REMEDIAL ACTION PLAN
AOI 1

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

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1.0 INTRODUCTION AND BACKGROUND

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

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

This Remedial Action Plan (RAP) was prepared by Sunoco to provide information relating to proposed or ongoing remedial actions in AOI 1 based on the findings and recommendations of the AOI 1 SCR and comments received by PADEP with respect to this report.

1.1 Site History and Background

The Sunoco Philadelphia Refinery is located on approximately 672 acres in southwest Philadelphia. The Facility has a long history of petroleum transportation, storage, and processing. The oldest portion of the Facility started petroleum related activities in the 1860's, when Atlantic Refining Company established an oil distribution center. In the 1900's, crude oil processing began and full-scale gasoline production was initiated during World War II. In addition to refining crude oil, various chemicals, such as acids and ammonia, were also produced at the site for a time. Current operations at the refinery are limited to the production of fuels and basic petrochemicals for the chemical industry. The Point Breeze Processing Area portion of the Facility has been operating under a Consent Order and Agreement since 1993. The 2003 CO&A replaced the 1993

CO&A and includes the Girard Point Processing Area, the West Yard, and the Schuylkill River Tank Farm.

AOI 1 comprises the northeast portion of the Point Breeze Process Area South Yard and includes the Belmont Terminal. Results of a RCRA Facility Investigation (RFI) for the Point Breeze Process Area are summarized in a report by ENSR Consulting and Engineering (ENSR) dated September 1992. The primary purpose of the RFI was to examine potential contaminant releases to surrounding soils/sediments, surface water, and groundwater within three areas of the Point Breeze Processing Area. The investigation included the completion of soil borings and monitoring wells; sampling of groundwater and surface water sediments; sampling of waste materials, sampling of subsurface soils; geophysical surveys; bathymetric surveys, tidal surveys, and monthly water level monitoring.

In addition the AOI 1 SCR, historical investigations and data gathering have been performed in AOI 1 and at areas which posed the highest potential for off-site migration and discharge to sensitive receptors. These reports and historical remediation activities were completed pursuant to the 1993 and 2003 Consent Order and Agreements between PADEP and Sunoco. These areas include the Belmont Terminal, the northeast border of AOI 1 (along 26th Street), and the 26th Street Sewer. Reports which document these activities include:

- Secor International Inc. (Secor), *26th Street Border, Point Breeze Processing Area, Philadelphia Refinery, Philadelphia, Pennsylvania, Remedial Investigation (RI) Report*, dated January 31, 2003. This report documented investigation work completed by Secor and Sunoco along the eastern boundary of AOI 1 to characterize the occurrence of LNAPL in this area and to develop a remedial approach for the recovery of LNAPL along 26th Street. The information from this report also supported US EPA's environmental indicator determination;
- Secor, *26th Street Border Progress Report*, dated January 1, 2003 through March 31, 2004. This report presented the progress of the implementation of recommendations presented in the RI Report during the period of January 2003 through March 2004. The report also provides 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;

- Sunoco, Inc. (R&M), *Current Conditions Report and Comprehensive Remedial Plan*, dated June 30, 2004. This report was prepared in accordance with the 2003 CO&A between PADEP and Sunoco and the Phase I Remedial Plan (attachment to CO&A) and developed a remedial approach to assessing internal and boundary environmental conditions at the refinery using all available historical data. The report presents a risk-based prioritization for characterization of the 11 AOIs for refinery, and includes a schedule for completing the characterization of each AOI. AOI 1 was the first AOI to be characterized in the schedule; and
- Quarterly reports prepared by Secor for the refinery. These reports are prepared on a quarterly basis and include status information on the remediation projects throughout the Philadelphia refinery and other related areas. In support of these status reports, Sunoco completes semi-annual gauging of all refinery monitoring points and annual sampling of select refinery perimeter wells.

2.0 REMEDIAL ACTION PLAN

The 2003 CO&A between PADEP and Sunoco identified corrective action goals to be undertaken by Sunoco at the Philadelphia Refinery and Belmont Terminal. These are:

- Attainment of an Act 2 standard at the boundaries of the Philadelphia Refinery and Belmont Terminal ("boundary issues");
- Protection of human health within the boundaries of the Philadelphia Refinery and Belmont Terminal ("internal issues"); and
- Assessment of potential for chemical degradation of groundwater under the Facility from past or present operations caused by geochemical processes that originate with the presence of petroleum chemicals in the soil and groundwater.

Boundary issues were listed as:

- Offsite NAPL on groundwater from past or current operations;
- Offsite dissolved-phase groundwater contamination from past or current operations;
- Current and future releases or seeps of contaminants into surface waters and the City of Philadelphia combined sewer system; and

- Soil contamination at levels which may result in future boundary issues due to surface runoff, migration of NAPL, or the leaching of chemicals from contaminated soil into groundwater.

Internal issues were listed as:

- Soil contamination which poses an unreasonable threat to human health;
- NAPL on groundwater where NAPL recovery is practicable or where NAPL recovery or containment is necessary to prevent offsite contamination; and
- Groundwater contamination or subsurface NAPL which poses an unreasonable threat to human health.

The Phase II section of the CO&A requires that, within 90 days of completion of an AOI characterization, Sunoco issues a report (Site Characterization Report) to the PADEP which proposes: a) no further action, b) further characterization and assessment, or c) other remediation projects that may include enhancements to existing recovery systems based on the results of the site characterization work and consistent with the overall goals of the CO&A.

Based on the findings of the site characterization activities completed in AOI 1 and the Belmont Terminal as described in the AOI 1 SCR, the following conclusions and recommendations required further action:

- Groundwater and LNAPL in the majority of the AOI is effectively addressed by the ongoing remedial activities. Potential offsite impacts/exposure pathways have been identified in the southeastern portion of AOI 1 (S-43 and S-50) and the northwestern portion of the Belmont Terminal. Additional remedial activities are proposed in the vicinity of S-43 and S-50 that will address potential off site migration. Subsequent to remedial feasibility testing, a remedy will be proposed in August 2005 for control of potential off-site migration of dissolved phase COCs from the southeastern portion of AOI 1; and
- A remediation plan will be developed to address the LNAPL plume in the northwest portion of the Belmont Terminal.

Sunoco and its representatives met with PADEP on August 30, 2007 to discuss the findings of the AOI 1 SCR. Following this meeting, Sunoco issued to the letter to PADEP that in included a list of action activities to be undertaken by Sunoco as a result of the meeting and discussions. The specific action items which pertain to this RAP include:

- Details on the remedial activities recommended from the Site Characterization Report including activities already initiated;
- The oxygen diffusion pilot study findings along 26th Street;
- The quarterly report summary letter will be used to provide descriptions of what systems/plans have been implemented in response to the site characterization reports' recommendations; and
- The quarterly summary letter will be used to describe a plan for measuring performance for a particular system each quarter. Subsequent quarterly reports will include this measure in addition to operational status and recovery rates.

