	35		CLAYEY SAND, non-plastic, wet, gray to green, petroleum odor, (SC).				0.6	9999+
			SANDY CLAY, high plasticity, saturated, gray to green, petroleum odor, (CH).					
			CLAYEY SAND, non-plastic, saturated, gray to green, up to 3/4" gravel (rounded), petroleum odor, (SC).				2.0	138.6
			CLAY, high plasticity, saturated, gray to green (product stained), petroleum odor, (CH).					
	40							

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

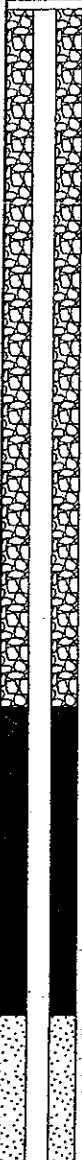
BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 3 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/16/03 12/16/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-186	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): 21.04	Groundwater Depth (ft.): 21.04	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
	5		Soft dig interval; no samples.					
			No sample; HSA only.					
	10		SILTY CLAY, non-plastic, saturated, mottled gray to brown, red brick fragments (less than 1/8"), petroleum odor, (CL-ML).				1.0	931.8
			SAND, non-plastic, moist; brown, medium through coarse grained, small (less than 1/8") angular gravel and roots present, petroleum odor, (SW). SILTY CLAY, non-plastic, saturated, mottled gray to brown, red brick fragments (less than 1/8"), petroleum odor, (CL-ML).				1.3	1891.7
			SILT, slight plasticity, moist, gray, petroleum odor, (ML).				1.7	534.5
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>								

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 1 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/16/03 12/16/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-186		
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 21.04	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA		
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)	
20 Slot PVC Screen, Circumslot			CLAY, high plasticity, saturated, gray (stained), petroleum odor, (CH).				1.4	2232.7	
			SILTY CLAY, low plasticity, saturated, gray, trace fine sand and fine gravel up to 3/4", petroleum odor, (CL-ML).						
			SILTY CLAY, low plasticity, saturated, gray, petroleum odor, (CL-ML).						
				CLAY, high plasticity, wet, gray to brown, fine through coarse grained trace sand, petroleum odor, (CH).				1.0	90.9
	20			SANDY CLAY, low plasticity, saturated, brown, petroleum odor, (CL).				1.7	2514.6
				CLAYEY SAND, low plasticity, saturated, light gray with black streaking (stained), petroleum odor, (CL).					
				SAND, non-plastic, moist, gray to brown, fine through coarse grained, trace greater than 1" fine gravel (well-rounded), petroleum odor, (SW).				0.8	3411.5
				CLAY, high plasticity, saturated, gray, trace sand, petroleum odor, (CH).				1.3	3477
	25			SAND, non-plastic, saturated, brown with black and reddish brown product staining, fine grained, some coarse sand through fine gravel (approx. 3/4", sub-rounded), petroleum odor, (SW).					
			SAND, non-plastic, saturated, brown with black and reddish brown product staining, fine grained, some coarse sand through fine gravel (approx. 3/4", sub-rounded), petroleum odor, (SW).				1.1	3300.6	
			SAND, non-plastic, saturated, brown with significant black and reddish brown product staining, fine grained, some coarse sand through fine gravel (approx. 3/4", sub-rounded), petroleum odor, (SW).				0.8	3333.4	

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well







BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 2 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/16/03 12/16/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-186	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 21.04	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
			SAND, non-plastic, saturated, brown with significant black and reddish brown product staining, fine through coarse grained, coarse sand present in trace amounts, some gravel, petroleum odor, (SW).				0.9	3345
			SANDY GRAVEL, non-plastic, saturated, brown, coarse grained, abundant fine gravel (approx. 1/8" to 1/4", sub-rounded through sub-angular), petroleum odor, (SWG).				1.8	3333.5
			SAND, non-plastic, saturated, brown with significant black and reddish brown product staining, fine through coarse grained, coarse sand present in trace amounts, some gravel, petroleum odor, (SW).					
			CLAY, high plasticity, saturated, gray, trace coarse sand (sub-angular), petroleum odor, (CH).					
			SANDY GRAVEL, non-plastic, saturated, brown, coarse grained, abundant fine gravel (approx. 1/8" to 1/4", sub-rounded through sub-angular), petroleum odor, (SWG).					
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>								

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 3 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/16/03 12/16/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-187	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 21.6	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
	5		Soft dig interval; no samples.					
	10		SILT, slight plasticity, wet, mottled gray and brown, wet at top gradational to moist on bottom, petroleum odor, (ML).				1.5	1680
			CLAYEY SILT, slight plasticity, moist, brown and gray, trace fine sand, petroleum odor, (ML).				2.0	2824.8
			CLAYEY SILT, low plasticity, moist, brown and gray, petroleum odor, (ML).				0.7	1165.8
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>								

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well


BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 1 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/16/03 12/16/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-187	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 21.6	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
								
			CLAY, high plasticity, wet, tan to brown, petroleum odor, (CH).				2.0	1452.8
			CLAY, high plasticity, wet, tan to brown, no odor, (CH).				0.9	568
	20		CLAY, high plasticity, wet, tan to brown, trace sand, petroleum odor, (CH).				0.8	1145.9
			SAND, non-plastic, wet, tan, fine grained, up to 1" fine gravel (rounded), petroleum odor, (SW).					
			CLAY, high plasticity, wet, brown, no odor, (CH).				0.8	506.8
			SAND, non-plastic, wet, tan, fine grained, up to 3/4" fine gravel (sub-rounded), no odor, (SW).					
	25		SAND, non-plastic, saturated, tan, medium grained, up to 1 1/4" fine gravel (sub-rounded), strong petroleum odor, (SW).				0.9	1136.8
		SAND, non-plastic, saturated, tan, medium grained, up to 1 1/4" fine gravel (sub-rounded), strong petroleum odor, (SW).				0.9	1792.6	
		No recovery.				0.0		

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 2 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/16/03 12/16/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-187		
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.):	Groundwater Depth (ft.): 21.6	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA		
Well Construction	Depth, (ft.)	Sample Type	Description					Recovery (feet)	PID Reading (ppm above background)
			SAND, non-plastic, saturated, brown, medium through coarse grained, approx. 1 1/4" gravel wedged in sampling shoe yielded low recovery, petroleum odor, (SW).					0.8	3245.7
			SAND, non-plastic, saturated, brown, fine through medium grained, slightly clayey, petroleum odor, (SP).					0.8	2140.3
			SAND, non-plastic, saturated, brown, medium grained, petroleum odor, (SP).						
			SANDY GRAVEL, non-plastic, saturated, brown (highly stained with product), up to 1" gravel (sub-rounded) present, petroleum odor, (GWS).						
			SAND, non-plastic, saturated, brown, medium grained, petroleum odor, (SP).						
	35								
	40								

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01019.02

Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 3 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/17/03 12/17/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-188	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): 21.5	Groundwater Depth (ft.): 21.5	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
	5		Soft dig interval; no samples.					
			No sample; HSA only.					
	10		SILT, non-plastic, wet, brown, cave-in, no odor, (ML).				2.0	159
			CLAY, high plasticity, moist, cream to tan, up to 1" gravel (sub-rounded), no odor, (CH).					
			SILT, non-plastic, wet, gray, cave-in with up to 1/4" gravel (sub-angular), no odor, (ML).				1.7	169
			SAND, non-plastic, moist, tan, medium grained, up to 1" fine gravel (red and sub-rounded), no odor, (SP).					
			CLAY, high plasticity, moist, cream, no odor, (CH).				1.7	332
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>								

Project No. 62SU.01019.02

Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

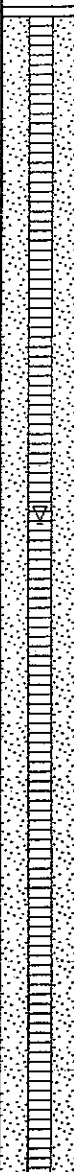
Approved by _____

Figure

(sheet 1 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/17/03 12/17/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-188	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 21.5		Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
 20 Slot PVC Screen, Circumslot			SAND, non-plastic, moist, yellowish brown, medium grained, no odor, (SP).					
			GRAVELLY CLAY, high plasticity, moist, gray, up to 1/4" gravel (sub-rounded), no odor, (CL).				2.0	82.3
			SAND, non-plastic, moist, yellowish brown to red, medium grained, no odor, (SP). No recovery.				0.0	
	20		CLAYEY SILT, low plasticity, moist, brown, up to 1" gravel (sub-rounded), petroleum odor, (ML).				1.7	9999+
			SAND, non-plastic, moist, reddish brown, fine grained, petroleum odor, (SP).					
			SANDY CLAY, low plasticity, moist, brown, fine grained sand and up to 1/4" gravel (sub-angular), petroleum odor, (CL).				1.7	9999+
			CLAYEY SAND, slight plasticity, moist, reddish brown, fine grained, up to 1" gravel (sub-rounded), petroleum odor, (SP).					
			SANDY CLAY, low plasticity, moist, brown, up to 1/4" gravel (angular), petroleum odor, (CL).				0.8	9999+
	25		SAND, non-plastic, wet, reddish brown, medium grained, up to 1/4" gravel (sub-angular), petroleum odor, (SW).					
			SANDY CLAY, low plasticity, wet, brown, up to 1" gravel (sub-angular), petroleum odor, (CL).				1.2	5958
			SAND, slight plasticity, wet, reddish brown (stained), medium grained with trace clay and up to 20% 1" gravel (sub-rounded to rounded), petroleum odor, (SW).					
		SANDY CLAY, low plasticity, wet, brown, up to 1" gravel (sub-angular), petroleum odor, (CL).				1.2	7882	
		SAND, slight plasticity, wet, reddish brown (stained), medium grained with trace clay and up to 20% 1" gravel (sub-rounded to rounded), petroleum odor, (SW).						

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

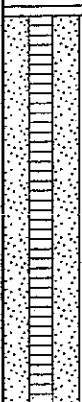


BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 2 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/17/03 12/17/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-188	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.):	Groundwater Depth (ft.): 21.5	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
			VERY SANDY CLAY, slight plasticity, saturated, dark brown, medium grained with large 1 1/2" gravel wedged in sampling shoe yielded low recovery, petroleum odor, (CL).				0.4	9999+
			SANDY CLAY, slight plasticity, saturated, dark brown, medium grained with large 1 1/4" gravel wedged in sampling shoe yielded low recovery, petroleum odor, (CL).				0.3	4468
	35							
	40							
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>								

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 3 of 3)

International Incorporated

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Date December 2003 through January 2004

Log of Well

Approved by _____

Figure (sheet 1 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 01/14/04 01/14/04	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-189	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 22.61	Total Depth (ft.): 34.5	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
Screen, Circumslot			SAND, non-plastic, wet, yellowish brown (stained green in discrete areas), medium grained, approx. 5% 1/2" and smaller gravel (angular) and red brick fragment inclusions, petroleum odor, (SW).				1.8	990.3
			SAND, non-plastic, wet, black, fine grained, cave-in from above, no odor, (SP). GRAVELLY SAND, slight plasticity, saturated, light brown (some staining), medium grained, approx. 30% gravel (well-rounded) up to 1", no odor, (SWG).					
			SAND, non-plastic, saturated, gray, fine grained, cave-in from above, petroleum odor, (SP). GRAVELLY SAND, slight plasticity, saturated, light brown (some staining), medium grained, approx. 30% gravel (well-rounded) up to 1", petroleum odor, (SWG).				2.0	2993.6
	20		CLAY, medium plasticity, moist, reddish brown, trace fine sand, petroleum odor, (CL). CLAY, medium plasticity, wet, reddish brown, trace medium sand at approx. 1% to 3%, slow grade to unit below, petroleum odor, (CH). CLAYEY SAND, non-plastic, wet, reddish brown to yellow brown, medium grained, approx. 40% clay with 1/2" gravel (sub-rounded) at base, slow grade from unit above, petroleum odor, (SC).				1.5	2006.4
			CLAY, high plasticity, wet, reddish brown, petroleum odor, (CH).				1.9	1689.4
			SAND, non-plastic, wet, yellow brown, medium grained, petroleum odor, (SP). SANDY CLAY, low plasticity, moist, reddish brown, less than 1% sub-rounded 1" gravel, petroleum odor, (CL). GRAVELLY SAND, non-plastic, wet, yellow brown, medium through coarse grained, approx. 40% gravel (angular) up to 1" on edge, petroleum odor, (SWG).				1.3	1582.4
	25		SANDY CLAY, low plasticity, saturated, reddish brown, fine grained sands, petroleum odor, (CL). GRAVELLY SAND, non-plastic, saturated, reddish brown with some yellow brown (stained), medium through coarse grained, trace clay and approx. 30% gravel (rounded) up to 1 1/4", petroleum odor, (SWG). CLAYEY SAND, non-plastic, wet, reddish brown, fine grained, cave-in from above, no odor, (SC).				1.5	991.9
			GRAVELLY SAND, non-plastic, saturated, yellow brown to gray, medium grained, greater than 1" gravel wedged in base of sampler, no odor, (SWG). CLAYEY SAND, non-plastic, saturated, brown, fine grained, cave-in from above, no odor, (SC).				0.9	576.3
			GRAVELLY SAND, non-plastic, saturated, mottled reddish brown to tan, fine through medium grained, approx. 30% gravel (sub-angular to rounded) approx.					

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure

(sheet 2 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 01/14/04 01/14/04	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-189	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 22.61	Total Depth (ft.): 34.5	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
			1/2", petroleum odor, (SWG).				0.8	2613.4
			CLAYEY SAND, non-plastic, saturated, brown, fine grained, petroleum odor, (SC). SAND, non-plastic, saturated, jet black (significantly stained), medium grained, approx. 15% to 20% greater than 1 1/4" gravel (sub-rounded to rounded), strong petroleum odor, (SW).					
			GRAVELLY SAND, non-plastic, saturated, jet black (significantly stained), medium grained, approx. 50% gravel (angular) up to 1", petroleum odor, (SWG).				1.3	1751.2
	35							
	40							
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>								

Project No. 62SU.01019.02

Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 3 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 01/13/04 01/14/04	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-190	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 22.31	Total Depth (ft.): 33.5	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
	5		Soft dig interval; no samples.					
			SAND, non-plastic, moist, gray to brown, fine grained, no odor, (SP).				1.7	337
			SAND, non-plastic, wet, gray to reddish brown (stained with product), fine grained, no odor, (SP).					
	10		CLAYEY SILT, low plasticity, wet, reddish brown, angular gravels present approx. 1" on edge, petroleum odor, (ML).				1.3	9999+
			SAND, slight plasticity, moist, light brown, fine grained, petroleum odor, (SC).					
			SAND, slight plasticity, moist, reddish brown to yellow, fine grained, up to 1/2" gravels (angular), petroleum odor, (SC).					
			SAND, slight plasticity, moist, reddish brown to yellow (significantly stained), fine grained, up to 1/2" gravels (angular), strong petroleum odor, (SC).					
			SAND, slight plasticity, moist, brown (stained), fine through medium grained, trace clay with approx. 1/4" gravels (angular), petroleum odor, (SC).				1.3	9999+
			SAND, slight plasticity, moist, brown (stained), fine through medium grained, trace clay, petroleum odor, (SC).					
			CLAYEY SAND, slight plasticity, wet (driller injected water to cool lead auger), gray, fine grained, strong petroleum odor, (SC).				1.6	3312.8

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01019.02

Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure

(sheet 1 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 01/13/04 01/14/04	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA	Method/Equipment: Hollow Stem Auger Split Spoon	Well Number: S-190
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 22.31	Total Depth (ft.): 33.5
				Drive wt.(lbs.): NA	Drop Dist.(in.): NA
Well Construction	Depth, (ft.)	Sample Type	Description	Recovery (feet)	PID Reading (ppm above background)
			SAND, non-plastic, wet, yellow brown, medium grained, approx. 1% to 2% of less than 1/4" gravel (angular) with large (greater than 1") gravel at base of sampler, petroleum odor, (SP).	2.0	110.8
			CLAYEY SAND, slight plasticity, wet, gray, fine grained, strong petroleum odor, (SC).		
			SAND, non-plastic, wet, yellow brown, medium through coarse grained, approx. 1% to 2% of less than 1/4" gravel (angular), no odor, (SP).		
			SANDY CLAY, slight plasticity, wet, gray, fine grained, cave-in from above, no odor, (CL).	1.5	542.9
			SAND, non-plastic, wet, yellow brown, medium grained, approx. 30% to 40% gravel (well-rounded), no odor, (SW).		
	20		CLAYEY SAND, slight plasticity, wet, reddish brown, fine grained, no odor, (SC).		
			CLAYEY SAND, slight plasticity, saturated, brown, fine grained, cave-in from above, no odor, (SC).	1.3	454.8
			GRAVELLY SAND, slight plasticity, saturated, reddish brown, fine through coarse grained, trace clay with abundant gravel (angular to rounded) from approx. 1/4" to greater than 1" on edge, no odor, (SWG).		
			CLAYEY SAND, slight plasticity, wet, brown, fine grained, cave-in from above, no odor, (SC).	1.6	674.5
			GRAVELLY SAND, slight plasticity, saturated, brown, fine through coarse grained with average size medium grained, trace clay with approx. 40% gravel (angular to well-rounded) from approx. 3/4" to 1", no odor, (SWG).		
25		SAND, slight plasticity, saturated, brown, medium through coarse grained, trace clay with approx. 30% large (greater than 1") gravel (angular to sub-rounded), no odor, (SW).	1.1	495.6	
		CLAYEY SAND, slight plasticity, saturated, brown, fine grained, cave-in from above, petroleum odor, (SC).	1.8	1726.8	
		SAND, slight plasticity, saturated, brown (significantly stained), medium through coarse grained, trace clay with approx. 30% 1" gravel (rounded to sub-rounded), strong petroleum odor, (SW).			
		CLAYEY SAND, slight plasticity, saturated, brown, medium grained, up to 1/2" gravel (sub-rounded), petroleum odor, (SC).	1.0	1003.5	
		CLAYEY GRAVEL, slight plasticity, saturated, brown (significantly stained), abundant (greater than 50%) gravel (angular) present greater than 1", strong petroleum odor, (GC).			