The following sections of this RAP provide detailed information relating to these action items as well as other ongoing activities.

2.1 Frontage Road System Installation at Belmont Terminal

2.1.1 System Description

The Belmont Terminal Groundwater and Light Non-aqueous Phase Liquid (LNAPL) Recovery System is comprised of a network of 13 recovery wells and 24 monitoring wells (Figure 3). The recovery wells are located along three areas where LNAPL has the potential to migrate to the Shunk Street sewer, along 26th Street and/or along Frontage Road. The system was expanded on July 10, 2006 to include total fluids recovery from a newer system known as the Frontage Road System, which includes recovery wells RW-15 and RW-26 through RW-32 (Figure 3). Historic recovery wells RW-21 through RW-25 continue to operate as a dual pumping system, with each well containing separate pumps controlled by density floats and conductivity probes to pump ground water and LNAPL. Recovered LNAPL is pumped directly to a holding tank. The contents of the holding tank are pumped out, as necessary, and used as feed stock by the refinery. Recovered groundwater is pumped to an oil water separator which discharges water to the Point Breeze Area Wastewater Treatment Plant. The

Frontage Road System wells (RW-15 and RW-26 through RW-32) discharge recovered total fluids to the existing oil water separator.

2.1.2 Operational Status

As a result of elevated benzene, toluene, ethylbenzene and xylene (BTEX) levels detected in the effluent from the oil water separator which exceed the permit limit for city of Philadelphia sewer system, different options for water discharge were evaluated during the spring of 2007. Sunoco received a response from AMS on May 25, 2007 requiring substantial additional calculations and a major permit review process if an air stripper was added. Therefore, the option to change the discharge point was exercised instead of using an air stripper. The discharge pipe was tied into to the existing 26th Street System discharge line running to a Benzene National Emissions Standards for Hazardous Air Pollutants (NESHAP) sewer which in turn discharges to Sunoco's wastewater treatment plant. This allowed for the Frontage Road wells to be re-started in September 2007.

The new discharge line connecting the oil water separator to the Benzene NESHAP controlled sewer has not yet been winterized. Weather pending and if necessary, the Frontage Road System will be shut down for the winter to prevent the lines from freezing and recovered groundwater from the original pumping system (RW-21, RW-22, RW-23, RW-24, and RW-25) will be discharged to the Philadelphia Sewer System. Monthly discharge samples will be collected and monitored while groundwater is being discharged to the Philadelphia Sewer System to confirm the effluent data remains below the Philadelphia Water Department discharge limits.

2.2 26th Street System Expansion and Performance Monitoring

The following sections discuss the proposed expansion of the existing 26th Street total fluids recovery system and planned system performance monitoring.

2.2.1 Remediation System Background

In a letter dated September 26, 2002, PADEP requested a report of actions taken to investigate and prevent off-site migration of LNAPL along the 26th Street border of the refinery. In response to the letter, Sunoco contracted Secor

to complete a remedial investigation and prepare a report of findings with recommendations for further action. Secor's 2003 26th Street Border RI Report documented investigation work completed by Secor and Sunoco along the eastern boundary of AOI 1 to characterize the occurrence of LNAPL in this area and to develop a remedial approach for the recovery of LNAPL along and across 26th Street. Activities completed during this investigation included:

- Installation of 12 monitoring wells;
- Liquid level gauging;
- Aquifer characterization, including performance of an aquifer pumping test and seven slug tests;
- Redevelopment and short-duration capacity testing of 400 series recovery wells;
- Performance of four LNAPL bail-down tests; and
- Collection and laboratory analysis of LNAPL samples for product characterization.

The RI Report recommended further testing of recovery wells and characterization of LNAPL along the northeast border of the refinery in AOI 1. The report also suggested that a horizontal utility be installed beneath 26th Street to accommodate total fluids recovery from wells located off-site.

Secor's 26th Street Progress Report, spanning January 1, 2003 through March 31, 2004, presented the status of the activities that were recommended in the RI Report and implemented during the reporting period. The progress report documented the following activities:

- Installation of 19 wells. Five 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 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).

2.2.2 Operational Status

The current 26th Street Sewer Area Total Fluids Recovery System is comprised of a network of 19 recovery wells along the northeastern border of the refinery, including six off-site extraction wells described below. The system was installed for hydraulic control to prevent LNAPL migration offsite east of 26th Street. Recovery wells RW-400, S-180, S-181, S-182, S-183, S-184, S-185, S-186, S-187, S-188, S-189, S-190, S-191 and S-192 are within the refinery confines and recovery wells S-194, S-195, S-261, S-262 and S-263 are located on the CSX property across 26th Street. All wells are equipped with pneumatic total fluids pumps. The pumps feature a liquid level control inside each pump that will discharge independently in accordance with the rate of recharge into the well. Total fluids produced by each well discharge to a Benzene NESHAP controlled sewer which is routed to the refinery's Point Breeze Area Wastewater Treatment Plant. Currently, 14 recovery wells located within the refinery boundaries and five recovery wells on the CSX property are operational. The weekly system performance data is reported in the refinery's quarterly status reports.

2.2.3 Remediation System Performance Monitoring

During the August 30, 2007 meeting, Sunoco and PADEP agreed that there were better hydrogeological matrix for performance monitoring along 26th Street. Sunoco has begun activities to further investigate an optimum matrix. For example, total fluid pumps are currently pumping from recovery wells S-180 through S-192 along 26th Street along the refinery perimeter. A multi-well pumping test in the vicinity of these recovery wells was completed to determine if hydraulic control can be demonstrated by operation of the current system.

In November, the 26th Street Total Fluids Recovery System was turned off for approximately one week allowing groundwater to return to static conditions. Transducers were installed in recovery wells S-183, S-185, S-187, S-189, and S-191 prior to turning off the system. Transducers in these wells were used to monitor recovery of the water levels following the pumping activities. Upon reactivation of pumping from recovery wells S-181, S-182, S-184, S-186, S-188, S-190, and S-192, the transducers were used to evaluate the influence of pumping. These recovery wells with the transducers are located on 50 feet centers between each of the pumping wells. Transducers were installed in S-83 and S-94 potentially effecting only one pumping well and S-179 which is located away for the pumping wells in order to monitor normal water levels fluctuations during the monitoring period. The pumping continued for approximately one week. Since the system is not currently configured to record the flow rate from each well the combined totalizer readings for these wells were recorded prior to pumping, daily during pumping (as practical), and at the completion of pumping. The depth to water and product was manually recorded before and after the completion of pumping in order to determine if there are any changes in the apparent product thickness.

If the results of the test indicate that the recovery wells have minimal to no effect on the monitoring wells located 50 feet away from the pumping, additional monitoring wells may be installed at closer well spacing intervals and an additional pump test may be conducted using the new observation wells. Data from the pump test and subsequent recommendations will be provided in the next quarterly report.

2.3 S-43 and S-50 Area

2.3.1 Area Description

LNAPL has been detected in well S-50, located along the eastern border of the refinery in AOI 1, since 2002. This LNAPL occurrence was further evaluated in 2003 and 2004 as part of Secor's remedial investigation work.

The result of the groundwater sampling completed in April 2005 in support of the AOI 1 SCR indicated that LNAPL was observed in well S-50 and that wells in the vicinity of S-50 and S-43 exhibited elevated concentrations of benzene (see Figure 9 of the AOI 1 Site Characterization Report). The highest concentrations of benzene were detected in groundwater at S-226 and S-127 which are proximal to Tank 121. The report concluded that, based on these findings, potential offsite impacts/exposure pathways exist at the S-43 and S-50 well areas.

As follow up to the conclusions in the AOI 1 SCR, Sunoco installed additional monitoring wells in the vicinity of S-50 and S-43 to further investigate groundwater and LNAPL conditions in these areas (Figure 4). To investigation the elevated benzene concentrations in groundwater in the vicinity of Tank 121, Sunoco completed a targeted investigation around Tank 121 to evaluate whether Tank 121 was a potential source of benzene. This included the installation of four borings in the area where higher levels of benzene have been previously detected as well as installation of a deeper well adjacent to S-42D, which was discussed at the August 2007 meeting with PADEP as possibly not being screened in the correct interval. This work was conducted in December 2007, and the results will be reported in subsequent quarterly status reports. Sunoco also initiated a pilot study using oxygen diffusion (iSOC) technology in the vicinity of wells S-43 and S-50. This pilot study was completed by Aquaterra. The Tank 121 investigation and the iSOC pilot study are discussed in further detail in the following sections.

2.3.2 Tank 121 Investigation

In October 2007, Sunoco inspected the run down line to Tank No. 121 to further investigate the source area of elevated benzene previously detected in nearby groundwater monitoring wells (S-226 & S-127). The run down line was

inspected by Sunoco refinery personnel for possible leaks at and below ground surface by excavating and uncovering the line. The investigation activities determined that the line was not leaking, although an insulated flange was reported to be emitting vapors. A gasket flange was installed to eliminate the vapors.

2.3.3 iSOC Pilot Study Near S-50 and S-43

The iSOC™ gas delivery system is a method of infusing supersaturated levels of dissolved oxygen into groundwater without sparging. The system uses a micro porous hollow fiber that provides a large surface area for mass transfer. This technique relies on groundwater flow for dispersion.

On behalf of Sunoco, a groundwater oxygen diffusion test to evaluate the effectiveness of oxygen diffusion as a barrier to dissolved hydrocarbon migration in AOI 1 along the 26th Street Boundary was performed from January 2006 through October 2007 by Aquaterra Technologies, Inc. (Aquaterra). Specifically, the areas that were tested are referred to as S-50 and S-43 Test Areas (Figure 4). The following monitoring wells in the S-43 Test Zone were monitored: S-43, S-44, S-227, and S-228 (injection well).

In July 2007, six additional monitoring wells were installed in the S-43 test zone. These wells are numbered S-255 through S-260. Two iSOC gas delivery systems were deployed in wells S-255 and S-256, respectively. Baseline laboratory and field tests were run on all wells in the S-43 Test zone following one month of system operation.

The S-50 test zone includes the following wells: S-210 (injection well), S-226, S-230, and S-231.

Well S-50 was not monitored in this study due to the presence of separate phase product. Additionally, the injection well was changed to S-232 from S-210 as stated in the work plan.

Please see attached Appendix A for the activities, methodologies and system deployment details for the oxygen injection test.

Data Analysis

The data produced by this test was analyzed to estimate aquifer performance characteristics, such as dissolved oxygen dispersion and radius of influence of each oxygen dispersion well. Similarly the increase in hydrocarbon degrading bacteria, and any change in dissolved volatile organic compounds (VOCs) were reviewed as indications of the effectiveness of the oxygen deployment test.

Report of Findings

S-43 Test Area

Table 1 lists the field parameters and laboratory analysis for the S-43 test area. The data indicates a good increase in the Heterotrophic plate count, BOD, and dissolved oxygen in all wells proximal to the injection point. BTEX and MTBE levels changed erratically however, with some wells showing an increase in concentration and other wells a decline. Typically, wells closer to the injection point showed a favorable decrease in BTEX and MTBE concentrations, although other wells including the former injection well (S-228), S-43, and S-259 showed a marked increase in BTEX and MTBE concentrations.

CO_2 and ORP parameters did not indicate any specific trends throughout the study. Based on the results of this field test, it is estimated that a radius of influence of 30 feet would be required for each injection point.

S-50 Test Area

As noted above, this test zone was modified from the original work plan due to the presence of NAPL in the intended injection well, S-50. S-210 was chosen as the injection well. Unfortunately it was not possible to have any down gradient monitoring points for this injection point due to the physical boundaries of 26th Street and the 26th Street Biofilter. Table 2 lists the field parameters and laboratory analysis for the S-50 test area.

The S-50 test area showed no positive results and the S-43 test area showed little change from the iSOC injection. This may be due to the lack of downgradient monitoring wells, however the cross gradient monitoring wells showed no effects from the oxygen injection either. Therefore, the iSOC test has been suspended at this time. As an alternative, Sunoco is considering expanding the total fluids recovery system along the south side of AOI 1 (south

of the existing 26th Street system) to hydraulically prevent the flow of groundwater off-site at this area. Aquifer pumping tests will be completed by Secor in support of the proposed system expansion; the results of the testing and future design will be reported in the quarterly reports for the refinery.

2.4 Odor Control Systems

The AOI 1 SCR concluded that potential off site vapor migration is effectively addressed through the ongoing operation of the Packer Avenue and 26th Street Sewer Ventilation System and Biofilter and the Shunk Street Sewer Ventilation System and Biofilter. A description of each system and its operational status are described below.

Packer Avenue and 26th Street Sewer Ventilation System and Biofilter

Hydrocarbon vapors are recovered from the Packer Avenue and 26th Street Sewers at manholes located along 26th Street. The vapors are extracted using two blowers. A third blower is used as a spare, however, currently the motor needs to be replaced on the third blower. The vapor odor and hydrocarbons collected in the sewer air stream is directed into four parallel treatment cells of the biofilter. Prior to entering the treatment cells, the air streams from each blower are combined into a single stream, which is then humidified through the use of steam. After passing through the biofilter media, the treated air is discharged to the atmosphere. The system operation is checked once per week and includes the collection of influent and effluent vapor concentrations utilizing a photoionization detector (PID). The pH of the biofilter leachate is checked monthly and the pH of the biofilter soil at each of the four beds is checked quarterly. Monitoring data is summarized in the quarterly status reports prepared for the refinery. Sunoco had proposed to PADEP a temporary three to five month shut down of the system, but after discussions with PADEP, it was decided that prior to implementing a test evaluating the system, a work plan should be submitted to PADEP for review and comment. Sunoco is developing a work plan to evaluate continued system performance. This plan will be provided to PADEP for approval prior to implementation.