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01019.02

Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

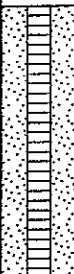
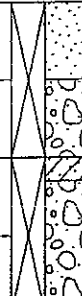
Approved by _____

Figure

(sheet 2 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 01/13/04 01/14/04	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-190	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 22.31	Total Depth (ft.): 33.5	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
	35		SAND, non-plastic, saturated, brown (product stained), medium grained, trace clay, petroleum odor, (SP).				0.8	9999+
			SANDY GRAVEL, non-plastic, saturated, brown (product stained), petroleum odor, (GWS).				2.0	1705.8
			CLAYEY SAND, slight plasticity, saturated, light brown, medium grained, cave-in from above, petroleum odor, (SC). SANDY GRAVEL, non-plastic, saturated, jet black (significant product staining), medium grained, trace clay with abundant (approx. 50%) gravel (well-rounded) between 1/4" and 1", petroleum odor, (GWS).					
	40							

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01019.02

Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 3 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 01/13/04 01/13/04	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA	Method/Equipment: Hollow Stem Auger Split Spoon	Well Number: S-191
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 22.61	Total Depth (ft.): 34.0
				Drive wt.(lbs.): NA	Drop Dist.(in.): NA
Well Construction	Depth, (ft.)	Sample Type	Description	Recovery (feet)	PID Reading (ppm above background)
2.2' of Above Grade Riser Stick-Up with Locking Cap Not Shown			Soft dig interval; no samples.		
Bentonite Seal	5				
			CLAYEY SAND, slight plasticity, moist, gray to brown, fine grained with less than 5% clay, petroleum odor, (SC).	1.6	1589
	10		CLAYEY SAND, slight plasticity, moist, reddish brown, fine grained with less than 5% clay, up to 3/4" gravel (sub-rounded) and less than 1% red brick fragment inclusions, strong petroleum odor, (SC).		
			CLAYEY SAND, slight plasticity, wet, reddish brown, fine grained, approx. 1" sub-rounded gravel at base, petroleum odor, (SC).	1.3	1792
			CLAYEY GRAVEL, slight plasticity, wet, reddish brown to black (highly stained with green product discoloration), large (greater than 1") gravel wedged in sampling shoe, strong petroleum odor, (GC).		
#1 Sand and Sch. 40 PVC Riser			SANDY CLAY, low plasticity, moist, brown, approx. 1/4" quartzite gravel (angular) at base, petroleum odor, (CL).	1.3	535
			SAND, non-plastic, moist, yellow brown, medium through coarse grained, petroleum odor, (SP).		
20 Slot PVC Screen, Circumslot			SILTY CLAY, low plasticity, moist, reddish brown, trace sand and up to 3/4" gravel (angular), no odor, (CL-ML).	1.2	885
The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.					

Project No. 62SU.01019.02

Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 1 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 01/13/04 01/13/04	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA	Method/Equipment: Hollow Stem Auger Split Spoon	Well Number: S-191
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): 22.61	Groundwater Depth (ft.): 22.61	Total Depth (ft.): 34.0
				Drive wt.(lbs.): NA	Drop Dist.(in.): NA
Well Construction	Depth, (ft.)	Sample Type	Description	Recovery (feet)	PID Reading (ppm above background)
			SAND, non-plastic, moist, yellow brown with color banding, medium through coarse grained, less than 1/2" gravel (sub-angular), no odor, (SP).		
			CLAYEY SAND, slight plasticity, moist, reddish brown, fine grained, cave-in from above, no odor, (SC).	1.3	706.9
			SAND, non-plastic, moist, yellow brown, medium grained, significant (approx. 20% to 30%) gravel (angular to sub-angular) up to 1/2", no odor, (SP).		
			No recovery.	0.0	
	20		SANDY CLAY, low plasticity, moist, brown to reddish brown, fine through medium grained, large (greater than 1" on edge) gravel (sub-rounded to sub-angular), no odor, (CL).	1.7	679
			SAND, non-plastic, moist, yellow brown to tan, medium grained, up to approx. 3/4" gravel (sub-rounded), no odor, (SP).		
			SANDY CLAY, slight plasticity, wet, brown with reddish brown at base, medium grained, up to 1/2" gravel (rounded), no odor, (CL).	1.6	803
			SAND, non-plastic, wet, tan with reddish brown and black (product streaking in discrete areas), medium grained, up to 3/4" gravel (sub-angular), petroleum odor, (SW).	1.2	1939
	25		SANDY CLAY, slight plasticity, saturated, brown, up to 1/2" gravel (rounded), strong petroleum odor, (CL).		
			SAND, non-plastic, saturated, black and brown (stained), medium grained, up to 1" gravel (rounded to well-rounded), petroleum odor, (SW).	1.8	1426
		SANDY CLAY, slight plasticity, saturated, brown, up to 1/2" gravel (rounded), petroleum odor, (CL).			
		SAND, non-plastic, saturated, black and brown (stained), medium grained, up to 1" gravel (rounded to well-rounded) and less than 10% red brick fragments, petroleum odor, (SW).	1.1	1430	
		SANDY CLAY, slight plasticity, saturated, brown, up to 1/2" gravel (rounded), petroleum odor, (CL).			
		SAND, non-plastic, saturated, gray to black (highly stained), medium grained, up to 1" gravel (rounded to well-rounded), strong petroleum odor, (SW).			

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01019.02

Date December 2003 through January 2004

Log of Well

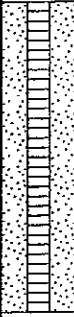

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 2 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 01/13/04 01/13/04	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-191	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 22.61		Total Depth (ft.): 34.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
	35		SAND, non-plastic, saturated, brown (significant staining), medium grained, up to 1" gravel (angular) present at approx. 40%, strong petroleum odor, (SW).				1.1	2864
			SAND, non-plastic, saturated, black (significant staining), medium grained, up to 1" gravel (angular) present at approx. 40%, strong petroleum odor, (SW).				2.0	935
			SAND, non-plastic, saturated, black (significant staining), medium through coarse grained, coarse grained concentration is trace with up to 1" gravel (angular) present at approx. 20%, strong petroleum odor, (SW).					
	40							

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Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 3 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 01/12/04 01/13/04	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-192	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 22.8	Total Depth (ft.): 33.4	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
	5		Soft dig interval; no samples.					
			SILT, non-plastic, moist, black, no odor, (ML).				0.8	400
			FILL, #57 stone.					
			SILT, non-plastic, moist, black to reddish brown, no odor, (ML).					
	10		CLAYEY SAND, slight plasticity, moist, black and red, fine grained, up to 1" gravel (rounded) present at less than 3%, no odor, (SC).				1.5	322
			CLAYEY SAND, slight plasticity, moist, black and red, fine grained, up to 1" gravel (rounded) present at less than 3%, no odor, (SC).				1.6	275
			SAND, non-plastic, moist, brown, fine grained, up to 1/2" gravel (sub-rounded), strong petroleum odor, (SW).				2.0	251
			SAND, non-plastic, moist, reddish brown to tan, medium grained, gravel (both rounded and angular) present between 1/2" and up to more than 1" on edge, no					

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 1 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 01/12/04 01/13/04	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-192	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 22.8	Total Depth (ft.): 33.4	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
			odor, (SW).					
			SAND, non-plastic, moist, brown to dark brown, fine grained, less than 10% medium grained sand and less than 1% angular gravel, no odor, (SP).				0.4	420
			SAND, non-plastic, moist, dark brown, fine grained, petroleum odor, (SP).				0.7	9999+
	20		SILT, non-plastic, dry to moist, brown, small (less than 1/4") sub-angular gravel, petroleum odor, (ML).					
			SILT, non-plastic, moist, brown, approx. 1/4" gravel (sub-angular to angular) inclusions with greater than 1" gravel at base of sampler, no odor, (ML).				1.6	770
			SILT, non-plastic, moist, dark brown, approx. 1/4" gravel (sub-angular) inclusions, no odor, (ML).				1.1	643
			SAND, non-plastic, moist, brown, medium grained, no odor, (SP).					
	25		SLIGHTLY CLAYEY SAND, non-plastic, saturated, brown, medium grained, up to 3/4" gravel (sub-rounded), petroleum odor, (SW).				1.0	1360
			SLIGHTLY CLAYEY SAND, non-plastic, saturated, brown, medium grained, up to 3/4" gravel (sub-rounded), petroleum odor, (SW).				1.8	9999+
			GRAVEL, non-plastic, saturated, gray to black (stained with product), sub-rounded to rounded gravel with little fines, petroleum odor, (GW).					
		SAND, very slight plasticity, moist, brown, medium grained, some (less than 5%) clay and up to 3/4" gravel (sub-rounded), no odor, (SW).				1.9	547	
		SANDY GRAVEL, non-plastic, saturated, brown, greater than 1" sub-angular to sub-rounded gravel in medium grained sand matrix (less than 40%).						

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Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

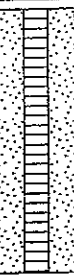


BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 2 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 01/12/04 01/13/04	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-192	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 22.8	Total Depth (ft.): 33.4	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
			petroleum odor, (GWS). CLAYEY SAND, non-plastic, saturated, dark brown to gray (highly stained with product), medium grained, abundant (approx. 50%) gravel (sub-angular to sub-rounded) between 1/2" to 1", petroleum odor, (SC).				0.6	1816
			CLAYEY SAND, non-plastic, saturated, dark brown to gray (highly stained with product), medium grained, large (greater than 1") gravel wedged in sampling shoe yielded low recovery, petroleum odor, (SC).				0.1	161
	35 40							
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>								

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____
Figure (sheet 3 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/04/03 12/04/03	Drilling Contractor: Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-193	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 24.2	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
			SILT, non-plastic, moist, dark brown, roots present, no odor, (ML).				0.8	2.2
			CLAYEY SILT, low plasticity, moist, light brown, red brick fragments present, no odor, (ML).				1.8	1.8
			CLAYEY SILT, low plasticity, moist, light brown, red brick fragments and roots present, no odor, (ML).				2.0	0.3
	5		CLAYEY SILT, low plasticity, moist, light brown, sericite flakes visible, no odor, (ML).					
			CLAY, medium plasticity, very moist, mottled gray and tan, no odor, (CL).				2.0	2.0
			CLAY, medium plasticity, very moist, light tan, no odor, (CL).					
			CLAY, medium plasticity, very moist, gray to green, no odor, (CL).					
			CLAY, high plasticity, saturated, green to gray, sharp contact with lower unit, no odor, (CH).				0.9	46.5
			SAND, non-plastic, moist, dark brown, fine grained, no odor, sharp contact with upper unit, (SP).					
	10		CLAY, low plasticity, wet, brown, no odor, (CL).				0.8	36.9
			FILL, red brick fragments.					
			SAND, non-plastic, moist, gray to black (product stained), fine grained, petroleum odor, (SP).					
		CLAY, low plasticity, moist, light tan and yellow orange, petroleum odor, (CL).				2.0	3034.7	
		SAND, non-plastic, moist, black (product stained), fine grained, some brown banding at bottom 5", strong petroleum odor, (SP).						
		SANDY CLAY, low plasticity, wet, light tan, no odor, (CL).				2.0	718.5	
		CLAY, high plasticity, moist, light tan, very impermeable layer, no odor, (CH).						

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Project No. 62SU.01019.02

Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure

(sheet 1 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/04/03 12/04/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-193	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 24.2	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
20 Slot PVC Screen, Circumslot			SAND, non-plastic, wet, brown, fine grained, petroleum odor, (SP). CLAY, high plasticity, moist, light tan, no odor, (CH).				1.4	242.5
			SAND, non-plastic, moist, brown to black, fine grained, up to 1/2" gravel (sub-rounded) on edge, petroleum odor, (SP). CLAY, high plasticity, moist, tan, no odor, (CH).				2.0	167.6
	20		CLAY, low plasticity, moist, brown to reddish brown, slow grade to unit below, some petroleum odor, (CH).				2.0	38.7
			SILT, low plasticity, moist, dark reddish brown, slow grade from unit above, sub-angular gravel (quartzite) approx. 1%, petroleum odor, (ML).					
			SANDY CLAY, slight plasticity, moist, brown, petroleum odor, (CL). SILT, non-plastic, moist, dark reddish brown, up to 1/4" sub-angular to sub-rounded quartzite gravel, petroleum odor, (ML).				1.3	220.6
			SILT, low plasticity, moist, gray, distinct iron staining at base (approx. 2"), petroleum odor, (ML).					
			SILT, medium to high plasticity, moist, reddish brown, small (approx. 1/8") quartzite gravel inclusions (less than 1%), petroleum odor, (MH).				1.3	1119.5
	25		GRAVELLY SAND, non-plastic, moist, light gray, medium grained, up to 1/4" pink and orange gravel (angular), petroleum odor, (SW).					
			SILT, high plasticity, moist, reddish brown, petroleum odor, (MH). CLAYEY GRAVEL, low plasticity, moist, reddish brown, abundant gravel (rounded) up to 1/2", petroleum odor, (GC).				2.0	1979.5
			GRAVELLY SAND, non-plastic, moist, light gray, coarse grained, petroleum odor, (SW). SILT, low plasticity, moist, bluish gray, sub-rounded gravel inclusions, petroleum odor, (ML). GRAVELLY SAND, non-plastic, wet, light gray with pink product staining, coarse grained, abundant gravel up to 1" on edge, petroleum odor, (SW).				0.8	961.3
The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.								

Project No. 62SU.01019.02

Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

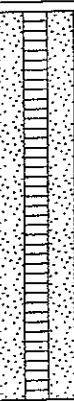
Approved by _____

Figure

(sheet 2 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/04/03 12/04/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-193	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.):	Groundwater Depth (ft.): 24.2	Total Depth (ft.): 35.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
			GRAVELLY SAND, non-plastic, wet, reddish brown, coarse grained, trace silt and up to 3/4" sub-rounded gravel, petroleum odor, (SW).				1.5	1408.3
			GRAVELLY SAND, non-plastic, wet, reddish brown, coarse grained, up to 1/2" rounded gravel, petroleum odor, (SW). GRAVELLY SAND, non-plastic, wet, reddish brown, coarse grained, up to 3/4" sub-rounded gravel, petroleum odor, (SW).				2.0	2058.3
	35							
	40							
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>								

Project No. 62SU.01019.02

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Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure

(sheet 3 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/03/03 12/04/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-194	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 24.7	Total Depth (ft.): 30.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
			SILT, non-plastic, moist, dark brown to black, red brick plugged sampler shoe, no odor, (ML).				0.2	6.5
			SILT, non-plastic, moist, orange to brown, concrete fill plugged sampler shoe, no odor, (ML).				0.5	45.0
			SILT, non-plastic, moist, dark brown, topsoil cave-in, no odor, (ML).				1.4	11.1
	5		CLAYEY SILT, low plasticity, moist, yellowish orange, some roots present, no odor, (ML).					
			CLAYEY SILT, low plasticity, moist, light brown, gradual grade to unit below, no odor, (ML).				2.0	21.2
			CLAYEY SILT, low to medium plasticity, moist, light brown, gradual grade from unit above, no odor, (ML).					
			CLAYEY SILT, low plasticity, moist, mottled gray and brown, petroleum odor, (ML).				1.4	1357.5
			CLAY, low plasticity, moist, light gray, trace fine sand present, petroleum odor, (CL).					
	10		SLIGHTLY CLAYEY SILT, low plasticity, moist, dark brown, sericite flakes and up to 1/2" rounded to sub-rounded gravel with small angular gravel (possibly fractured rock) at bottom of spoon, petroleum odor, (ML).				0.4	9999+
			CLAY, low plasticity, moist, dark reddish brown, angular gravel present up to 1/8", petroleum odor, (CL).				2.0	9999+
		CLAY, low to medium plasticity, moist, tan with some gray, less than 3% reddish brown angular gravel (1/8") present, petroleum odor, (CL).						
		CLAY, low to medium plasticity, moist, gray blue, less than 3% reddish brown angular gravel (1/8") present, petroleum odor, (CL).						
		SAND, non-plastic, moist, gray and brown, fine grained, slight petroleum odor (SP).				1.5	1583.5	

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Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 1 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/03/03 12/04/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-194	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): 24.7	Groundwater Depth (ft.): 24.7	Total Depth (ft.): 30.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
20 Slot PVC Screen, Circumslot	20	CLAYEY SILT, low plasticity, moist, dark brown, up to 1/2" sub-angular gravels, petroleum odor, (ML). SLIGHTLY SANDY CLAY, low plasticity, moist, light gray, petroleum odor, (CL). SAND, non-plastic, wet, black (product stained), fine grained, strong petroleum odor, (SP). SAND, non-plastic, wet, black (product stained), fine grained, strong petroleum odor, (SP). CLAY, medium to high plasticity, moist, cream to orange yellow, petroleum odor, (CH). CLAY, high plasticity, moist, cream to orange yellow, no odor, (CH).	2.0	9999+				
			1.0	82.7				
			1.3	5.9				
			2.0	9.1				
			2.0	31.9				
			1.4	518.7				
			1.0	1821.3				
			The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.					

Project No. 62SU.01019.02

Date December 2003 through January 2004

Log of Well






BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 2 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/03/03 12/04/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-194	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 24.7	Total Depth (ft.): 30.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
			CLAY, high plasticity, saturated, brown, no odor, (CH).				1.7	539.7
			CLAY, high plasticity, saturated, green to gray, up to 3/4" sub-rounded gravel, no odor, (CH).					
			GRAVELLY SAND, non-plastic, saturated, light brown with red product staining toward bottom of spoon, fine grained, abundant gravel up to 1 1/2" on edge, strong petroleum odor, (SW).				2.0	1460.5
			CLAYEY SAND, slight plasticity, saturated, gray to green, fine grained, petroleum odor, (SW).					
			SAND, non-plastic, saturated, gray to green, fine grained, abundant gravel, petroleum odor, (SW).					
	35							
	40							
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>								

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 3 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/02/03 12/03/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-195	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 26.35	Total Depth (ft.): 37.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
			SILT, non-plastic, moist, dark brown, some roots present, no odor, (ML).				2.0	0.0
			SILT, non-plastic, moist, brown, no odor, (ML).					
			SILT, non-plastic, moist, brown, no odor, (ML).				2.0	0.1
			SILT, non-plastic, saturated, brown, no odor, (ML).					
			SAND, non-plastic, saturated, brown, fine grained, no odor, (SP).				2.0	1.0
	5		CLAYEY SILT, low plasticity, moist, brown, some fine sand, no odor, (ML).					
			CLAY, low plasticity, moist, white to gray, no odor, (CL).				2.0	0.5
			CLAY, low plasticity, moist, light gray, no odor, (CL).					
			SAND, non-plastic, moist, brown, fine grained with sub-angular inclusions of fine gravel (approx. 1/4") on edge, no odor, (SW).					
			SAND, non-plastic, moist, brown, medium grained with small mica (muscovite) up to 1/8" on edge, angular, no odor, (SW).				1.8	0.0
			CLAYEY SILT, low plasticity, moist, brown, no odor, (ML).					
			SAND, non-plastic, moist, gray and white (salt and pepper texture), fine grained, petroleum odor, (SP).					
	10		SAND, non-plastic, moist, mottled with color banding ranging from dark brown to light tan, fine grained, petroleum odor, (SP).				1.2	0.2
			SAND, non-plastic, moist, yellow to brown, fine grained, no odor, (SP).				1.8	5.7
			SAND, non-plastic, moist, gray to brown, fine grained, no odor, (SP).					
		SAND, non-plastic, moist, light gray, fine grained, no odor, (SP).						
		SAND, non-plastic, moist, black (product stained), fine grained, petroleum odor, (SP).				1.7	0.6	
		CLAYEY SILT, low plasticity, wet, mottled gray and brown, no odor, (ML).						

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 1 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/02/03 12/03/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-195		
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 26.35	Total Depth (ft.): 37.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA		
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)	
			SAND, non-plastic, moist, pink and black (product stained), fine grained, petroleum odor, (SP).				1.3	0.5	
			SAND, non-plastic, moist, pink and black (product stained), fine grained, up to 3/4" coarse gravel (well-rounded to sub-rounded), petroleum odor, (SW).						
			SAND, non-plastic, moist, brown to black, fine grained, up to 1" angular rock (quartzite) inclusions, no odor, (SW).						
				CLAYEY SILT, low plasticity, wet, brown, some angular (coarse) sand, no odor, (ML).				1.5	2.3
				SAND, non-plastic, moist, dark brown, medium grained, up to 3/4" coarse gravel (well-rounded to sub-rounded), petroleum odor, (SW).					
	20			CLAYEY SILT, low plasticity, wet, brown and gray to tan, no odor, (ML).				1.5	3.3
				SAND, non-plastic, moist, dark brown (product stained), coarse grained, up to 1/2" coarse gravel (sub-rounded), petroleum odor, (SW).					
				SAND, non-plastic, moist, brown and black (product stained), fine grained, petroleum odor, (SP).				2.0	1.4
				SAND, non-plastic, moist, brown and black (product stained), medium through coarse (up to 1/8") grained, sub-angular, petroleum odor, (SP).					
				SAND, non-plastic, moist, dark brown to black (product stained), fine grained, up to 1/4" coarse gravel (rounded), petroleum odor, (SW).				1.2	0.9
25			SAND, non-plastic, wet, pink and brown (product stained), fine grained, up to 1/4" coarse gravel (rounded), petroleum odor, (SW).						
			CLAYEY SILT, low plasticity, moist, brown, no odor, (ML).				0.8	3.7	
			SANDY SILT, low plasticity, moist, reddish brown, up to 1/2" sub-angular gravel, no odor, (ML).						
			SILTY CLAY, low plasticity, saturated, light brown, no odor, (CL).				0.9	10.0	
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>									

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

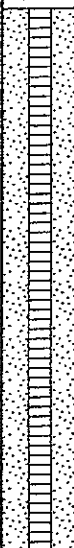




BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 2 of 3)

SECOR

International Incorporated

Logged By: JM	Dates Drilled: 12/02/03 12/03/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-195	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 26.35	Total Depth (ft.): 37.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
			CLAYEY SILT, low to medium plasticity, saturated, brown and gray, rock plugged bottom 5" of spoon, no odor, (ML).				0.8	3.1
			SAND, non-plastic, saturated, brown, medium grained, angular, up to 3/4" coarse gravel (sub-rounded), rock with petroleum odor plugged bottom 5" of spoon, (SP).				1.4	287
			SAND, non-plastic, saturated, dark brown, medium grained, angular, up to 3/4" coarse gravel (rounded to sub-rounded quartzite), no odor, (SP).				1.9	56.3
	35		GRAVEL, non-plastic, saturated, dark brown, small grained, angular, up to 3/4" coarse gravel (rounded to sub-rounded quartzite), slight petroleum odor, (GW).					
	40							
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>								

Project No. 62SU.01019.02

Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE


Approved by _____

Figure

(sheet 3 of 3)

SECOR

International Incorporated

Logged By: SM	Dates Drilled: 11/18/03 12/01/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-196	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 46.1	Total Depth (ft.): 55.7	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
			SILT, non-plastic, dry, black, little fine sand with pieces of slag, no odor, (ML).				1.5	0.0
			SILTY SAND, non-plastic, dry, brown, fine grained with some medium through coarse sand, no odor, (SM).					
			SAND, non-plastic, dry, reddish brown, fine grained with some medium through coarse sand, little fine gravel and clay, no odor, (SP).				0.5	0.0
			SAND, non-plastic, dry, black, fine through coarse grained, slag inclusions, no odor, (SW).				0.9	0.0
	5		SANDY CLAY, low plasticity, moist, light brown, fine grained, little medium through coarse sand with trace silt and fine gravel, no odor, (CL).					
			SILT, non-plastic, dry, brown, saprolitic, no odor, (ML).				0.4	0.0
			SILT, non-plastic, dry, brown, saprolitic, no odor, (ML).				0.5	0.0
	10		SILT, slight plasticity, moist, orange brown, trace clay and fine through medium sand, no odor, (ML).				0.7	0.0
			SILT, slight plasticity, moist, orange brown, trace clay and fine through medium sand, no odor, (ML).				1.6	0.0
			SILT, slight plasticity, moist, orange brown, some clay and fine through coarse sand, no odor, (ML).					
		SILT, slight plasticity, moist, brown, little clay and trace fine through coarse sand, no odor, (ML).				1.3	0.0	
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>								

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 1 of 4)

SECOR

International Incorporated

Logged By: SM	Dates Drilled: 11/18/03 12/01/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-196	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 46.1	Total Depth (ft.): 55.7	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
			SILT, slight plasticity, moist, brown and gray, little clay and trace fine through coarse sand, no odor, (ML).				1.5	0.0
			CLAY, low plasticity, moist, gray, some silt and trace fine sand, no odor, (CL).				1.2	0.0
	20		CLAY, low plasticity, moist, gray, some silt and trace fine sand, no odor, (CL).				0.5	0.0
			SILT, non-plastic, moist, gray and black, little fine sand and pieces of organic material, no odor, (ML).					
			FILL, pieces of brick, glass, and slag with trace dry, black silt.				0.8	0.0
	25		SAND, non-plastic, dry, black, fine through medium grained, inclusions of brick, coal, and slag, no odor, (SP).				1.2	0.0
			No recovery.				0.0	
			SANDY SILT, non-plastic, wet (base of spoon), black, fine grained, inclusions of brick, no odor, (MLS).				0.6	0.0
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>								

Project No. 62SU.01019.02

Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure

(sheet 2 of 4)

SECOR

International Incorporated

Logged By: SM	Dates Drilled: 11/18/03 12/01/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-196	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 46.1	Total Depth (ft.): 55.7	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
<p>Bentonite Seal</p> <p>#1 Sand and Sch. 40 PVC Riser</p> <p>20 Slot PVC Screen, Circumslot</p>			SILT, non-plastic, moist, gray, trace fine sand, no odor, (ML).				1.7	0.0
			SAND, non-plastic, wet, gray, fine grained, no odor, (SP).					
			CLAYEY SILT, slight plasticity, dry, gray, trace fine sand, no odor, (ML).				2.0	0.0
			SAND, non-plastic, dry, gray, fine grained, no odor, (SP).					
	35		SILT, slight plasticity, dry, tan, little clay, no odor, (ML).				2.0	0.0
			SAND, non-plastic, moist to wet, gray, fine grained, little medium through coarse grained and little silt, no odor, (SP).				1.7	0.0
			CLAY, low plasticity, moist, tan, some silt, no odor, (CL).					
			CLAY, low plasticity, dry, tan, little silt, no odor, (CL).				1.7	0.0
	40		CLAY, low plasticity, dry, tan and brown, trace silt, no odor, (CL).				2.0	0.0
			CLAY, low plasticity, dry, light brown, trace silt, no odor, (CL).					
			CLAY, low plasticity, dry, light brown, trace silt, no odor, (CL).				2.0	0.0
			CLAY, low plasticity, dry, brown, trace silt, no odor, (CL).					
		CLAY, low plasticity, dry, brown, little silt and trace fine sand, no odor, (CL).						
		CLAY, low plasticity, dry, light gray (some staining from iron deposition and oxidation), trace silt, no odor, (CL).				2.0	0.0	

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 3 of 4)

SECOR

International Incorporated

Logged By: SM	Dates Drilled: 11/18/03 12/01/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-196	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 46.1	Total Depth (ft.): 55.7	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
			CLAY, low plasticity, dry, light gray (some staining from iron deposition and oxidation), trace silt, no odor, (CL).				2.0	0.0
			CLAY, low plasticity, moist, light gray, some fine sand and little medium and coarse grained sand, no odor, (CL).				1.1	0.0
			SAND, non-plastic, moist, gray, fine grained, some silt and trace medium through coarse grained sand, no odor, (SP).					
			SAND, non-plastic, moist, pink, fine grained, some medium grained sand, no odor, (SP).					
	50		SAND, non-plastic, moist, pink, fine grained, little silt and medium through coarse grained sand, no odor, (SP).				1.4	0.0
			CLAY, low plasticity, moist, tan, trace silt, no odor, (CL).					
			SAND, non-plastic, moist, gray, fine grained, some silt and little medium through coarse grained sand, no odor, (SP).					
		SILT, non-plastic, dry, reddish brown, some fine sand, no odor, (ML).				0.4	184	
		GRAVELLY SAND, non-plastic, wet, gray and reddish brown, coarse grained sand and fine grained gravel, some fine through medium grained sand, petroleum odor, (SWG).						
55		SANDY GRAVEL, non-plastic, wet, brown, fine grained gravel and coarse grained sand, little fine through medium grained sand, no odor, (GWS).				0.5	0.0	
		SANDY GRAVEL, non-plastic, wet, brown, fine grained gravel and coarse grained sand, little fine through medium grained sand, no odor, (GWS).				0.7	0.0	

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure

(sheet 4 of 4)

SECOR

International Incorporated

Logged By: SM	Dates Drilled: 11/19/03 11/20/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-197	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 45.51	Total Depth (ft.): 55.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
			FILL, pieces of coal and slag with little dry, black silt.				1.3	
			FILL, pieces of coal and slag with little dry, black silt.				0.4	
	5		SANDY CLAY, low plasticity, dry, brown, fine grained, trace medium through coarse sand, no odor, (CL).				1.2	
			SANDY CLAY, low plasticity, dry, brown, fine grained, trace medium through coarse sand, no odor, (CL).				0.8	
			CLAY, low plasticity, dry, red, no odor, (CL).					
			SILT, non-plastic, dry, brown, saprolitic, no odor, (ML).					
			No recovery, stone wedged in shoe of sampler.				0.0	
	10		SILT, non-plastic, dry, brown, saprolitic, no odor, (ML).				0.4	0.0
			SILT, non-plastic, dry, brown, saprolitic, no odor, (ML). SILT, non-plastic, dry, gray, saprolitic, relict schistose texture, no odor, (ML).				2.0	0.0
			FILL, pieces of black, dry cinder.				0.8	0.0
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>								

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 1 of 4)

SECOR

International Incorporated

Logged By: SM	Dates Drilled: 11/19/03 11/20/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-197	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 45.51	Total Depth (ft.): 55.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
			SILT, non-plastic, dry, gray, saprolitic, relict schistose texture, no odor, (ML).					
			SILT, non-plastic, dry, gray, saprolitic, relict schistose texture, no odor, (ML).				1.2	0.0
			FILL, pieces of black, dry cinder.					
			SILT, non-plastic, dry, gray, saprolitic, relict schistose texture, no odor, (ML).					
			SILT, non-plastic, dry, gray, saprolitic, relict schistose texture, no odor, (ML).				1.0	0.0
			CLAY, low plasticity, moist, brown, some fine sand, no odor, (CL).					
			CLAY, low plasticity, moist, brown, trace fine through coarse sand and fine gravel, no odor, (CL).					
	20		CLAY, low plasticity, moist, brown, some fine sand, no odor, (CL).				1.3	0.0
			CLAYEY SILT, slight plasticity, moist, brown, trace fine gravel, no odor, (ML).					
			FILL, pieces of black, moist cinder.				1.2	0.0
			CLAY, low plasticity, dry, reddish brown, no odor, (CL).					
			FILL, pieces of black, moist cinder.				1.0	0.0
	25		FILL, pieces of black, moist cinder.					
			FILL, pieces of black, moist (and wet at base) cinder.				1.0	0.0
		FILL, pieces of black, wet cinder.				2.0	0.0	
		SILT, slight plasticity, dry, gray to green, trace fine sand, no odor, (ML).						

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 2 of 4)

SECOR

International Incorporated

Logged By: SM	Dates Drilled: 11/19/03 11/20/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-197	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.): ▽	Groundwater Depth (ft.): 45.51	Total Depth (ft.): 55.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
			CLAYEY SILT, slight plasticity, moist, gray, no odor, (ML).				2.0	0.0
			SAND, non-plastic, moist, brown and gray, fine grained, no odor, (SP).					
			SAND, non-plastic, wet, brown and gray, fine grained, no odor, (SP).				1.5	0.0
			CLAY, low plasticity, dry, pink and tan, little silt, no odor, (CL).				2.0	0.0
	35		CLAY, low plasticity, dry, pink and tan, little silt, no odor, (CL).				0.4	0.0
			CLAY, low plasticity, dry, tan, little silt, no odor, (CL).				2.0	0.0
	40		SILTY CLAY, low plasticity, dry, tan and brown, no odor, (CL).				2.0	0.0
			SILTY CLAY, low plasticity, dry, tan and brown, no odor, (CL).				2.0	0.0
		SILTY CLAY, low plasticity, dry, gray, some fine sand, no odor, (CL).				1.5	0.0	
<p>The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.</p>								

Project No. 62SU.01019.02

Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

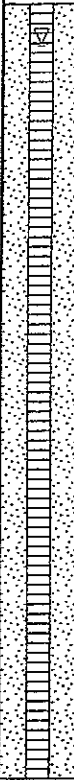





Approved by _____

Figure

(sheet 3 of 4)

SECOR

International Incorporated

Logged By: SM	Dates Drilled: 11/19/03 11/20/03	Drilling Contractor Parratt-Wolff, Inc.	Project Name: Sunoco, Inc. Philadelphia Refinery, PA		Method/Equipment: Hollow Stem Auger Split Spoon		Well Number: S-197	
See "Legend to Logs" for sampling method, classifications and laboratory testing methods		Boring Diam.(in.): 10.25	Surface Elev.(ft.):	Groundwater Depth (ft.): 45.51	Total Depth (ft.): 55.0	Drive wt.(lbs.): NA	Drop Dist.(in.): NA	
Well Construction	Depth, (ft.)	Sample Type	Description				Recovery (feet)	PID Reading (ppm above background)
			SANDY GRAVEL, non-plastic, dry, gray, fine grained gravel and fine through coarse grained sand, slight petroleum odor, (GWS).				0.9	483
			SANDY GRAVEL, non-plastic, moist, gray and red, fine grained gravel and fine through coarse grained sand, petroleum odor, (GWS).					
			SANDY GRAVEL, non-plastic, wet, gray and red, fine grained gravel and fine through coarse grained sand, petroleum odor, (GWS).				1.3	567
	50		SANDY GRAVEL, non-plastic, wet, gray and red, fine grained gravel and fine through coarse grained sand, petroleum odor, (GWS).				2.0	464
			SANDY GRAVEL, non-plastic, wet, gray and red, fine grained gravel and fine through coarse grained sand, petroleum odor, (GWS).				1.8	377
	55							

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01019.02 Date December 2003 through January 2004

Log of Well

BORING LOGS 26TH STREET.GPJ
LOG OF BOREHOLE

Approved by _____

Figure (sheet 4 of 4)

APPENDIX D

James M. Stewart, Inc.