Shunk Street Sewer Ventilation System and Biofilter

Hydrocarbon vapors are recovered from the Shunk Street Sewer at a manhole on the Belmont Terminal. The Shunk Street Sewer Ventilation System and Biofilter consist of a LAU Industries fan. The vapor odor and hydrocarbons collected in the sewer air stream is directed into three parallel treatment cells of the biofilter. Prior to entering the

treatment cells, the air stream is humidified through the use of water foggers. After passing through the biofilter media, the treated air is discharged to the atmosphere. The system operation is checked once per week and includes the collection of influent and effluent vapor concentrations utilizing a PID. The pH of the biofilter leachate is checked monthly and the pH of the biofilter soil at each of the three beds is checked quarterly. Quarterly vapor sampling was eliminated in the 4th Quarter 2004, as historic sampling has shown that the biofilter is operating as designed. Monitoring data is summarized in the quarterly status reports prepared for the refinery.

3.0 Conclusions

This RAP was prepared to provide information relating to proposed or ongoing remedial actions in AOI 1 based on the findings and recommendations of the AOI 1 Site Characterization Report and comments to the report received by PADEP and discussed during meetings. Conclusions based on the information provided in Section 2 of this RAP are summarized below.

- The Frontage Road recovery system at Belmont Terminal has been installed and is operating. This system has been effective in preventing off-site migration to the Shunk Street sewer. Performance of this system will continued to be monitored and documented in the quarterly status reports for the refinery;
- Based on groundwater modeling as described in the AOI 1 Site Characterization Report, and performance monitoring data related to the 26th Street System and documented in the quarterly status reports, LNAPL is not migrating off-site. Sunoco is currently evaluating the radius of influence of each pumping well as detailed in Section 2.2.3. Better hydrogeological matrix for performance monitoring along 26th Street is being investigated and will be reported in subsequent quarterly status reports. In addition, Sunoco is in a conceptual design phase for winterizing the 26th Street System so that it may run continuously;
- After conducting the iSOC testing in the S-50 and S-43 area, Sunoco has concluded that iSOC technology is not the optimum remedy to address LNAPL and groundwater at this area and that a different remediation strategy is needed. Sunoco is considering expanding the total fluids recovery system along the south side of AOI 1 (south of the existing 26th Street system) to hydraulically prevent the flow of groundwater off-site at this area. Aquifer pumping tests will be completed by Secor in support of the proposed system expansion; the results of the testing and future design will be reported in the quarterly status reports;

- Sunoco will continue to operate two separate sewer odor control systems (Packer Avenue and 26th Street Sewer Ventilation and Biofilter and Shunk Street Sewer Ventilation System and Biofilter). Data and operation status reports, as well as future performance monitoring plans, will be provided for these systems in the quarterly status reports.

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TABLES

Table 1
S-43 Test Zone
Field Measurements and Laboratory Data Summary

AOI 1 Remedial Action Plan
Philadelphia Refinery

			Field Measure						Laboratory Analysis													
Location	TOC Elevation (ft)	Date	DTW	CO2@10 sec.	ORP	pH	DO	Temp	Heterotrophic Plate Count	pH	TDS	BOD	TOC	Turbidity	Specific Conductance	Nitrate Nitrogen	DO	Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE
S-43	23.32	9/14/2005							140	<2.0	325	11.6	10.8	NA	NA	<0.10	NA	740	40	180	89	10
		1/5/2006	23.55	493	-120	8.2	1.14	16.2														
		4/10/2006	25.10	424	171	7.96	3.86	16.7														
		5/19/2006	24.93	455	80	7.92	7.43	15.2														
		5/26/2006	24.95	703	-84	6.2	0	16.2														
		6/1/2006	24.98	497	-96	6.26	2.11	16.8														
		6/13/2006	24.97	354	-110	9.33	2.26	16.9														
		6/6/2006	24.98	390	-79	8.61	2.22	15.9														
		6/22/2006	24.90	2432	-87	6.64	1.88	17.19														
		6/29/2006	24.06	OVER	123	6.57	2.96	18.57														
		7/7/2006	24.81	377	72	7.82	2.26	16.62														
		7/20/2006	24.70	360	-77	6.32	2.47	17.29														
		7/31/2006	24.64	388	-66	6.6	1.56	19.4														
		8/9/2006	24.56	363	-132	6.5	1.11	19.1														
		8/18/2006	24.60	386	-123	6.6	1.00	18.5														
		8/23/2006	24.55	381	-103	6.4	0.96	18.9														
		9/7/2006	24.37	401	192	6.6	1.03	18.2														
		9/19/2006	24.10	2443	-78	8.15	0.59	18.7														
		9/26/2006	24.13	349	-84	6.9	0.97	18.0														
		10/6/2006	23.80	485	-160	6.2	6.6	14.9														
		10/13/2006	24.00	559	-96	6.6	1.13	16.6														
		10/19/2006	23.85	410	-130	7.2	1.05	17.9														
		10/26/2006	23.99	352	-91	7	1.12	15.3														
		11/2/2006	23.83	352	-120	7.9	6.04	15.2														
		11/9/2006	23.60	290	-101	7.6	1.22	18.5														
		11/16/2006	23.56	348	-96	7.6	1.21	15.9														
		11/22/2006	23.66	1742	-116	7.1	1.05	14.5														
		12/1/2006	23.50	OVER	-64	6.8	1.05	17.5														
		12/6/2006	23.49	1004	-111	7.4	1.39	14.7														
		12/11/2006	23.55	446	-48	7.6	1.21	15.1														
		1/12/2007	23.61	600	-54	8.1	1.95	14.3														
		1/18/2007	23.65	1093	-40	8.1	1.03	14.6														
		1/26/2007	23.55	442	-100	7.9	1.45	9.5														
		2/2/2007	23.46	OVER	-78	7.6	0.75	15														
		3/1/2007	24.06	562		7.1	0.8	15.4														
		3/9/2007	24.09	547		7.3	0.94	15.7														
		3/16/2007	23.76	1036	-32	7.6	1.12	12.2														
		3/23/2007	24.04		43	7.4	4.51	16.2														
		3/30/2007	23.93	1496	-31	7.6	2.53	16.5														
		5/23/2007	23.27	324	41	7.4	2.20	17.6														
		7/6/2007	23.41	486	49	7.5	1.14	18.4														
		7/27/2007	23.54	OVER	-96	7.3	1.20	19.1														
		8/3/2007	23.60	335	-35	7.7	3.04	20.9														
		8/6/2007	23.59						16,000	6.6	249	7.8	8.1	171	468	<0.50	0.93	NA	NA	NA	NA	NA
		8/10/2007	23.61	OVER	148	7.9	2.95	18.5														
		8/22/2007	23.78	387	-57	8.1	3.91	16.8														
		9/7/2007	23.90	779	-73	7.0	0.71	19.5														
		9/14/2007	23.95	336	-47	6.7	0.76	17.7	3,500		326	16.8	8.6	164	590	<0.50	NA	1,200	69	320	220	<10
		9/27/2007	24.02	316	-73	6.8	0.63	18.3														
		10/12/2007	24.16	376	32	6.8	0.69	16.1														
		10/24/2007	24.28	345	-84	7.2	1.13	18.0	8,300		305	22.9	10.2	170	722	<0.50	NA	1,600	120	620	400	8