Land Surveyors

File # 3028list
Checked BY: JMS

Page 1 of 9
May 21, 2003

Sunoco, Inc. – Philadelphia Refinery
Point Breeze Processing Area – Belmont Terminal – 26th Street Area
Well Locations

Well #	Elevations (Feet)			Coordinates (Feet)	
	Ground	Inner Casing	Protective Outer Casing	(Y) North	(X) East
MW-21	29.51	28.86	29.63	224344.76	2685822.02
MW-22	27.47	27.03	27.53	224303.76	2685892.40
MW-23	27.75	27.13	27.81	224209.24	2685911.59
MW-24	27.88	27.17	27.81	224271.92	2685772.49
MW-25	30.64	30.15	30.74	224365.13	2685725.37
MW-26	27.09	26.74	27.02	224123.49	2685919.80
MW-27	29.05	28.65	29.03	224064.98	2685686.47
MW-28	29.26	28.78	29.21	224169.04	2685580.94
MW-29	29.50	28.95	29.50	223955.49	2685481.11
MW-30	32.11	31.70	32.10	224260.90	2684981.77
MW-31	30.98	30.56	30.96	224155.67	2685353.30
MW-32	29.59	29.14	29.58	224285.65	2685565.45
MW-33	30.40	29.99	30.40	224346.47	2685299.96
MW-34	27.99	27.79	27.97	224437.43	2685182.02
OW-2	32.16	31.67	32.16	224391.69	2685938.56
OW-12	30.47	30.22	30.60	224424.23	2685685.61
OW-13	32.39	32.20	32.47	224385.14	2685988.27
OW-14	32.41	32.21	32.44	224372.18	2686076.11
OW-16	31.64	31.38	31.75	224419.79	2685739.16
OW-17	30.30	29.99	30.35	224388.49	2685586.86
OW-18	30.75	30.84	30.97	224437.48	2685520.03
OW-19	31.22	31.00	31.29	224415.30	2685716.75
OW-20	32.43	31.87	32.46	224403.81	2685839.93

Horizontal Datum: Pennsylvania State Plane Coordinates – NAD 83 / South Zone
Vertical Datum: NAVD 88

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James M. Stewart, Inc.

Land Surveyors

File # 3028list
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Page 2 of 9
May 21, 2003

Sunoco, Inc. – Philadelphia Refinery
Point Breeze Processing Area – Belmont Terminal – 26th Street Area
Well Locations

Well #	Elevations (Feet)			Coordinates (Feet)	
	Ground	Inner Casing	Protective Outer Casing	(Y) North	(X) East
PZ-100	18.10	18.18		222350.30	2683602.32
PZ-101	17.30	17.17	17.32	222295.98	2683594.66
PZ-400	27.71	28.19		224095.56	2686131.12
PZ-401	24.10	23.97	24.25	223552.75	2686051.48
PZ-402	23.95	23.62	24.08	223551.63	2686061.48
PZ-403	24.38	24.41	24.61	222935.10	2685965.34
PZ-404	24.07	26.01		222933.22	2685981.00
RW-1	30.58	29.55	30.58	224407.29	2685679.96
RW-2	10.13		11.97	220837.94	2683712.01
RW-4	31.37	30.45	31.41	224388.41	2685788.78
RW-6	32.47	31.06	32.68	224377.28	2686037.78
RW-7	29.07	28.21	29.17	224363.39	2685893.90
RW-15	30.86	30.50	30.93	224440.91	2685520.50
RW-100	20.43	20.79	21.20	222348.80	2683341.91
RW-101	19.73	20.03	20.48	222383.55	2683489.07
RW-102	17.38	17.65	18.10	222320.86	2683598.74
RW-103	19.86	20.18	20.78	222358.08	2683769.80
RW-104	9.99	10.77	11.17	222446.60	2682959.50
RW-105	9.83	10.39	10.82	222412.07	2682963.70
RW-106	10.24	10.79	11.20	222348.45	2682946.19
RW-107	10.12	10.78	11.21	222271.97	2682915.11
RW-108	9.34	9.90	10.33	222180.78	2682895.30
RW-109	9.31	9.86	10.30	222083.92	2682882.41

Horizontal Datum: Pennsylvania State Plane Coordinates – NAD 83 / South Zone
Vertical Datum: NAVD 88

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James M. Stewart, Inc.

Land Surveyors

Sunoco, Inc. – Philadelphia Refinery
Point Breeze Processing Area – Belmont Terminal – 26th Street Area
Well Locations

Well #	Elevations (Feet)			Coordinates (Feet)	
	Ground	Inner Casing	Protective Outer Casing	(Y) North	(X) East
RW-400	27.45	28.19	28.59	224104.19	2686123.22
RW-401	24.51	24.77	25.12	223554.90	2686039.79
RW-402	23.59	20.05	21.76	223415.16	2686055.30
RW-403	23.61	24.10	24.19	223262.18	2686034.56
RW-404	23.19	23.74	23.99	223152.24	2686015.19
RW-405	24.00	24.11	24.75	222932.56	2685989.79
RW-406	24.09		26.92	223542.05	2686057.10
RW-600	9.31	9.14	9.37	223296.10	2683368.61
RW-601	12.07	11.92	12.03	223212.72	2683324.83
RW-602	11.23	10.07	11.07	223248.57	2683337.66
S-1	4.62	7.03		218592.69	2683071.87
S-2	4.33	7.10		218077.46	2683360.65
S-3	7.86	10.91		217784.28	2683570.06
S-5	6.51	6.19	6.53	218241.56	2683837.63
S-8	6.53	6.14	6.47	218427.58	2683688.21
S-9	6.59	6.24	6.58	218437.25	2683683.26
S-10	6.49	6.17	6.44	218444.25	2683682.16
S-11	6.57	6.33	6.55	218661.35	2683575.57
S-12	6.74	8.35	8.57	218879.26	2683521.25
S-13	6.65	8.04	8.29	218891.65	2683521.34
S-14	6.50	8.14	8.20	218904.01	2683518.92
S-15	6.15	8.99		218913.91	2683519.59
S-16	21.84	23.80	24.08	218965.24	2683816.54
S-17	17.23	20.02		219271.22	2683785.14

Horizontal Datum: Pennsylvania State Plane Coordinates – NAD 83 / South Zone
Vertical Datum: NAVD 88

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James M. Stewart, Inc.

Land Surveyors

Checked BY: JMS

May 21, 2003

Sunoco, Inc. – Philadelphia Refinery
Point Breeze Processing Area – Belmont Terminal – 26th Street Area
Well Locations

Well #	Elevations (Feet)			Coordinates (Feet)	
	Ground	Inner Casing	Protective Outer Casing	(Y) North	(X) East
S-18	21.76	23.61	23.84	218958.97	2683822.77
S-19	17.45	18.78	19.28	218820.62	2684046.47
S-20	17.84	20.39	20.55	218851.27	2684072.10
S-21	19.97	22.76	218915.47	2683996.02	
S-22	17.52	18.86	19.01	218842.30	2684080.90
S-23	18.53	20.44	21.07	218578.86	2684062.44
S-24	17.41	19.83	19.93	218725.17	2684110.55
S-25	12.06	14.94		218447.16	2684274.97
S-26	17.60	20.76		218758.26	2684615.95
S-27	24.60	26.84		219121.61	2684393.01
S-28	22.66	25.74		219583.40	2684391.35
S-29	21.83	23.30		219694.79	2684380.20
S-30	21.64	23.13		219702.61	2684379.56
S-31	21.24	24.36		219592.61	2684202.55
S-32	21.29	24.20		219917.06	2684135.82
S-33	21.25	21.45	220311.98	2684149.27	
S-34	21.46	23.30	220356.54	2684176.95	
S-35	21.74	24.69		220363.93	2684236.21
S-36	21.91	24.23		220366.09	2684276.10
S-37	23.42	25.90	220370.42	2684325.96	
S-38	15.97	18.95		219183.83	2685232.49
S-38D	15.88	17.70	18.10	219173.76	2685231.04
S-38I	15.84	18.19	18.53	219162.59	2685229.49
S-39	21.25	22.88	23.37	220133.11	2685582.26
S-40	21.67	24.46		220733.63	2685637.31

Horizontal Datum: Pennsylvania State Plane Coordinates – NAD 83 / South Zone

Vertical Datum: NAVD 88

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Land Surveyors

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Page 5 of 9
May 21, 2003

Sunoco, Inc. – Philadelphia Refinery
Point Breeze Processing Area – Belmont Terminal – 26th Street Area
Well Locations

Well #	Elevations (Feet)			Coordinates (Feet)	
	Ground	Inner Casing	Protective Outer Casing	(Y) North	(X) East
S-41	25.09	25.75	26.20	221298.09	2685772.24
S-42	25.13	25.72	26.01	221300.58	2685770.30
S-43	23.46	23.22	23.46	221634.03	2685815.50
S-44	22.21	23.34	24.02	221765.43	2685821.49
S-45	21.93	21.57	21.71	221888.07	2685855.20
S-46	19.68	22.56	22.88	222077.10	2685283.21
S-47	19.77	22.21	22.52	222077.33	2685274.85
S-48	18.82	21.03	21.23	222220.99	2684870.91
S-50	21.00	22.48	23.08	222241.44	2685881.34
S-51	21.22	23.36		222519.95	2685938.59
S-52	23.70	23.54	23.86	222552.97	2685893.62
S-53	21.38	21.38	21.95	222278.99	2684179.38
S-54	21.32	23.07	23.45	221765.89	2684412.09
S-55	12.93	15.98		221232.26	2684841.22
S-56	13.45	15.00		220723.49	2684592.77
S-57	10.13	12.50		220382.65	2683745.49
S-59	10.88	12.87		220840.74	2683738.61
S-60	12.01	15.08		221051.09	2683756.34
S-61	15.69	18.26	18.50	221700.82	2683868.82
S-62	19.40	21.59	222319.10	2683629.83	
S-63	18.51	21.40	222268.62	2683223.27	
S-64	9.24	10.85	11.16	222212.14	2682948.82
S-65	10.32	10.86	12.48	222451.95	2682947.88
S-66	25.84	25.40	25.79	221327.20	2682717.47
S-68	10.49	10.92		220365.88	2682954.93
S-69	11.61	15.52		219960.09	2682401.78
S-69D	11.74	13.76	14.16	219970.80	2682399.10

Horizontal Datum: Pennsylvania State Plane Coordinates – NAD 83 / South Zone
 Vertical Datum: NAVD 88

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James M. Stewart, Inc.

Land Surveyors

File # 3028list
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Page 6 of 9
 May 21, 2003

Sunoco, Inc. – Philadelphia Refinery
Point Breeze Processing Area – Belmont Terminal – 26th Street Area
Well Locations

Well #	Elevations (Feet)			Coordinates (Feet)	
	Ground	Inner Casing	Protective Outer Casing	(Y) North	(X) East
S-70	21.95	22.13		223133.19	2683462.83
S-71	21.91	24.04	24.42	223178.00	2683534.96
S-72	31.69	34.26		223835.64	2683824.73
S-72D	32.20	34.62	35.04	223838.52	2683834.10
S-73	35.31	38.54		224159.26	2684618.08
S-74	27.99	30.09	224333.26	2686172.32	
S-75	28.01	31.23	224095.80	2686143.90	
S-76	29.61	31.04	224035.22	2685601.00	
S-77	33.71	33.45		223934.32	2685224.90
S-77P	30.83	33.04	33.23	223931.04	2685250.50
S-78	29.56	30.93	31.33	223423.38	2684757.06
S-79	27.87	30.97	223434.11	2685646.29	
S-79P	27.88	30.42	30.76	223426.17	2685643.78
S-80	29.94	32.13	32.43	223706.53	2685606.55
S-81	25.78	27.85		223880.17	2686124.02
S-82	24.60	27.29	27.56	223599.04	2686055.67
S-83	23.63	23.33	23.60	223399.48	2686061.37
S-84	23.32	22.99	23.31	223298.35	2686035.75
S-84P	23.26	23.26		223303.28	2686042.20
S-85	22.94	25.13		223173.08	2686023.30
S-86	24.35	27.05	27.28	223064.66	2685944.82
S-87	24.39	25.87	26.12	223065.25	2685939.91
S-88	23.64	24.10	223039.30	2686004.66	
S-88A	23.47	25.72	223107.63	2686012.45	
S-89	23.91	25.99		222922.41	2685988.52

Horizontal Datum: Pennsylvania State Plane Coordinates – NAD 83 / South Zone
Vertical Datum: NAVD 88

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James M. Stewart, Inc.

Land Surveyors

File # 3028list
Checked BY: JMS

Page 7 of 9
May 21, 2003

Sunoco, Inc. – Philadelphia Refinery

Point Breeze Processing Area – Belmont Terminal – 26th Street Area
Well Locations

Well #	Elevations (Feet)			Coordinates (Feet)	
	Ground	Inner Casing	Protective Outer Casing	(Y) North	(X) East
S-91	21.44	23.35	24.16	222271.31	2684188.16
S-92	20.76	20.37	20.73	222194.35	2684428.36
S-93	19.78	21.66	22.77	222338.65	2683258.96
S-95	21.61	22.99	23.34	221422.29	2685351.26
S-96	15.94	19.77		220718.53	2684857.12
S-97	28.74	30.31	30.90	219546.08	2684857.01
S-98	27.19	28.80	29.12	223981.81	2686256.88
S-99	22.80	25.40	25.49	222765.83	2686083.84
S-100	25.09	26.95	27.67	223522.63	2686177.84
S-101	48.27	49.12	49.38	223162.80	2686296.03
S-102	15.63	18.22	18.92	221406.75	2683873.83
S-103	23.55	26.11	26.57	221274.57	2684427.94
S-104	15.05	18.11	18.42	221448.27	2684803.51
S-105	10.87	12.67	13.60	223163.59	2683300.96
S-106	11.78	11.52	11.82	223225.70	2683321.51
S-107	11.31	12.48	12.54	223257.96	2683338.60
S-108	9.00	10.89	11.61	223294.08	2683361.88
S-109	10.16	10.13	10.04	223248.05	2683300.83
S-110	23.17	25.70	26.10	223250.41	2683409.39
S-111		Damaged		220875.56	2684175.79
S-112	15.94	15.68	15.98	220610.77	2683035.52
S-113	12.91	12.80	13.03	220679.79	2683404.80
S-114	9.87	9.48	9.81	220130.92	2683138.52
S-116	26.69	26.36	26.58	222787.98	2685621.02
S-117	18.60	18.41	18.64	222352.34	2685491.75

Horizontal Datum: Pennsylvania State Plane Coordinates – NAD 83 / South Zone

Vertical Datum: NAVD 88

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James M. Stewart, Inc.

Land Surveyors

File # 3028list

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Page 8 of 9

May 21, 2003

Sunoco, Inc. – Philadelphia Refinery
Point Breeze Processing Area – Belmont Terminal – 26th Street Area

Well Locations

Well #	Elevations (Feet)			Coordinates (Feet)	
	Ground	Inner Casing	Protective Outer Casing	(Y) North	(X) East
S-118	18.34	17.90	18.36	221629.17	2685532.76
S-119	23.82	26.60	26.87	220752.86	2685393.24
S-120	16.47	19.82	19.86	220402.98	2685596.68
S-121	18.53	21.12	21.97	220221.94	2685120.47
S-122	22.92	25.71	26.08	219646.60	2685442.91
S-123	19.23	22.13	22.65	219320.35	2684990.32
S-124	20.46	23.20	23.54	218884.83	2685003.67
S-125	23.84	25.99	26.49	223505.81	2686078.52
S-126	26.41	28.48	28.99	222948.50	2685672.92
S-127	15.38	17.10	17.79	222202.71	2685644.17
S-128	20.13	20.72		222366.54	2683653.78
S-129	20.29	21.03		222366.11	2683689.83
S-130	20.54	22.63	222280.38	2684124.50	
S-131	19.06	20.57	222306.90	2684099.65	
S-132	21.53	23.59		222243.33	2684095.13
S-133	19.63	21.30		222303.06	2684056.02
S-134	20.94	22.23		222208.76	2684441.01
S-135	21.24	23.25		222277.51	2684161.61
S-136	21.12	23.10		222257.42	2684134.85
S-137	20.72	22.54		222273.23	2684043.13
S-138	21.65	22.89		222508.29	2683504.86
S-139	19.31	21.73	222392.49	2683570.21	
S-140	20.92	22.32	222441.03	2683480.29	
S-141	20.29	22.14		222387.70	2683426.93
S-142	18.04	20.02		222347.80	2683609.42
S-143	21.61	23.16		222447.43	2683521.37

Horizontal Datum: Pennsylvania State Plane Coordinates – NAD 83 / South Zone

Vertical Datum: NAVD 88

9622 Evans Street Philadelphia, PA 19115 Office 215 969 1577 Fax 215 969 0338

James M. Stewart, Inc.

Land Surveyors

File # 3028list

Page 9 of 9

Checked BY: JMS

May 21, 2003

Sunoco, Inc. – Philadelphia Refinery
Point Breeze Processing Area – Belmont Terminal – 26th Street Area
Well Locations

Well #	Elevations (Feet)			Coordinates (Feet)	
	Ground	Inner Casing	Protective Outer Casing	(Y) North	(X) East
S-144	19.67	21.71		222338.23	2683681.59
S-145	10.96	10.38	11.04	223242.14	2683324.16
S-146	9.40	8.80	9.44	223263.11	2683325.13
S-147	11.26	10.54	11.40	223227.94	2683311.11
S-148	9.04	8.43	8.96	223268.88	2683308.83
S-149	10.16	9.81	10.12	223223.02	2683284.18
S-150	21.11	20.85	21.09	223189.19	2683393.37
S-151	22.88	22.38	22.86	223240.61	2683456.79
S-152	11.47	10.71	11.34	223246.91	2683336.73
S-153	10.30	10.78	12.04	223235.73	2683290.29
S-154	10.23	10.00	10.20	223236.74	2683288.60
S-155	22.49	21.72	22.51	223179.57	2683445.72
S-156	21.23	22.28	222281.18	2684179.65	
S-157	20.29	20.66	222285.03	2684106.77	
SD-1	17.04	19.24	20.36	223203.56	2683363.68
TW-3	32.41	32.11	32.39	224405.13	2685837.57
TW-5	32.34	32.07	32.37	224416.34	2685994.17
TW-8	30.37	30.14	30.37	224456.46	2685681.64
TW-9	32.43	32.10	32.42	224400.06	2686091.51
TW-10	30.55	30.22	30.64	224430.44	2685634.28
TW-11	32.61	32.40	32.64	224363.64	2686135.36

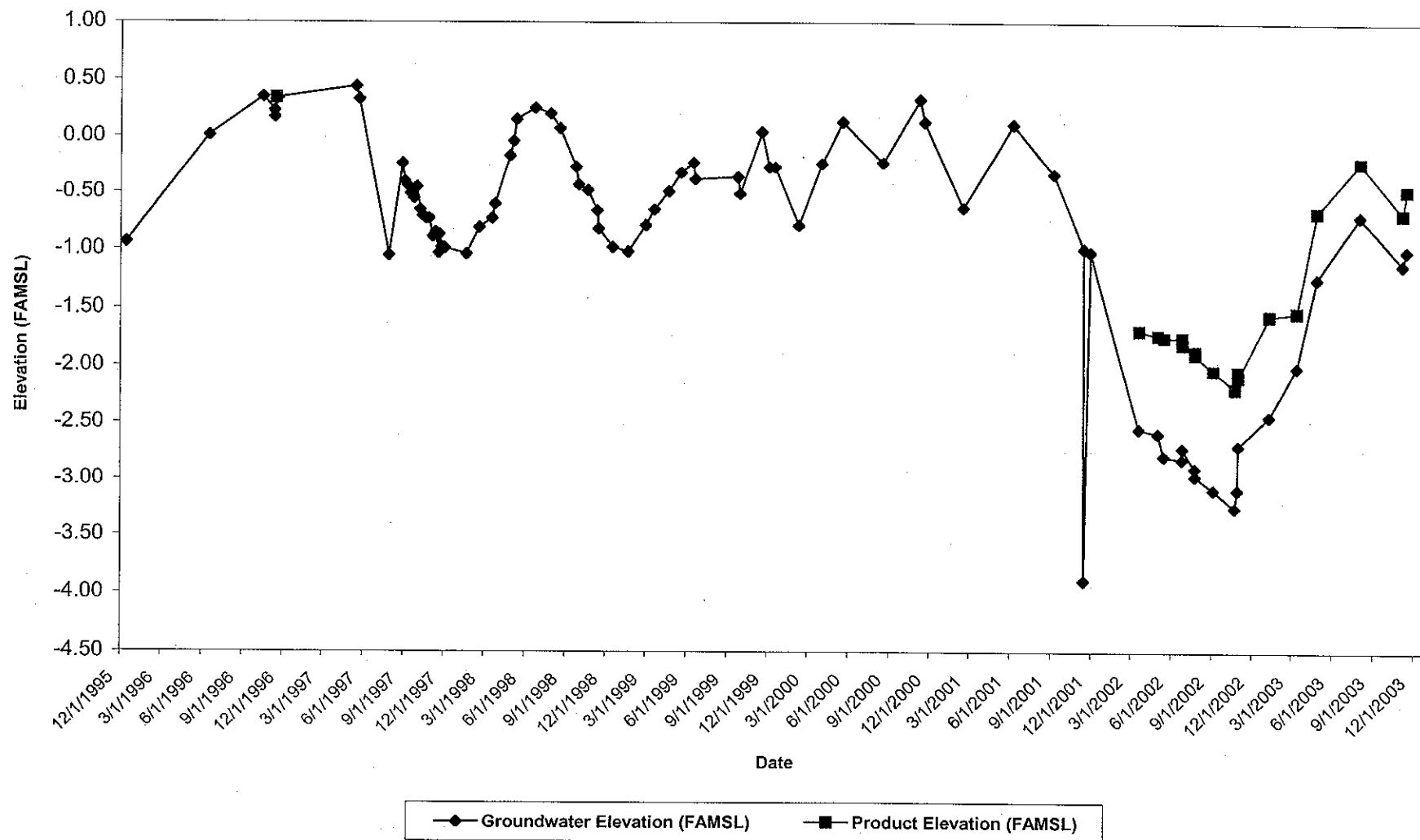
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Vertical Datum: NAVD 88

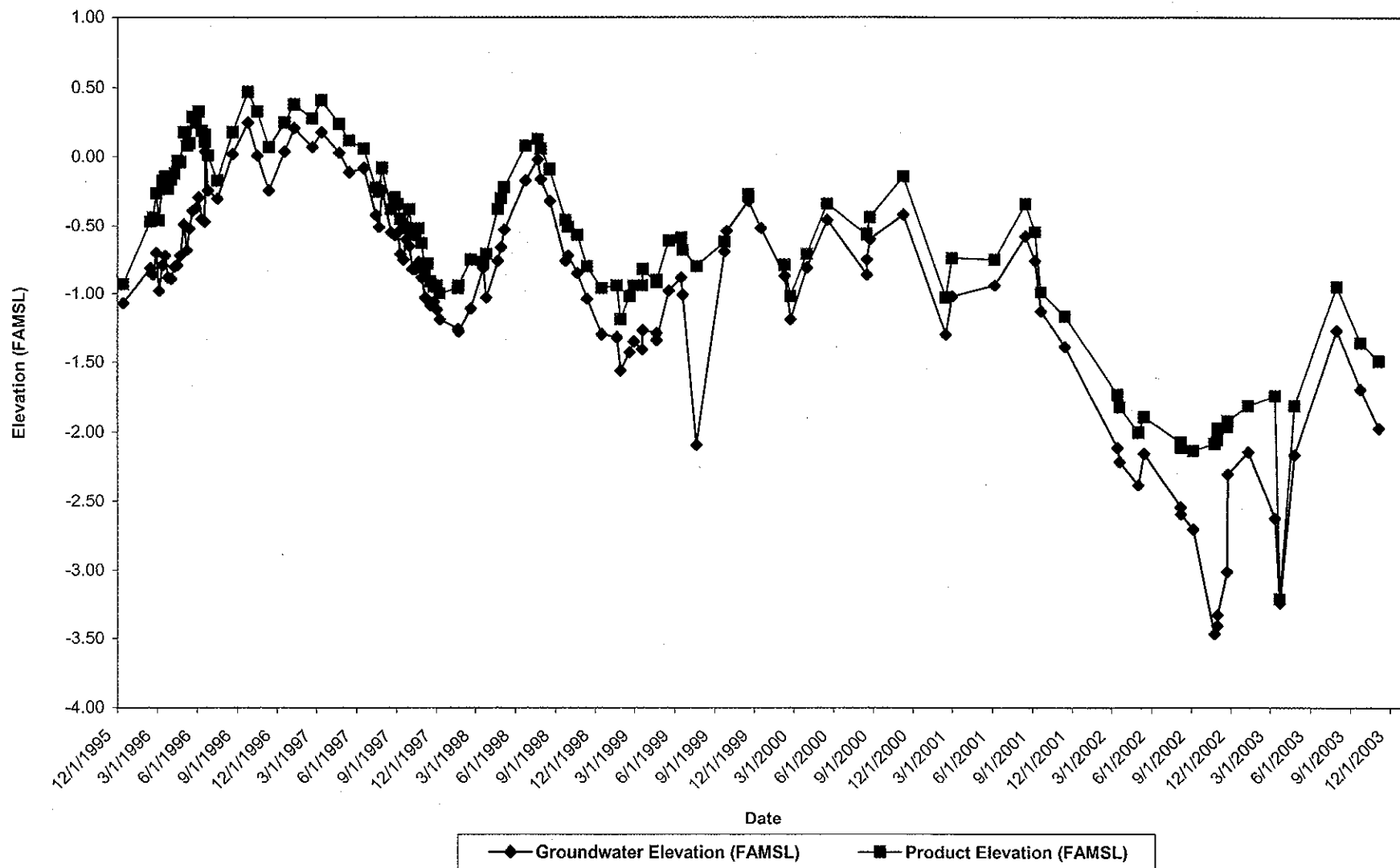
9622 Evans Street Philadelphia, PA 19115 Office 215 969 1577 Fax 215 969 0338

APPENDIX E

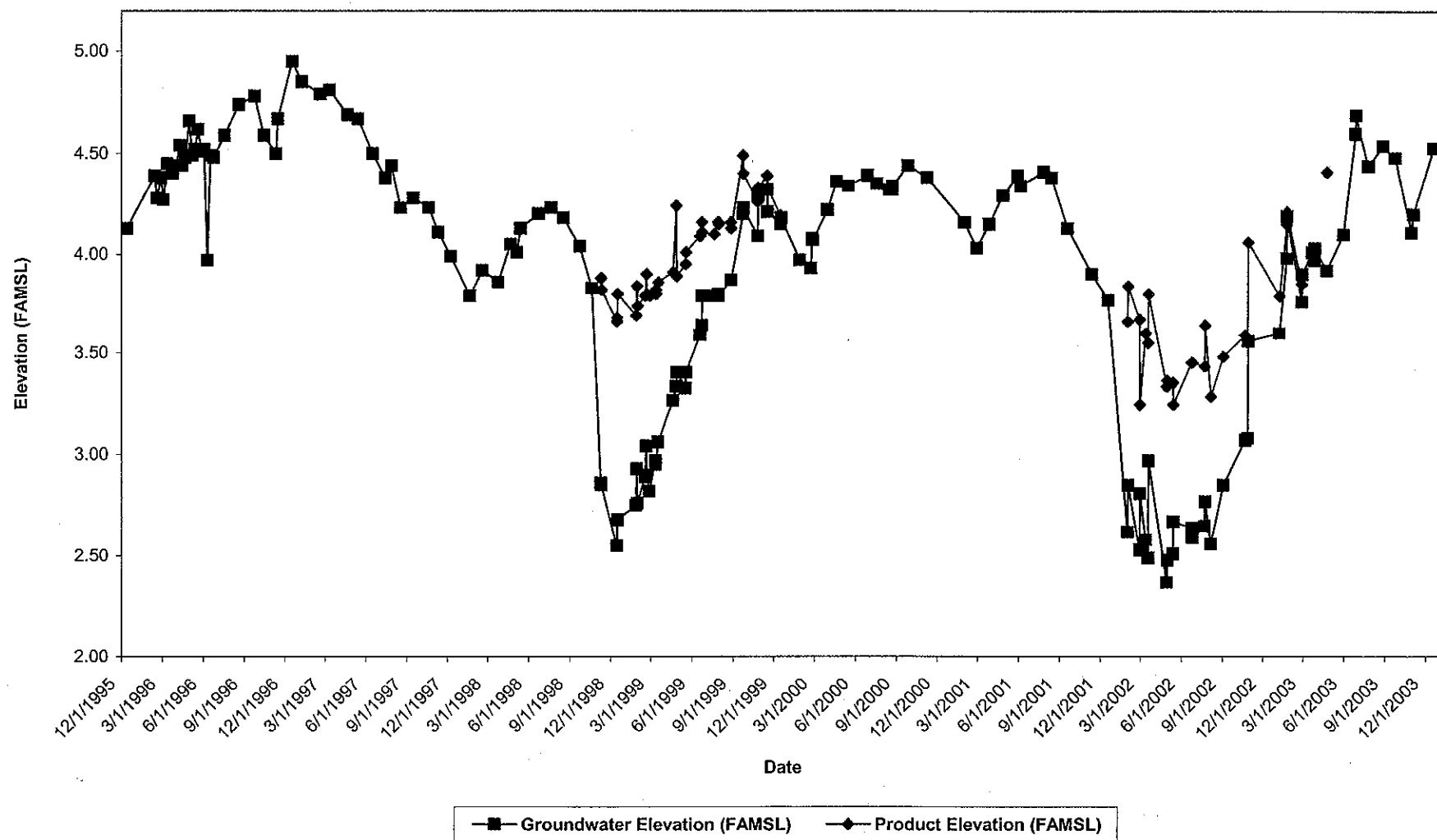
S-50
Groundwater Gauging Results
Sunoco, Inc. Philadelphia Refinery



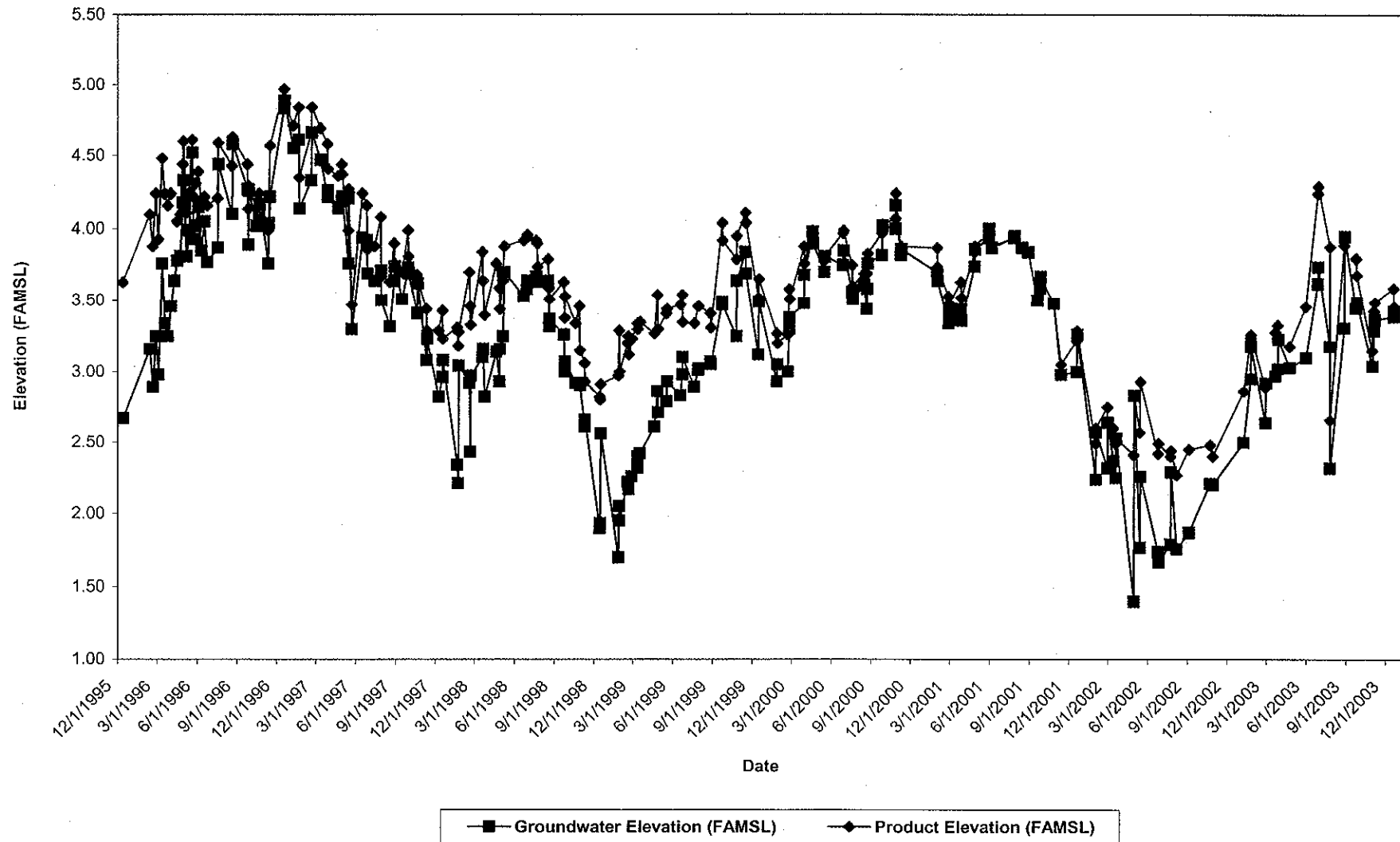
S-89
Groundwater Gauging Results
Sunoco, Inc. Philadelphia Refinery



S-98
Groundwater Gauging Results
Sunoco, Inc. Philadelphia Refinery



S-100
Groundwater Gauging Results
Sunoco, Inc. Philadelphia Refinery



APPENDIX F

SECOR International, Inc.