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S-44	23.48	9/14/2005							21	<2.0	364	18.1	19.6	NA	NA	<0.10	NA	NA	NA	NA	NA
		9/22/2005							NA	NA	NA	NA	NA	NA	NA	NA	NA	1,400	<50	<50	<50	82
		1/5/2006	25.10	388	-128	7.5	0.85	16.3													
		4/10/2006	26.58	383	-126	6.88	1.62	17.4													
		5/19/2006	26.62	461	-61	6.8	1.52	14.3													
		5/26/2006	26.64	539	-102	6.7	0	16.2													
		6/1/2006	26.54	376	-112	6.49	1.88	16.5													
		6/6/2006	26.59	402	-99	9.11	1.7	15.9													
		6/13/2006	26.60	566	-92	9.06	1.84	16.2													
		6/22/2006	26.59	412	-102	6.74	1.50	17.01													
		6/29/2006	24.65	469	-89	6.36	2.34	16.21													
		7/7/2006	26.39	377	-95	6.4	1.79	15.41													
		7/20/2006	26.49	423	-116	6.65	2.67	17.03													
		7/31/2006	26.33	447	-120	6.9	1.65	17.3													
		8/9/2006	26.29	380	-122	6.6	1.13	18.6													
		8/18/2006	26.29	386	-101	6.8	1.17	19.0													
		8/23/2006	26.21	502	-110	6.6	1.11	18.9													
		9/7/2006	25.78	385	49	6.6	1.54	17.3													
		9/19/2006	25.56	386	-89	8.51	0.84	18.1													
		9/26/2006	25.72	329	-127	6.6	1.07	17.5													
		10/6/2006	25.61	435	-120	6.4	1.66	15													
		10/13/2006	25.56	348	-110	6.8	1.33	16.2													
		10/19/2006	25.38	402	-88	6.9	1.41	17.1													
		10/26/2006	25.65	342	-81	6.9	2.18	14.4													
		11/2/2006	25.43	332	-80	7.2	1.21	15.5													
		11/9/2006	24.71	282	-85	6.9	1.26	17.8													
		11/16/2006	25.09	321	-85	7.0	1.29	15.2													
		11/22/2006	25.13	432	-105	6.5	1.27	14.4													
		12/1/2006	25.05	605	-108	6.9	1.18	17.6													
		12/6/2006	25.20	357	-107	7.0	1.15	14.7													
		12/11/2006	25.22	459	-75	7.4	1.82	14.7													
		1/12/2007	25.20	355	-88	7.3	1.12	13.9													
		1/18/2007	25.28	530	-99	7.2	1.57	14.5													
		1/26/2007	25.18	347	-106	7.5	1.48	6.8													
		2/2/2007	25.05	538	-91	7.5	0.83	15													
		3/1/2007	25.63	544		7.1	0.78	15.6													
		3/9/2007	25.71	357		7.5	0.89	15.4													
		3/16/2007	25.41	369	-54	8	0.93	12.8													
		3/23/2007	25.62		-71	7.3	1.78	16.4													
		3/30/2007	25.57	365	-101	7.6	2.22	16.5													
		5/23/2007	24.89	395	-101	7.1	1.45	17.8													
		7/6/2007	24.94	520	-124	6.9	1.95	17.6													
		7/27/2007	25.16	322	-139	7.7	0.97	18.3													
		8/3/2007	25.25	332	-150	7.1	1.16	20.3													
		8/6/2007	25.20						5,600	6.7	349	11.9	20.1	362	641	<0.50	3.22	NA	NA	NA	NA	NA
		8/10/2007	25.29	374	-80	7.1	1.80	18.8													
		8/22/2007	25.32	443	-127	7.2	1.42	16.2													
		9/7/2007	25.60	305	-130	7.1	0.83	18.8													
		9/14/2007	25.54	328	-111	6.8	0.94	17.5	7,800	NA	454	34.1	35.5	222	662	<0.50	NA	1,100	24	28	58	210
		9/27/2007	25.68	331	-104	6.8	1.38	17.8													
		10/12/2007	25.66	421	-101	6.8	0.89	15.4													
		10/24/2007	25.91	454	-96	6.8	1.90	17.1	1,600	NA	381	25.2	18.4	178	664	<0.50	NA	1,400	28	27	41	220