102 Pickering Way - Suite 200

Exton, PA

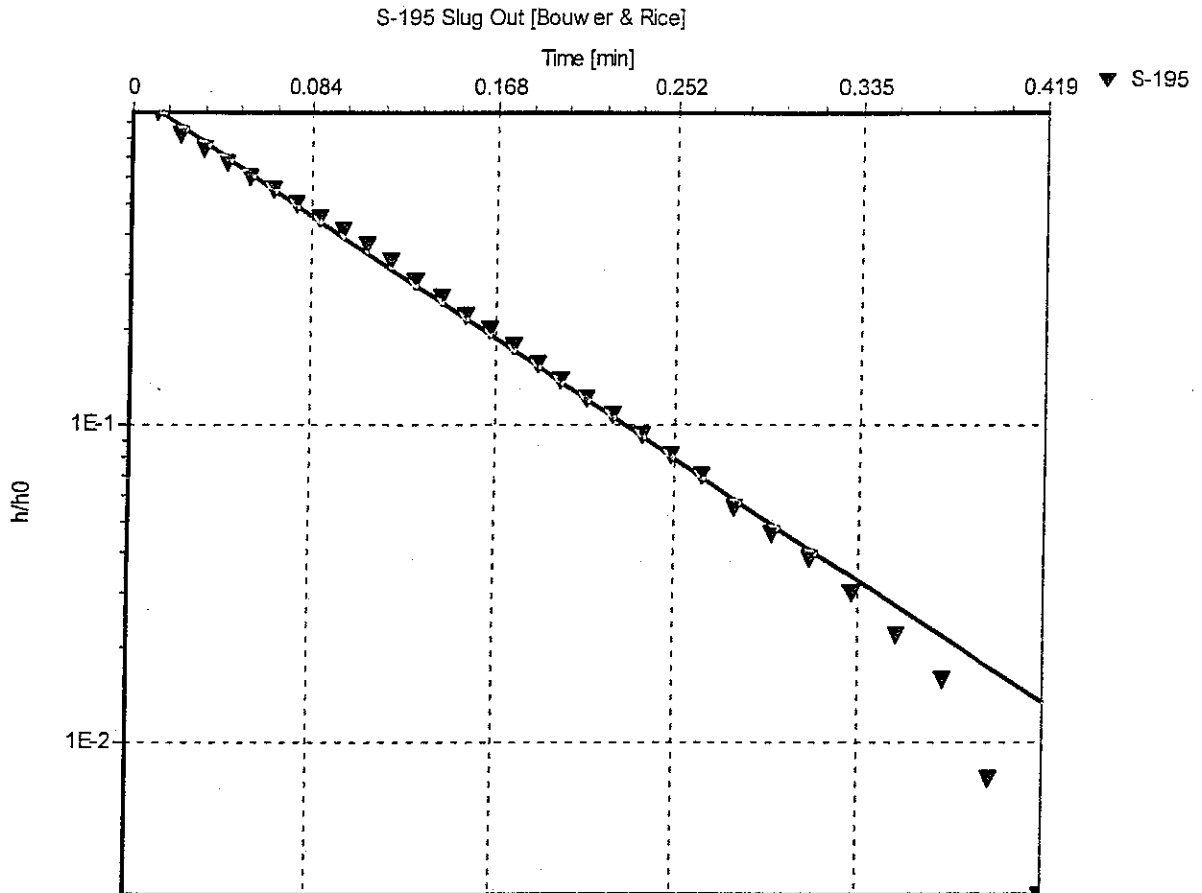
Phone: (484) 875-3075

Slug Test Analysis Report

Project: Sunoco 26th ST

Number:

Client: Sunoco Inc.

Slug Test: S-195 Slug OutAnalysis Method: Bouwer & RiceAnalysis Results:

Conductivity: 2.71E+1 [ft/d]

<u>Test parameters:</u>	Test Well:	S-195	Aquifer Thickness:	11.16 [ft]
	Casing radius:	0.167 [ft]	Gravel Pack Porosity (%)	25
	Screen length:	20 [ft]		
	Boring radius:	0.427 [ft]		
	r(eff):	0.258 [ft]		

Comments:

Evaluated by:

Evaluation Date: 2/24/04

SECOR International, Inc.

102 Pickering Way - Suite 200

Exton, PA

Phone: (484) 875-3075

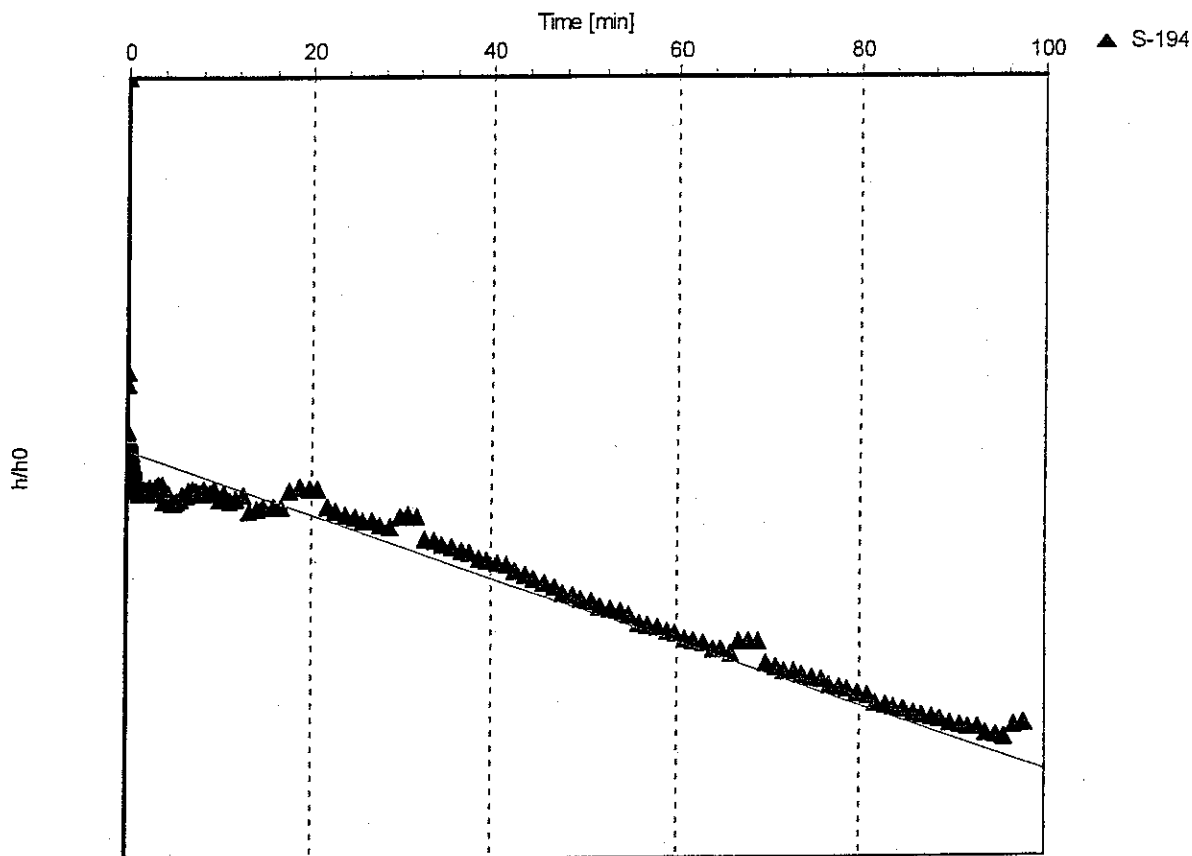
Slug Test Analysis Report

Project: Sunoco 26th ST

Number:

Client: Sunoco Inc.

S-194 Slug In [Bouwer & Rice]

Slug Test: S-194 Slug InAnalysis Method: Bouwer & RiceAnalysis Results:

Conductivity: 7.28E-3 [ft/d]

Test parameters:

Test Well: S-194

Aquifer Thickness: 5.55 [ft]

Casing radius: 0.167 [ft]

Gravel Pack Porosity (%) 25

Screen length: 15 [ft]

Boring radius: 0.427 [ft]

r(eff): 0.258 [ft]

Comments:

Evaluated by:

Evaluation Date: 2/24/04

SECOR International, Inc.

102 Pickering Way - Suite 200

Exton, PA

Phone: (484) 875-3075

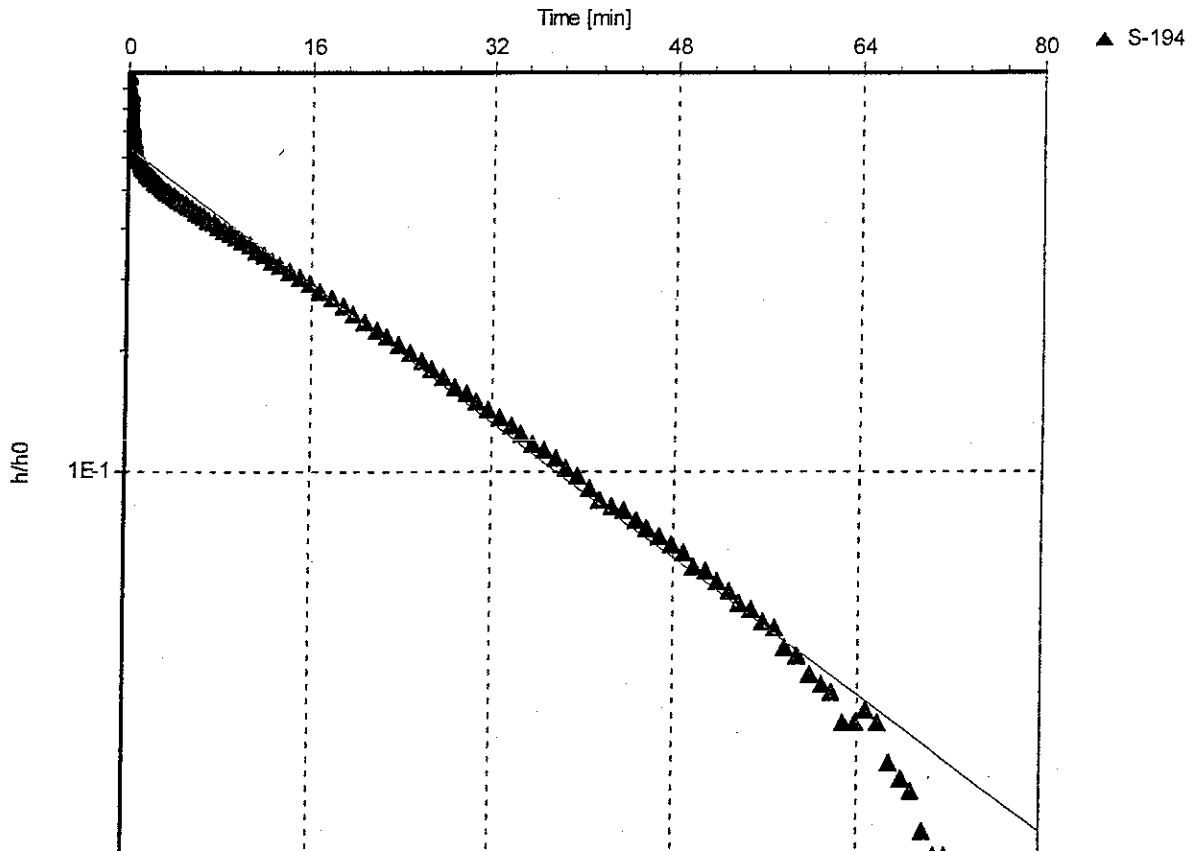
Slug Test Analysis Report

Project: Sunoco 26th ST

Number:

Client: Sunoco Inc.

S-193 Slug Out [Bouwer & Rice]

Slug Test: S-193 Slug OutAnalysis Method: Bouwer & RiceAnalysis Results:

Conductivity: 1.68E-1 [ft/d]

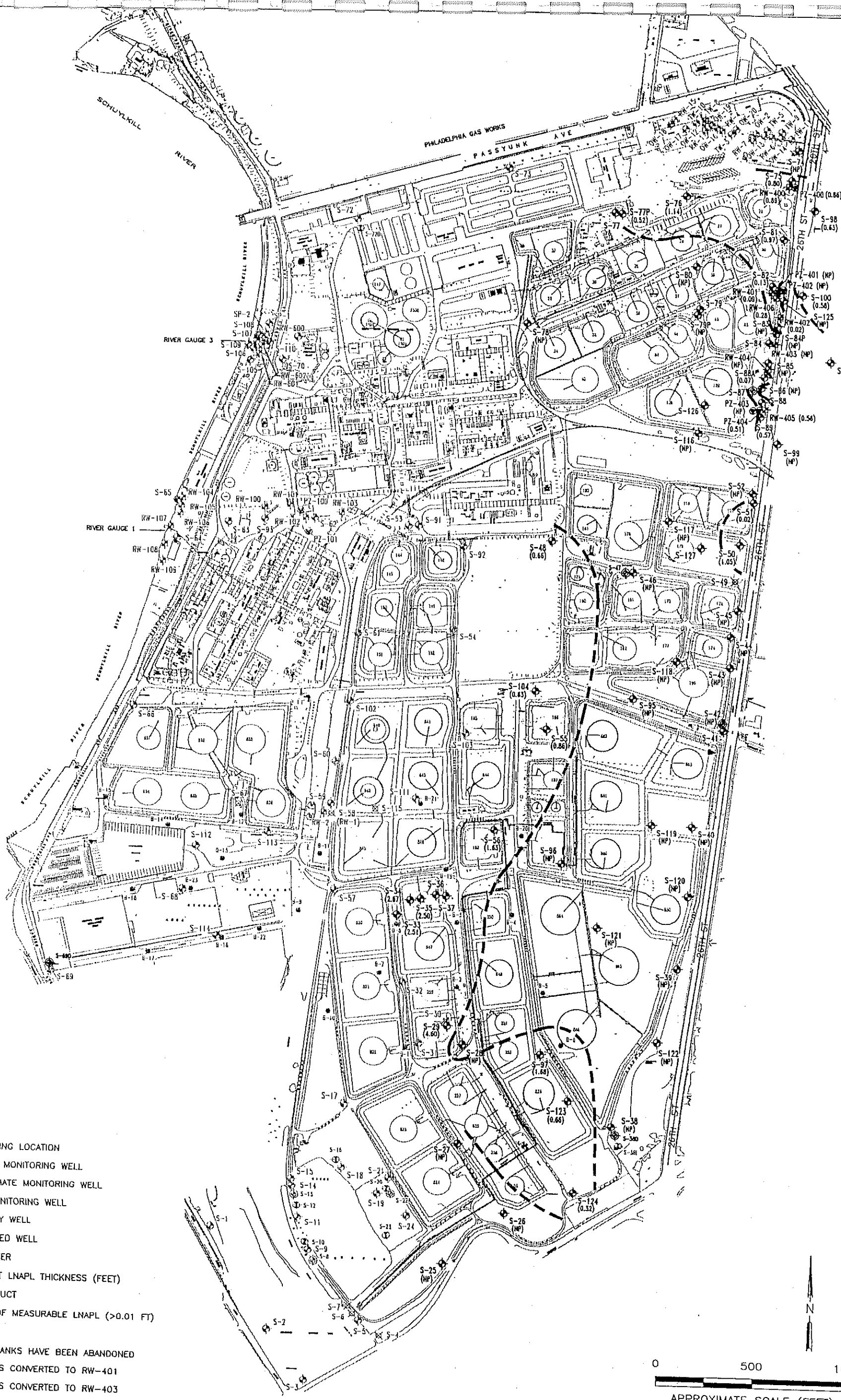
<u>Test parameters:</u>	Test Well:	S-194	Aquifer Thickness:	11.45 [ft]
	Casing radius:	0.167 [ft]	Gravel Pack Porosity (%)	25
	Screen length:	15 [ft]		
	Boring radius:	0.427 [ft]		
	r(eff):	0.258 [ft]		

Comments:

Evaluated by:

Evaluation Date: 2/24/04

APPENDIX G



LEGEND

- CPT BORING LOCATION
- ⊕ SHALLOW MONITORING WELL
- ⊕ INTERMEDIATE MONITORING WELL
- ⊕ DEEP MONITORING WELL
- ⊕ RECOVERY WELL
- ⊕ ABANDONED WELL
- ⊕ PIEZOMETER
- (0.78) APPARENT LNAPL THICKNESS (FEET)
- (NP) NO PRODUCT
- EXTENT OF MEASURABLE LNAPL (>0.01 FT)

NOTE

- 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) 876-3076/876-9288 (FAX)

APPROXIMATE EXTENT OF MEASURABLE LNAPL
(SEPTMBER 3, 2002)
26TH STREET AREA
SUNOCO PHILADELPHIA REFINERY
PHILADELPHIA, PENNSYLVANIA

FIGURE:

4-14

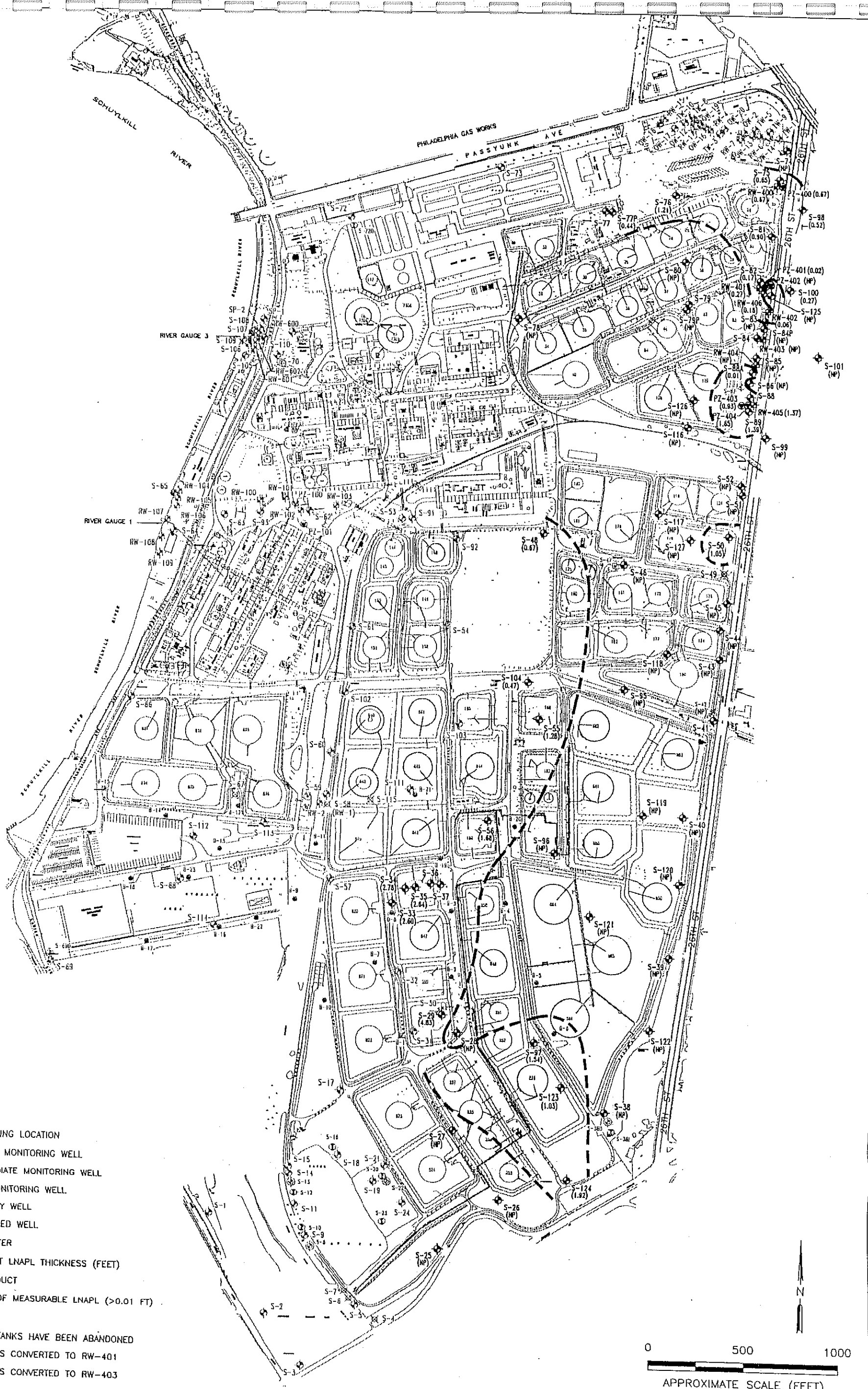
JOB#: 62SU.01017.02.0006

APPR:

DWN: KPM

DATE: 01/27/03

DWG: 62SU-1017-2-6(4-14).DWG

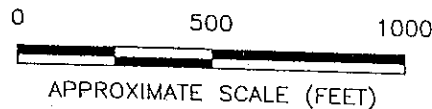


LEGEND

- CPT BORING LOCATION
- ◆ SHALLOW MONITORING WELL
- ⊕ INTERMEDIATE MONITORING WELL
- ⊕ DEEP MONITORING WELL
- ⊕ RECOVERY WELL
- ⊕ ABANDONED WELL
- ⊕ PIEZOMETER
- (0.76) APPARENT LNAPL THICKNESS (FEET)
- (NP) NO PRODUCT
- EXTENT OF MEASURABLE LNAPL (>0.01 FT)

NOTE

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
 EYTON, PENNSYLVANIA 19341
 (484) 876-3076/875-9288 (FAX)

APPROXIMATE EXTENT OF MEASURABLE LNAPL
 (OCTOBER 22, 2002)
 26TH STREET AREA
 SUNOCO PHILADELPHIA REFINERY
 PHILADELPHIA, PENNSYLVANIA

FIGURE:

4-15

JOB #: 62SU.01017.02.0008 APPR: DWN: KPM DATE: 01/08/03

DWG: 62SU-1017-2-6(4-15).DWG

APPENDIX H



ANALYTICAL RESULTS

Prepared for:

Sun: SECOR International, Inc
Suite 200
102 Pickering Way
Exton PA 19341
484-875-9075

Prepared by:

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

SAMPLE GROUP

The sample group for this submittal is 889036. Samples arrived at the laboratory on Friday, March 19, 2004. The PO# for this group is PHILA. REFINERY.

Client Description

S-84 Grab Water Sample
S-98 Grab Water Sample
S-125 Grab Water Sample
S-179 Grab Water Sample
S-180 Grab Water Sample
S-181 Grab Water Sample
S-182 Grab Water Sample
S-183 Grab Water Sample
S-184 Grab Water Sample
S-185 Grab Water Sample
S-186 Grab Water Sample
S-187 Grab Water Sample
S-188 Grab Water Sample
S-189 Grab Water Sample
S-192 Grab Water Sample
S-193 Grab Water Sample
S-194 Grab Water Sample
S-195 Grab Water Sample
S-196 Grab Water Sample
S-197 Grab Water Sample
Trip Blank Water Sample

Lancaster Labs Number

4238669
4238670
4238671
4238672
4238673
4238674
4238675
4238676
4238677
4238678
4238679
4238680
4238681
4238682
4238683
4238684
4238685
4238686
4238687
4238688
4238689

1 COPY TO

Sun: SECOR International, Inc

Attn: Mr. Steve Baggett

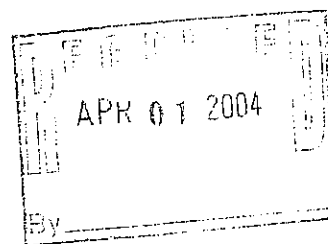


Lancaster Laboratories, Inc.
2425 New Holland Pike
PO Box 12425
Lancaster, PA 17605-2425
717-656-2300 Fax: 717-656-2681



Lancaster
Laboratories

Questions? Contact your Client Services Representative
Sandra L. Patton at (717) 656-2300.



Respectfully Submitted,

Robin C. Runkle
ROBIN C. RUNKLE
SENIOR CHEMIST



Lancaster Laboratories Sample No. WW 4238669

S-84 Grab Water Sample

Philadelphia Refinery

SUNOCO: 26th St. - Philadelphia, PA

Collected: 03/18/2004 12:45 by SM

Account Number: 11183

Submitted: 03/19/2004 15:00

Reported: 03/29/2004 at 09:46

Discard: 04/06/2004

Sun: SECOR International, Inc
Suite 200
102 Pickering Way
Exton PA 19341

S--84

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation	Units	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624					
00843	Benzene	71-43-2	74.	10.	ug/l	2
00850	Toluene	108-88-3	< 10.	10.	ug/l	2
00852	Ethylbenzene	100-41-4	440.	10.	ug/l	2
03589	Xylene (total)	1330-20-7	5,000.	100.	ug/l	20
The reporting limits for the GC/MS volatile compounds were raised because sample dilution was necessary to bring target compounds into the calibration range of the system.						

Commonwealth of Pennsylvania Lab Certification No. 36-037

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/24/2004 17:03	Susan McMahon-Luu	2
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/24/2004 17:27	Susan McMahon-Luu	20



Lancaster Laboratories Sample No. WW 4238670

S-98 Grab Water Sample

Philadelphia Refinery

SUNOCO: 26th St. - Philadelphia, PA

Collected: 03/17/2004 12:45 by SM

Account Number: 11183

Submitted: 03/19/2004 15:00

Reported: 03/29/2004 at 09:46

Discard: 04/06/2004

Sun: SECOR International, Inc

Suite 200

102 Pickering Way

Exton PA 19341

S--98

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation	Units	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624					
00843	Benzene	71-43-2	770.	100.	ug/l	20
00850	Toluene	108-88-3	53.	10.	ug/l	2
00852	Ethylbenzene	100-41-4	560.	10.	ug/l	2
03589	Xylene (total)	1330-20-7	5,600.	100.	ug/l	20

Commonwealth of Pennsylvania Lab Certification No. 36-037

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/24/2004 17:51	Susan McMahon-Luu	2
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/24/2004 18:15	Susan McMahon-Luu	20



Lancaster Laboratories Sample No. WW 4238671

S-125 Grab Water Sample
 Philadelphia Refinery
 SUNOCO: 26th St. - Philadelphia, PA
 Collected: 03/17/2004 13:48 by SM

Account Number: 11183

Submitted: 03/19/2004 15:00
 Reported: 03/29/2004 at 09:46
 Discard: 04/06/2004

Sun: SECOR International, Inc
 Suite 200
 102 Pickering Way
 Exton PA 19341

S-125

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation	Units	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624					
00843	Benzene	71-43-2	14,000.	500.	ug/l	100
00850	Toluene	108-88-3	200.	50.	ug/l	10
00852	Ethylbenzene	100-41-4	230.	50.	ug/l	10
03589	Xylene (total)	1330-20-7	720.	50.	ug/l	10

Commonwealth of Pennsylvania Lab Certification No. 36-037

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/24/2004 18:39	Susan McMahon-Luu	10
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/24/2004 19:02	Susan McMahon-Luu	100



Lancaster Laboratories Sample No. WW 4238672

S-179 Grab Water Sample

Philadelphia Refinery

SUNOCO: 26th St. - Philadelphia, PA

Collected: 03/18/2004 13:50 by SM

Account Number: 11183

Submitted: 03/19/2004 15:00

Reported: 03/29/2004 at 09:46

Discard: 04/06/2004

Sun: SECOR International, Inc
Suite 200

102 Pickering Way
Exton PA 19341

S-179

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation	Units	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624					
00843	Benzene	71-43-2	5.	5.	ug/l	1
00850	Toluene	108-88-3	< 5.	5.	ug/l	1
00852	Ethylbenzene	100-41-4	13.	5.	ug/l	1
03589	Xylene (total)	1330-20-7	89.	5.	ug/l	1

Commonwealth of Pennsylvania Lab Certification No. 36-037

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/24/2004 04:11	Susan McMahon-Luu	1



Lancaster Laboratories Sample No. WW 4238673

S-180 Grab Water Sample

Philadelphia Refinery

SUNOCO: 26th St. - Philadelphia, PA

Collected: 03/18/2004 13:08 by SM

Account Number: 11183

Submitted: 03/19/2004 15:00

Reported: 03/29/2004 at 09:46

Discard: 04/06/2004

Sun: SECOR International, Inc
Suite 200

102 Pickering Way

Exton PA 19341

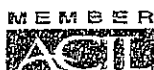
S-180

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation	Units	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624					
00843	Benzene	71-43-2	< 5.	5.	ug/l	1
00850	Toluene	108-88-3	< 5.	5.	ug/l	1
00852	Ethylbenzene	100-41-4	< 5.	5.	ug/l	1
03589	Xylene (total)	1330-20-7	18.	5.	ug/l	1

Commonwealth of Pennsylvania Lab Certification No. 36-037

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/24/2004 04:36	Susan McMahon-Luu	1



Lancaster Laboratories, Inc.
2425 New Holland Pike
PO Box 12425
Lancaster, PA 17605-2425
717.555.3300 Fax 717.555.2621



Lancaster Laboratories Sample No. WW 4238674

S-181 Grab Water Sample
 Philadelphia Refinery
 SUNOCO: 26th St. - Philadelphia, PA
 Collected: 03/18/2004 09:35 by SM

Account Number: 11183

Submitted: 03/19/2004 15:00
 Reported: 03/29/2004 at 09:46
 Discard: 04/06/2004

Sun: SECOR International, Inc
 Suite 200
 102 Pickering Way
 Exton PA 19341

S-181

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation	Units	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624					
00843	Benzene	71-43-2	5,100.	500.	ug/l	100
00850	Toluene	108-88-3	250.	50.	ug/l	10
00852	Ethylbenzene	100-41-4	480.	50.	ug/l	10
03589	Xylene (total)	1330-20-7	2,200.	50.	ug/l	10

Commonwealth of Pennsylvania Lab Certification No. 36-037

Laboratory Chronicle

CAT No.	Analysis Name	Method	Analysis		Analyst	Dilution Factor
			Trial#	Date and Time		
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/24/2004 19:26	Susan McMahon-Luu	10
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/24/2004 19:50	Susan McMahon-Luu	100



Lancaster Laboratories Sample No. WW 4238675

S-182 Grab Water Sample

Philadelphia Refinery

SUNOCO: 26th St. - Philadelphia, PA

Collected: 03/17/2004 14:42 by SM

Account Number: 11183

Submitted: 03/19/2004 15:00

Reported: 03/29/2004 at 09:46

Discard: 04/06/2004

Sun: SECOR International, Inc
Suite 200
102 Pickering Way
Exton PA 19341

S-182

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation	Units	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624					
00843	Benzene	71-43-2	14,000.	500.	ug/l	100
00850	Toluene	108-88-3	160.	50.	ug/l	10
00852	Ethylbenzene	100-41-4	130.	50.	ug/l	10
03589	Xylene (total)	1330-20-7	270.	50.	ug/l	10

Commonwealth of Pennsylvania Lab Certification No. 36-037

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/24/2004 20:14	Susan McMahon-Luu	10
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/24/2004 20:37	Susan McMahon-Luu	100



Lancaster Laboratories, Inc.
2425 New Holland Pike
PO Box 12425
Lancaster, PA 17605-2425
717.656.2200 Fax: 717.656.2681



Lancaster Laboratories Sample No. WW 4238676

S-183 Grab Water Sample
 Philadelphia Refinery
 SUNOCO: 26th St. - Philadelphia, PA
 Collected: 03/18/2004 12:00 by SM

Account Number: 11183

Submitted: 03/19/2004 15:00
 Reported: 03/29/2004 at 09:46
 Discard: 04/06/2004

Sun: SECOR International, Inc
 Suite 200
 102 Pickering Way
 Exton PA 19341

S-183

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation	Units	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624					
00843	Benzene	71-43-2	14,000.	1,000.	ug/l	200
00850	Toluene	108-88-3	130.	50.	ug/l	10
00852	Ethylbenzene	100-41-4	170.	50.	ug/l	10
03589	Xylene (total)	1330-20-7	650.	50.	ug/l	10

Commonwealth of Pennsylvania Lab Certification No. 36-037

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/24/2004 21:24	Susan McMahon-Luu	200
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/25/2004 10:12	Susan McMahon-Luu	10



Lancaster Laboratories Sample No. WW 4238677

S-184 Grab Water Sample

Philadelphia Refinery

SUNOCO: 26th St. - Philadelphia, PA

Collected: 03/18/2004 11:03 by SM

Account Number: 11183

Submitted: 03/19/2004 15:00

Reported: 03/29/2004 at 09:46

Discard: 04/06/2004

Sun: SECOR International, Inc

Suite 200

102 Pickering Way

Exton PA 19341

S-184

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation	Units	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624					
00843	Benzene	71-43-2	700.	100.	ug/l	20
00850	Toluene	108-88-3	20.	5.	ug/l	1
00852	Ethylbenzene	100-41-4	41.	5.	ug/l	1
03589	Xylene (total)	1330-20-7	98.	5.	ug/l	1

Commonwealth of Pennsylvania Lab Certification No. 36-037

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/24/2004 22:12	Susan McMahon-Luu	20
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/25/2004 09:49	Susan McMahon-Luu	1



Lancaster Laboratories, Inc.
2425 New Holland Pike
PO Box 12425
Lancaster, PA 17605-2425
717-656-2300 Fax: 717-656-2681



Lancaster Laboratories Sample No. WW 4238678

S-185 Grab Water Sample

Philadelphia Refinery

SUNOCO: 26th St. - Philadelphia, PA

Collected: 03/18/2004 10:20 by SM

Account Number: 11183

Submitted: 03/19/2004 15:00

Reported: 03/29/2004 at 09:46

Discard: 04/06/2004

Sun: SECOR International, Inc
Suite 200

102 Pickering Way

Exton PA 19341

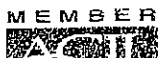
S-185

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation	Units	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624					
00843	Benzene	71-43-2	160.	5.	ug/l	1
00850	Toluene	108-88-3	16.	5.	ug/l	1
00852	Ethylbenzene	100-41-4	40.	5.	ug/l	1
03589	Xylene (total)	1330-20-7	78.	5.	ug/l	1

Commonwealth of Pennsylvania Lab Certification No. 36-037

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/24/2004 18:02	Susan McMahon-Luu	1



Lancaster Laboratories, Inc.
2425 New Holland Pike
PO Box 12425
Lancaster, PA 17605-2425



Lancaster Laboratories Sample No. WW 4238679

S-186 Grab Water Sample

Philadelphia Refinery

SUNOCO: 26th St. - Philadelphia, PA

Collected: 03/18/2004 10:00 by SM

Account Number: 11183

Submitted: 03/19/2004 15:00

Reported: 03/29/2004 at 09:46

Discard: 04/06/2004

Sun: SECOR International, Inc
Suite 200

102 Pickering Way
Exton PA 19341

S-186

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation	Units	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624					
00843	Benzene	71-43-2	89.	5.	ug/l	1
00850	Toluene	108-88-3	8.	5.	ug/l	1
00852	Ethylbenzene	100-41-4	7.	5.	ug/l	1
03589	Xylene (total)	1330-20-7	15.	5.	ug/l	1

Commonwealth of Pennsylvania Lab Certification No. 36-037

Laboratory Chronicle

CAT No.	Analysis Name	Method	Analysis Trial#	Date and Time	Analyst	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/24/2004 18:49	Susan McMahon-Luu	1



Lancaster Laboratories Sample No. WW 4238680

S-187 Grab Water Sample
 Philadelphia Refinery
 SUNOCO: 26th St. - Philadelphia, PA
 Collected: 03/17/2004 14:30 by SM

Account Number: 11183

Submitted: 03/19/2004 15:00
 Reported: 03/29/2004 at 09:46
 Discard: 04/06/2004

Sun: SECOR International, Inc
 Suite 200
 102 Pickering Way
 Exton PA 19341

S-187

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation	Units	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624					
00843	Benzene	71-43-2	450.	50.	ug/l	10
00850	Toluene	108-88-3	37.	5.	ug/l	1
00852	Ethylbenzene	100-41-4	46.	5.	ug/l	1
03589	Xylene (total)	1330-20-7	100.	5.	ug/l	1

Commonwealth of Pennsylvania Lab Certification No. 36-037

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/24/2004 19:35	Susan McMahon-Luu	1
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/24/2004 19:59	Susan McMahon-Luu	10



Lancaster Laboratories Sample No. WW 4238681

S-188 Grab Water Sample
 Philadelphia Refinery
 SUNOCO: 26th St. - Philadelphia, PA
 Collected: 03/17/2004 13:35 by SM

Account Number: 11183

Submitted: 03/19/2004 15:00
 Reported: 03/29/2004 at 09:47
 Discard: 04/06/2004

Sun: SECOR International, Inc
 Suite 200
 102 Pickering Way
 Exton PA 19341

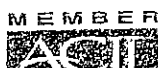
S-188

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation	Units	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624					
00843	Benzene	71-43-2	990.	100.	ug/l	20
00850	Toluene	108-88-3	15.	10.	ug/l	2
00852	Ethylbenzene	100-41-4	320.	10.	ug/l	2
03589	Xylene (total)	1330-20-7	660.	10.	ug/l	2