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S-227	21.83	9/14/2005							150	<2.0	291	18.8	12.6	NA	NA	<0.10	NA	900	120	790	2,200	36
		1/5/2006	22.06	479	-72	7.5	1.25	15.8														
		4/10/2006	23.61	404	-95	6.83	1.8	16.6														
		5/19/2007	23.51	1022	-90	7.15	1.71	14.8														
		5/26/2006	23.51	453	-117	6.22	0	15.9														
		6/1/2006	23.52	1162	-120	6.5	3.37	16.6														
		6/6/2007	23.55	374	-105	9.12	1.35	15.9														
		6/22/2006	23.49	497	-78	6.76	1.39	17.44														
		6/13/2006	23.59	354	-91	8.96	1.5	16.5														
		6/29/2006	22.72	OVER	-97	5.88	6.09	16.41														
		7/7/2006	23.40	360	-91	6.36	1.12	15.77														
		7/20/2006	23.28	647	-84	6.08	2.25	16.59														
		7/31/2006	23.14	441	-91	6.9	1.10	18.3														
		8/9/2006	23.15	374	-95	7.0	1.07	19.1														
		8/18/2006	23.10	414	-90	6.9	0.90	18.1														
		8/23/2006	23.15	535	-96	6.9	0.77	18.9														
		9/7/2006	22.88	705	87	6.8	1.55	18.5														
		9/19/2006	22.62	398	-91	8.54	0.41	18.6														
		9/26/2006	22.65	339	-91	7.0	1.59	18.3														
		10/6/2006	22.50	377	-60	7.3	2.09	14.1														
		10/13/2006	22.51	337	-54	6.3	0.8	16.2														
		10/19/2006	22.39	1619	-62	6.9	1.11	17.8														
		10/26/2006	22.52	355	-60	6.9	1.54	14.9														
		11/2/2006	22.37	348	-88	7.0	1.53	15.1														
		11/9/2006	22.15	346	-55	7.4	1.23	18.2														
		11/16/2006	22.10	348	-88	6.9	1.59	15.5														
		11/22/2006	22.19	1705	-119	6.6	1.38	14.8														
		12/1/2006	21.96	OVER	-62	6.0	1.45	18.7														
		12/6/2006	22.01	469	-5	7.3	1.66	15.8														
		12/11/2006	22.10	462	-11	7.7	1.47	14.6														
		1/12/2007	22.15	338	-61	7.5	1.52	14.1														
		1/18/2007	22.28	1103	-114	7.8	1.25	15														
		1/26/2007	22.08	323	-82	8.2	1.67	16.2														
		2/2/2007	21.96	615	-31	8	1.06	14.6														
		3/1/2007	22.58	390		7.8	1.6	14.2														
		3/9/2007	22.61	361		7.9	1.54	15.8														
		3/16/2007	22.32	316	-12	5.2	1.36	12.6														
		3/23/2007	22.58		-111	7.5	2.75	16.2														
		3/30/2007	22.50	352	-108	7.5	2.16	15.7														
		5/23/2007	21.79	334	-188	7.5	2.18	17.7														
		7/6/2007	21.93	368	-66	7.4	1.62	18.3														
		7/27/2007	22.07	472	-177	7.3	0.91	20.6														
		8/3/2007	22.15	317	-136	6.9	1.92	20.2														
		8/6/2007	22.14						7,700	6.4	348	18.6	10.7	240	669	<0.50	0.75	NA	NA	NA	NA	NA
		8/10/2007	22.16	563	-134	6.7	0.60	18.4														
		8/22/2007	22.29	445	-137	7.0	1.13	16.6														
		9/7/2007	22.44	545	-111	6.9	0.63	19.2														
		9/14/2007	22.51	332	-100	6.7	1.23	17.3	1,400	NA	322	26.6	9.4	199	676	<0.50	NA	680	68	580	1,100	10
		9/27/2007	22.56	694	-111	6.8	0.77	18.2														
		10/12/2007	22.70	359	-93	6.9	1.26	16.4														
		10/24/2007	22.18	342	-98	6.7	0.76	17.7	15,000	NA	359	38.9	9.2	240	816	<0.50	NA	520	60	520	900	10

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S-228	21.12	9/14/2007							4,900	<2.0	202	68.4	15.1	NA	NA	<0.10	NA	770	50	280	940	100
Injection Well		1/5/2006	21.39	313	-60	7.3	>20	15.5														
		4/10/2006	22.93	387	-12	6.91	>20	17														
		5/19/2006	22.83	420		6.94	>20	14.3														
		5/26/2006	22.82	447	-5	6.42	>20	15.9														
		6/1/2006	22.86	393	-27	6.36	>20	15.7														
		6/6/2006	22.80	380	-13	7.51	>20	15.9														
		6/13/2006	22.85	334	-7	7.25	>20	15.9														
		6/22/2006	22.75	433	16	6.74	>20	17.34														
		6/29/2006	22.11	898	-17	5.97	8.63	15.76														
		7/7/2006	22.66	356	-44	6.31	1.56	15.71														
		7/20/2006	22.53	344	-93	6.31	2.66	16.95														
		7/31/2006	22.44	403	-92	6.9	0.96	19.5														
		8/9/2006	22.41	359	-124	6.9	0.95	18.8														
		8/18/2006	22.42	490	-127	6.9	1.40	18.1														
		8/23/2006	22.40	464	-125	6.7	0.71	18.5														
		9/7/2006	22.18	508	98	7.1	0.90	18.4														
		9/19/2006	21.93	354	-114	8.84	0.65	18.3														
		9/26/2006	21.97	337	-75	7.1	>20	18.1														
		10/6/2006	21.81	364	-69	7.9	>20	13.8														
		10/13/2006	21.78	342	86	7.8	>20	16.5														
		10/19/2006	21.68	1334	38	7.4	>20	17.5														
		10/26/2006	21.81	342	-1	7.9	>20	14.5														
		11/2/2006	21.70	321	-88	7.0	>20	15.2														
		11/9/2006	21.44	289	75	7.4	>20	17.9														
		11/16/2006	21.39	342	43	7.0	>20	15.9														
		11/22/2006	21.45	2238	-76	7.1	1.14	15.3														
		12/1/2006	21.21	1332	-67	6.6	>20	18.6														
		12/6/2006	21.32	406	10	7.1	1.46	15.7														
		12/11/2006	21.38	412	4	8.2	11.51	13.6														
		1/12/2007	21.46	661	-23	8.4	>20	13.8														
		1/18/2007	21.49	1971	-23	8.2	>20	14.3														
		1/26/2007	21.40	315	-30	8.1	>20	10.3														
		2/2/2007	21.30	422	56	8.4	>20	14.2														
		3/1/2007	21.89	368		8.3	>20	13.9														
		3/9/2007	21.93	405		7.9	>20	15.5														
		3/16/2007	21.63	552	63	8.4	>20	12.2														
		3/23/2007	21.89		50	7.2	>20	15.9														
		3/30/2007	21.76	911	-26	7.6	>20	15.6														
		5/23/2007	21.12	338	105	7.8	>20	17.7														
		7/6/2007	21.24	352	60	7.8	13.98	18.5														
		7/27/2007	21.37	435	50	8	>20	19.5														
		8/3/2007	21.46	315	-10	7.1	>20	20.6														
		8/6/2007	21.45						22,000	6.5	280	10.8	10.5	178	531	<0.50	0.56	NA	NA	NA	NA	NA
		8/10/2007	21.47	OVER	-110	6.9	0.81	18.2														
		8/22/2007	21.62	501	-79	7.6	>20	16.8														
		9/7/2007	21.75	366	-89	7.3	0.69	19.4														
		9/14/2007	21.83	300	-58	6.9	0.74	17.4	6,300		272	28.5	10.3	275	538	<0.50	NA	240	28	390	940	15
		9/27/2007	21.89	757	-100	7.1	0.72	18.7														
		10/12/2007	22.04	339	-101	6.8	0.69	16.5														
		10/24/2007	22.20	303	-102	7.0	0.67	18.1	3,000		288	22.3	11.0	295	704	<0.50	NA	480	34	430	630	16

Table 1
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Field Measurements and Laboratory Data Summary

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S-255 (new-2)	21.91	9/14/2007	21.88	329	-43	6.8	0.60	17.4	3,100	NA	199	16.9	11.0	62.5	504	<0.50	NA	410	98	930	2,400	<20
		9/27/2007	21.92	348	-55	7.2	>20	18.5														
		10/12/2007	21.88	347	-36	6.9	>20	15.9														
		10/24/2007	23.10	391	60	7.3	4.59	18.3	38,000	NA	299	23.4	16.8	131	494	<0.50	NA	710	73	520	2,800	48
S-256 (new-1)	21.41	9/14/2007	22.78	397	-66	7.2	0.58	18.2	1,200	NA	145	15.6	12.6	186	352	<0.50	NA	1,600	110	460	1,600	110
		9/27/2007	22.83	516	33	7.0	1.34	19.5														
		10/12/2007	22.93	366	147	7.5	13.60	16.5														
		10/24/2007	22.34	355	-87	6.9	2.68	16.6	120,000	NA	273	57.5	16.1	4,160	441	<0.50	NA	200	55	770	1,900	4
S-257 (new-3)	23.27	9/14/2007	23.53	1255	-94	7.0	0.77	17.1	45,000	NA	323	30.6	13.9	450	537	<0.50	NA	990	240	1,100	2,200	<20
		9/27/2007	23.65	1090	-115	6.9	0.46	17.9														
		10/12/2007	23.69	314	-112	6.9	0.92	15.8														
		10/24/2007	23.89	404	-116	7.5	1.19	17.7	5,400	NA	330	37.7	14.3	346	649	<0.50	NA	1,000	220	1,100	2,100	6
S-258 (new-4)	22.80	9/14/2007	23.97	1002	-104	6.7	0.50	17.7	510	NA	321	461	11.7	1,630	553	<0.50	NA	1,700	120	1,200	1,700	9
		9/27/2007	24.05	379	-102	6.6	0.43	18.6														
		10/12/2007	23.58	417	-34	6.8	1.40	15.7														
		10/24/2007	24.33	339	-72	6.8	1.05	17.6	2,200	NA	319	34.2	11.1	289	694	<0.50	NA	840	69	610	860	6
S-259 (new-5)	22.56	9/14/2007	24.94	1558	-104	6.6	0.70	17.7	2,000	NA	313	26.4	11.3	82.0	618	<0.50	NA	1,600	94	770	670	20
		9/27/2007	24.97	2281	-100	6.6	0.45	17.8														
		10/12/2007	24.84	449	-20	6.7	0.73	16.0									NA					
		10/24/2007	25.25	547	-95	6.8	1.12	17.5	33,000	NA	282	>211	11.9	752.0	567	<0.50	NA	2,700	150	1,400	1,200	23
S-260 (new-6)	21.70	9/14/2007	23.56	1037	-99	6.6	0.74	17.7	13,000	NA	514	151	25.2	714	885	<0.50	NA	2,000	100	67	34	100
		9/27/2007	23.64	893	-98	6.6	0.46	18.4														
		10/12/2007	23.74	371	-97	6.7	0.55	16.0														
		10/24/2007	23.85	712	-86	6.7	0.87	17.6	5,100	NA	284	66.9	14.6	458	529	0.80	NA	1,000	84	62	31	48

NA- Not analyzed

Table 2
S-50 Test Zone
Field Measurements and Laboratory Data Summary

AOI 1 Remedial Action Plan
Philadelphia Refinery

			Field Measure						Laboratory Analysis													
Location	TOC Elevation (ft)	Date	DTW	CO2@10 sec.	ORP	pH	DO	Temp	Heterotrophic Plate Count	pH	TDS	BOD	TOC	Turbidity	Specific Conductance	Nitrate Nitrogen	DO	Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE
S-210		1/5/2006	23.28	-	-	-	-	-														
		5/19/2006	24.45	475	-84	6.85	1.55	15.2														
		5/26/2006	24.40	454	-120	6.46	0	17.9														
		6/1/2006	24.47	517	-106	6.31	1.08	18.3														
		6/6/2006	24.45	391	-98	8.94	1.77	17.4														
		6/22/2006	24.31	1757	-89	6.62	1.25	18.83														
		6/29/2006	23.87	765	-89	6.27	1.71	18.29														
		7/7/2006	24.31	355	-87	6.32	1.61	17.72														
		7/20/2006	24.18	377	-90	6.25	1.31	18.3														
		7/31/2006	24.11	1536	-106	6.5	0.67	20.8														
		8/9/2006	24.10	501	-97	6.6	1.08	20.1														
		8/18/2006	24.16	506	-80	6.6	0.87	19.5														
		8/23/2006	24.14	488	-98	6.6	0.85	20.3														
		9/7/2006	23.86	1290	-12	6.5	0.89	19.5														
		9/19/2006	23.58	356	-88	8.43	0.59	19.5														
		9/26/2006	23.70																			
		10/6/2006	23.90																			
		10/13/2006	23.73	472																		
		10/19/2006	23.65	1021																		
		10/26/2006	23.00	419																		
		11/2/2006	23.61	385																		
		11/9/2006	23.36	271																		
		11/16/2006	23.21																			
		11/22/2006	23.26																			
		12/1/2006	22.88	389	-75	6.9	0.81	19.4														
		12/6/2006	23.05	477	-80	6.9	0.92	17.0														
		12/11/2006	23.21	698	-62	7.3	0.81	17.8														
		1/12/2007	23.34	-	-	-	-	-														
		1/18/2007	23.33	444																		
		1/26/2007	23.33																			
		2/2/2007	23.31	415																		
		3/1/2007	23.92	504		7.4	1	17.5														
		3/9/2007	23.91	374		6.9	0.95	16.1														
		3/16/2007	23.93	409																		
		3/23/2007	23.72		-117	7.6	1.73	17.5														
		3/30/2007	23.68																			
		5/23/2007	23.09	365																		
		7/6/2007	23.15	334																		
		7/27/2007	23.21	355																		
		8/3/2007	23.32	471																		
		8/10/2007	23.20	367																		
		8/22/2007	23.48	360																		
		9/7/2007	23.56	283																		
		9/14/2007	23.55	319																		
		9/27/2007	23.64	371																		
		10/12/2007	23.89	344																		
		10/24/2007	23.88	342																		