Commonwealth of Pennsylvania Lab Certification No. 36-037

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/24/2004 20:22	Susan McMahon-Luu	2
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/24/2004 20:46	Susan McMahon-Luu	20



Lancaster Laboratories, Inc.
 2425 New Holland Pike
 PO Box 12425
 Lancaster, PA 17605-2425
 717.656.3200 Fax: 717.656.2681



Lancaster Laboratories Sample No. WW 4238682

S-189 Grab Water Sample

Philadelphia Refinery

SUNOCO: 26th St. - Philadelphia, PA

Collected: 03/18/2004 09:20 by SM

Account Number: 11183

Submitted: 03/19/2004 15:00

Reported: 03/29/2004 at 09:47

Discard: 04/06/2004

Sun: SECOR International, Inc
Suite 200

102 Pickering Way

Exton PA 19341

S-189

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation	Units	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624					
00843	Benzene	71-43-2	3,400.	500.	ug/l	100
00850	Toluene	108-88-3	25.	13.	ug/l	2.5
00852	Ethylbenzene	100-41-4	180.	13.	ug/l	2.5
03589	Xylene (total)	1330-20-7	490.	13.	ug/l	2.5

Commonwealth of Pennsylvania Lab Certification No. 36-037

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/24/2004 21:33	Susan McMahon-Luu	100
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/25/2004 10:06	Susan McMahon-Luu	2.5

Lancaster Laboratories, Inc.
2425 New Holland Pike
PO Box 12425
Lancaster, PA 17605-2425
717.656.2600 Fax: 717.656.2601



Lancaster Laboratories Sample No. WW 4238683

S-192 Grab Water Sample
 Philadelphia Refinery
 SUNOCO: 26th St. - Philadelphia, PA
 Collected: 03/18/2004 09:55 by SM

Account Number: 11183

Submitted: 03/19/2004 15:00
 Reported: 03/29/2004 at 09:47
 Discard: 04/06/2004

Sun: SECOR International, Inc
 Suite 200
 102 Pickering Way
 Exton PA 19341

S-192

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation	Units	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624					
00843	Benzene	71-43-2	990.	100.	ug/l	20
00850	Toluene	108-88-3	28.	10.	ug/l	2
00852	Ethylbenzene	100-41-4	1,200.	100.	ug/l	20
03589	Xylene (total)	1330-20-7	2,700.	100.	ug/l	20

Commonwealth of Pennsylvania Lab Certification No. 36-037

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/24/2004 21:56	Susan McMahon-Luu	20
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/25/2004 08:54	Susan McMahon-Luu	2



Lancaster Laboratories, Inc.
 2425 New Holland Pike
 PO Box 12425
 Lancaster, PA 17605-2425
 717-656-2300 Fax: 717-656-2681



Lancaster Laboratories Sample No. WW 4238684

S-193 Grab Water Sample
 Philadelphia Refinery
 SUNOCO: 26th St. - Philadelphia, PA
 Collected: 03/17/2004 14:25 by SM

Account Number: 11183

Submitted: 03/19/2004 15:00
 Reported: 03/29/2004 at 09:47
 Discard: 04/06/2004

Sun: SECOR International, Inc
 Suite 200
 102 Pickering Way
 Exton PA 19341

S-193

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation	Units	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624					
00843	Benzene	71-43-2	170.	5.	ug/l	1
00850	Toluene	108-88-3	< 5.	5.	ug/l	1
00852	Ethylbenzene	100-41-4	51.	5.	ug/l	1
03589	Xylene (total)	1330-20-7	68.	5.	ug/l	1

Commonwealth of Pennsylvania Lab Certification No. 36-037

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/24/2004 22:43	Susan McMahon-Luu	1



Lancaster Laboratories Sample No. WW 4238685

S-194 Grab Water Sample
 Philadelphia Refinery
 SUNOCO: 26th St. - Philadelphia, PA
 Collected: 03/17/2004 14:20 by SM

Account Number: 11183

Submitted: 03/19/2004 15:00
 Reported: 03/29/2004 at 09:47
 Discard: 04/06/2004

Sun: SECOR International, Inc
 Suite 200
 102 Pickering Way
 Exton PA 19341

S-194

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation	Units	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624					
00843	Benzene	71-43-2	7.	5.	ug/l	1
00850	Toluene	108-88-3	< 5.	5.	ug/l	1
00852	Ethylbenzene	100-41-4	33.	5.	ug/l	1
03589	Xylene (total)	1330-20-7	120.	5.	ug/l	1

Commonwealth of Pennsylvania Lab Certification No. 36-037

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/24/2004 23:30	Susan McMahon-Luu	1



Lancaster Laboratories, Inc.
 2425 New Holland Pike
 PO Box 12425
 Lancaster, PA 17605-2425
 717.666.3300 Fax 717.666.3084



Lancaster Laboratories Sample No. WW 4238686

S-195 Grab Water Sample

Philadelphia Refinery

SUNOCO: 26th St. - Philadelphia, PA

Collected: 03/17/2004 11:50 by SM

Account Number: 11183

Submitted: 03/19/2004 15:00

Reported: 03/29/2004 at 09:47

Discard: 04/06/2004

Sun: SECOR International, Inc
Suite 200
102 Pickering Way
Exton PA 19341

S-195

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation	Units	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624					
00843	Benzene	71-43-2	< 5.	5.	ug/l	1
00850	Toluene	108-88-3	< 5.	5.	ug/l	1
00852	Ethylbenzene	100-41-4	< 5.	5.	ug/l	1
03589	Xylene (total)	1330-20-7	< 5.	5.	ug/l	1

Commonwealth of Pennsylvania Lab Certification No. 36-037

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/24/2004 23:54	Susan McMahon-Luu	1



Lancaster Laboratories, Inc.
2425 New Holland Pike
PO Box 12425
Lancaster, PA 17605-2425
717.655.3300 Fax: 717.655.3691



Lancaster Laboratories Sample No. WW 4238687

S-196 Grab Water Sample

Philadelphia Refinery

SUNOCO: 26th St. - Philadelphia, PA

Collected: 03/18/2004 12:30 by SM

Account Number: 11183

Submitted: 03/19/2004 15:00

Reported: 03/29/2004 at 09:47

Discard: 04/06/2004

Sun: SECOR International, Inc
Suite 200
102 Pickering Way
Exton PA 19341

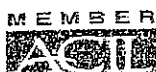
S-196

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation	Units	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624					
00843	Benzene	71-43-2	< 5.	5.	ug/l	1
00850	Toluene	108-88-3	< 5.	5.	ug/l	1
00852	Ethylbenzene	100-41-4	< 5.	5.	ug/l	1
03589	Xylene (total)	1330-20-7	< 5.	5.	ug/l	1

Commonwealth of Pennsylvania Lab Certification No. 36-037

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/25/2004 00:17	Susan McMahon-Luu	1



Lancaster Laboratories, Inc.
2425 New Holland Pike
PO Box 12425
Lancaster, PA 17605-2425
717-656-2300 Fax: 717-656-2681



Lancaster Laboratories Sample No. WW 4238688

S-197 Grab Water Sample
 Philadelphia Refinery
 SUNOCO: 26th St. - Philadelphia, PA
 Collected: 03/18/2004 11:30 by SM

Account Number: 11183

Submitted: 03/19/2004 15:00
 Reported: 03/29/2004 at 09:47
 Discard: 04/06/2004

Sun: SECOR International, Inc
 Suite 200
 102 Pickering Way
 Exton PA 19341

S-197

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation	Units	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624					
00843	Benzene	71-43-2	< 5.	5.	ug/l	1
00850	Toluene	108-88-3	< 5.	5.	ug/l	1
00852	Ethylbenzene	100-41-4	< 5.	5.	ug/l	1
03589	Xylene (total)	1330-20-7	< 5.	5.	ug/l	1

Commonwealth of Pennsylvania Lab Certification No. 36-037

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/25/2004 00:40	Susan McMahon-Luu	1



Lancaster Laboratories, Inc.
 2425 New Holland Pike
 PO Box 12425
 Lancaster, PA 17605-2425
 717-656-2300 Fax: 717-656-2681



Lancaster Laboratories Sample No. WW 4238689

Trip Blank Water Sample
 Philadelphia Refinery
 SUNOCO: 26th St. - Philadelphia, PA
 Collected: n.a.

Account Number: 11183

Submitted: 03/19/2004 15:00
 Reported: 03/29/2004 at 09:47
 Discard: 04/06/2004

Sun: SECOR International, Inc
 Suite 200
 102 Pickering Way
 Exton PA 19341

S--TB

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation	Units	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624					
00843	Benzene	71-43-2	< 5.	5.	ug/l	1
00850	Toluene	108-88-3	< 5.	5.	ug/l	1
00852	Ethylbenzene	100-41-4	< 5.	5.	ug/l	1
03589	Xylene (total)	1330-20-7	< 5.	5.	ug/l	1

Commonwealth of Pennsylvania Lab Certification No. 36-037

Laboratory Chronicle

CAT No.	Analysis Name	Method	Analysis Trial#	Date and Time	Analyst	Dilution Factor
01131	BTEX, MTBE, TBA by EPA 624	EPA 624	1	03/25/2004 01:04	Susan McMahon-Luu	1



Lancaster Laboratories, Inc.
 2425 New Holland Pike
 PO Box 12425
 Lancaster, PA 17605-2425
 717-656-2300 Fax: 717-656-2681

Analysis Request / Environmental Services Chain of Custody



For Lancaster Laboratories use only
 Acct. # 11183 Group# 889036 Sample # 4238669-89 **COC #** 0049987

1 OF 3

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

1 Client: <u>SUNOCO</u> Acct. #: _____ Project Name#: <u>26th ST.</u> PWSID #: _____ Project Manager: <u>STEVE RAGGETT</u> P.O. #: _____ Sampler: <u>S. MORESCALCHI</u> Quote #: _____ Name of state where samples were collected: <u>PA</u>			Matrix Total # of Containers: <u>3</u> <input type="checkbox"/> Plastic Checkers <input type="checkbox"/> NEDES Containers <input type="checkbox"/> Water <input type="checkbox"/> Other		5 Analyses Requested (Diagonal lines indicating no analyses requested)										For Lab Use Only FSC: _____ SCR #: <u>1188198</u>									
2 Sample Identification			3 Composite		4 Matrix		6 Sunoco Philadelphia Refinery per Steve 3/22/04 Remarks: time 3:00 TJB 3/19/04										Temperature of samples upon receipt (if requested)							
Date Collected Time Collected			Grab Composite		Matrix		Total # of Containers										Remarks		Temperature of samples upon receipt (if requested)					
S-84			03-18-04 1245		✓		✓		3		✓										time 3:00 TJB 3/19/04			
S-98			03-17-04 1245		✓		✓		1		✓													
S-125			03-17-04 1348		✓		✓		1		✓													
S-179			03-18-04 1350		✓		✓		1		✓													
S-180			03-18-04 1308		✓		✓		1		✓													
S-181			03-18-04 0935		✓		✓		1		✓													
S-182			03-17-04 1442		✓		✓		1		✓													
S-183			03-18-04 1200		✓		✓		1		✓													
S-184			03-18-04 1103		✓		✓		1		✓													
S-185			03-18-04 1020		✓		✓		1		✓													

7 Turnaround Time Requested (TAT) (please circle): <u>Normal</u> 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: <u>[Signature]</u> Date: <u>3/15/04</u> Time: <u>17:15</u> Received by: <u>[Signature]</u> Date: <u>3/16/04</u> Time: <u>09:20</u>			
8 Data Package Options (please circle if required) QC Summary Type VI (Raw Data) SDG Complete? Yes No Type I (Tier I) GLP Site-specific QC required? Yes No Type II (Tier II) Other (If yes, indicate QC sample and submit triplicate volume.) Type III (NJ Red. Del.) Internal Chain of Custody required? Yes No Type IV (CLP)				Relinquished by: <u>[Signature]</u> Date: <u>03-18-04</u> Time: <u>17:45</u> Received by: <u>[Signature]</u> Date: <u>3/19/04</u> Time: <u>15:00</u>			
Relinquished by: <u>[Signature]</u> Date: <u>3/18/04</u> Time: <u>17:15</u> Received by: <u>[Signature]</u> Date: <u>3/19/04</u> Time: <u>15:00</u>				Relinquished by: <u>[Signature]</u> Date: <u>3/18/04</u> Time: <u>17:15</u> Received by: <u>[Signature]</u> Date: <u>3/19/04</u> Time: <u>15:00</u>			

Analysis Request / Environmental Services Chain of Custody



For Lancaster Laboratories use only
 Acct. # 11183 Group# 889036 Sample # 4238669-89

COC # 0049988

2 of 3

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

1 Client: <u>SUNOCO</u> Acct. #: _____ Project Name#: <u>26th ST.</u> PWSID #: _____ Project Manager: <u>STEVE BAGGETT</u> P.O.#: _____ Sampler: <u>S. MORESCALCHI</u> Quote #: _____ Name of state where samples were collected: <u>PA</u>			4 Matrix <input type="checkbox"/> Potable Check <input type="checkbox"/> NPDES Applicable <input type="checkbox"/> Other		5 Analyses Requested <u>BTEX/624</u>										6 For Lab Use Only FSC: _____ SCR #: <u>1188198</u> Sunoco Philadelphia Refinery per Steve 3/22/04 Temperature of samples upon receipt (if requested): _____					
Sample Identification	Date Collected	Time Collected	Grab	Composite	Soil	Water	Other	Total # of Containers	Remarks											
S-186	03-18-04	1000	✓			✓		3	temp 3.0											
S-187	03-17-04	1430	✓			✓			TJB 3/19/04											
S-188	03-17-04	1335	✓			✓														
S-189	03-18-04	0920	✓			✓														
S-192	03-18-04	0955	✓			✓														
S-193	03-17-04	1425	✓			✓														
S-194	03-17-04	1420	✓			✓														
S-195	03-17-04	1150	✓			✓														
S-196	03-18-04	1230	✓			✓														
S-197	03-18-04	1130	✓			✓														

7 Turnaround Time Requested (TAT) (please circle): <u>Normal</u> 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: <u>[Signature]</u> Date <u>3/18/04</u> Time <u>1715</u> Relinquished by: <u>[Signature]</u> Date <u>3/18/04</u> Time <u>1715</u> Relinquished by: <u>[Signature]</u> Date <u>3/19-04</u> Time <u>1345</u> Relinquished by: <u>[Signature]</u> Date <u>3/19/04</u> Time <u>1500</u>				Received by: <u>[Signature]</u> Date <u>3/18/04</u> Time <u>0730</u> Received by: <u>[Signature]</u> Date <u>03-16-04</u> Time <u>0925</u> Received by: <u>[Signature]</u> Date <u>3/19/04</u> Time <u>1342</u> Received by: <u>[Signature]</u> Date <u>3/19/04</u> Time <u>1500</u>			
--	--	--	--	--	--	--	--	---	--	--	--

8 Data Package Options (please circle if required) QC Summary Type VI (Raw Data) SDG Complete? Yes No Type I (Tier I) GLP Site-specific QC required? Yes No Type II (Tier II) Other (If yes, Indicate QC sample and submit triplicate volume.) Type III (NJ Red. Del.) Internal Chain of Custody required? Yes No Type IV (CLP)			
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Analysis Request / Environmental Services Chain of Custody



For Lancaster Laboratories use only

Acct. # 11188

Group# 889036

Sample # 4738669-89

COC # 0049989

3 of 3

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

1 Client: <u>SUNOCO</u> Acct. #: _____ Project Name/ #: <u>26th ST.</u> PWSID #: _____ Project Manager: <u>STEVE RABBITT</u> P.O. #: _____ Sampler: <u>S. HINESCALCHZ</u> Quote #: _____ Name of state where samples were collected: <u>PA</u>		3 Grab Composite <input checked="" type="checkbox"/> Grab <input type="checkbox"/> Composite		4 Matrix <input type="checkbox"/> Potable <input checked="" type="checkbox"/> Check <input type="checkbox"/> NPDES Applicable <input type="checkbox"/> Water <input type="checkbox"/> Other		5 Analytes Requested <u>BTEX/624</u>		For Lab Use Only FSC: _____ SCR #: <u>1188198</u>		6 Temperature of samples upon receipt (if requested)
2 Sample Identification <u>TRIP BLANK</u>		Date Collected: <u>08</u> Time Collected: _____		Total # of Containers: <u>2</u>		Remarks <u>Time 3:00</u> <u>TIB 3/19/04</u>				
7 Turnaround Time Requested (TAT) (please circle): <u>Normal</u> 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: <u>[Signature]</u> Date: <u>3/15/04</u> Time: <u>17:15</u>		Received by: <u>[Signature]</u> Date: <u>3/16/04</u> Time: <u>07:00</u>		9				
8 Data Package Options (please circle if required) QC Summary Type VI (Raw Data) SDG Complete? Yes No Type I (Tier I) GLP Site-specific QC required? Yes No Type II (Tier II) Other (If yes, indicate QC sample and submit triplicate volume.) Type III (NJ Red. Del.) Internal Chain of Custody required? Yes No Type IV (CLP)		Relinquished by: <u>[Signature]</u> Date: <u>03-19-04</u> Time: <u>13:45</u>		Received by: <u>[Signature]</u> Date: <u>3/19/04</u> Time: <u>13:45</u>						
		Relinquished by: <u>[Signature]</u> Date: <u>3/19/04</u> Time: <u>15:00</u>		Received by: <u>[Signature]</u> Date: <u>3/19/04</u> Time: <u>15:00</u>						
		Relinquished by: <u>[Signature]</u> Date: _____ Time: _____		Received by: <u>[Signature]</u> Date: <u>3/19/04</u> Time: <u>15:00</u>						