Table 2
S-50 Test Zone
Field Measurements and Laboratory Data Summary

AOI 1 Remedial Action Plan
Philadelphia Refinery

S-230		1/5/2006	18.52	992	-85	7.9	0.83	16.3													
		6/1/2006	20.44	449	-112	6.23	1.31	16.3													
		6/6/2006	18.62	3441	-78	8.65	2.66	17.4													
		6/22/2006	20.04	OVER	-119	6.79	1.92	16.90													
		6/29/2006	18.84	OVER	-105	6.39	1.82	18.24													
		7/7/2006	18.01	OVER	-104	6.43	1.74	17.92													
		7/20/2006	19.69	2308	-122	6.43	1.3	16.89													
		7/31/2006	19.35	1823	-136	6.8	1.18	22.5													
		8/9/2006	20.04	2468	-152	6.6	0.82	18.8													
		8/18/2006	20.36	617	-157	6.9	0.86	18.8													
		8/23/2006	20.44	2587	-128	6.6	0.64	19.5													
		9/7/2006	18.60	OVER	-94	6.5	1.16	19.7													
		9/19/2006	18.82	327	-59	7.54	0.58	19.2													
		9/26/2006	19.46	OVER	-121	6.7	0.92	19.3													
		10/6/2006	19.65	1110	-115	6.9	0.99	15.5													
		10/13/2006	19.13	1214	-105	6.9	0.67	17.7													
		10/19/2006	19.80	OVER	-99	6.9	0.82	18.7													
		10/26/2006	19.00	1334	-77	7.1	0.78	16													
		11/2/2006	18.69	1526	-75	7.0	0.88	17.7													
		11/9/2006	17.83	3134	-73	5.9	1.66	18.1													
		11/16/2006	17.99	OVER	-71	6.9	0.77	16.8													
		11/22/2006	18.10	1038	-89	6.8	0.72	14.7													
		12/1/2006	18.38	1029	-90	7.1	0.76	18.8													
		12/6/2006	18.74	382	-97	6.9	0.87	16.5													
		12/11/2006	19.05	OVER	-77	7.6	0.66	17.2													
		1/12/2007	18.28	371	-100	7.4	0.87	14.5													
		1/18/2007	18.93	OVER	-98	7	0.97	14.6													
		1/26/2007	19.06	1490	-90	7.2	0.99	14.9													
		2/2/2007	19.25	2109	-80	7.4	0.94	14.7													
		3/1/2007	19.40	OVER		7.4	0.87	16.9													
		3/9/2007	19.54	1822		7.8	1.05	15.1													
		3/16/2007	19.93	1399	-53	7.6	1.17	13.4													
		3/23/2007	18.44		-52	7.6	1.80	16.1													
		3/30/2007	18.93	OVER	-54	7.5	1.82	16.9													
		5/23/2007	18.78	1585	-38	7.4	1.11	18.0													
		7/6/2007	18.30	910	-45	7.8	2.72	20.6													
		7/27/2007	19.15	2051	-105	7.5	1.36	19.8													
		8/3/2007	19.30	1372	-102	7.3	1.07	19.9													
		8/10/2007	19.36	1487	-117	7.1	10.5	18.7													
		8/22/2007	19.33	535	-81	NM	0.81	16.9													
		9/7/2007	19.46	1780	-114	7.0	0.72	19.3													
		9/14/2007	19.59	770	-113	7.0	0.87	19.5	30,000	NA	406	174	20.7	710	567	<0.50	NA	2,600	<5	32	64	<5
		9/27/2007	20.00	798	-98	6.9	0.70	19.4													
		10/12/2007	20.14	634	-88	6.9	0.78	17.0													
		10/24/2007	20.16	560	-93	6.9	0.82	18.4	19,000	NA	413	83.7	18.8	1,960	775	<0.50	NA	2,400	9	28	57	6

Table 2
S-50 Test Zone
Field Measurements and Laboratory Data Summary

AOI 1 Remedial Action Plan
Philadelphia Refinery

S-231		1/5/2006	19.52	1576	-139	7.8	0.56	17.6													
		6/1/2006	20.76	441	-101	6.43	1.68	17.7													
		6/6/2006	20.13	OVER	-21	7.48	1.22	17.4													
		6/22/2006	20.65	OVER	-49	6.42	1.15	18.70													
		6/29/2006	15.72	OVER	-36	6.26	1.93	18.51													
		7/7/2006	19.20	OVER	-15	6.38	1.07	17.51													
		7/20/2006	20.45	881	-65	6.31	1.8	17.91													
		7/31/2006	19.68	OVER	-49	6.4	0.72	20.9													
		8/9/2006	20.45	2575	-128	6.6	0.84	20.5													
		8/18/2006	20.49	678	-187	6.6	0.82	19.9													
		8/23/2006	20.47	OVER	-147	6.7	0.68	19.9													
		9/7/2006	18.50	OVER	74	6.6	0.85	20.1													
		9/19/2006	19.81	422	-87	8.16	0.64	20.9													
		9/26/2006	20.02	OVER	-96	6.6	0.79	20.3													
		10/6/2006	19.49	662	-88	6.7	0.9	17.6													
		10/13/2006	17.12	1555	-80	6.8	0.86	19.6													
		10/19/2006	15.01	OVER	-96	6.9	0.85	21													
		10/26/2006	19.95	1791	-78	7.2	0.78	17													
		11/2/2006	19.76	OVER	-80	7.1	0.85	18.1													
		11/9/2006	9.17	1170	-85	6.9	0.78	19.7													
		11/16/2006	18.38	OVER	-77	7.2	0.86	17.9													
		11/22/2006	19.60	1457	-89	7.2	0.75	16.1													
		12/1/2006	20.73	1054	-93	7.1	0.85	19.7													
		12/6/2006	19.60	1639	-108	7.1	0.71	17.0													
		12/11/2006	19.66	OVER	-90	7.6	0.68	17.3													
		1/12/2007	19.58	734	-93	7.6	0.65	15.8													
		1/18/2007	19.81	3098	-107	7.3	0.71	16													
		1/26/2007	19.70	1850	-112	7.4	0.95	14.5													
		2/2/2007	19.73	OVER	-72	7.6	0.6	15.4													
		3/1/2007	20.46	2540		6.9	0.63	17.2													
		3/9/2007	20.47	OVER		6.9	0.52	17.1													
		3/16/2007	20.22	OVER	-49	7.9	0.74	15.2													
		3/23/2007	20.22		-251	7.6	1.62	17.7													
		3/30/2007	20.11	OVER	-99	7.3	1.59	17.9													
		5/23/2007	19.44	1231	-195	6.9	0.73	18.3													
		7/6/2007	19.45	1824	-149	7.8	0.91	19.0													
		7/27/2007	19.65	509	-152	7.4	1.4	21.6													
		8/3/2007	19.73	673	-159	6.8	2.45	19.8													
		8/10/2007	19.73	1367	-133	6.8	0.65	20.1													
		8/22/2007	18.95	1160	-71	6.7	0.67	18.4													
		9/7/2007	19.93	313	-119	6.9	0.60	21.1													
		9/14/2007	19.98	2958	-90	6.8	0.65	20.3	15,000	NA	199	19.5	8.3	198	338	<0.50	NA	8,000	270	120	690	<20
		9/27/2007	20.01	493	-89	NM	0.50	20.3													
		10/12/2007	19.51	OVER	-65	6.9	0.60	18.6													
		10/24/2007	20.24	758	-85	6.7	0.74	19.5	6,900	NA	226	29.3	9.0	127	450	<0.50	NA	17,000	450	210	1,100	<20

Table 2
S-50 Test Zone
Field Measurements and Laboratory Data Summary

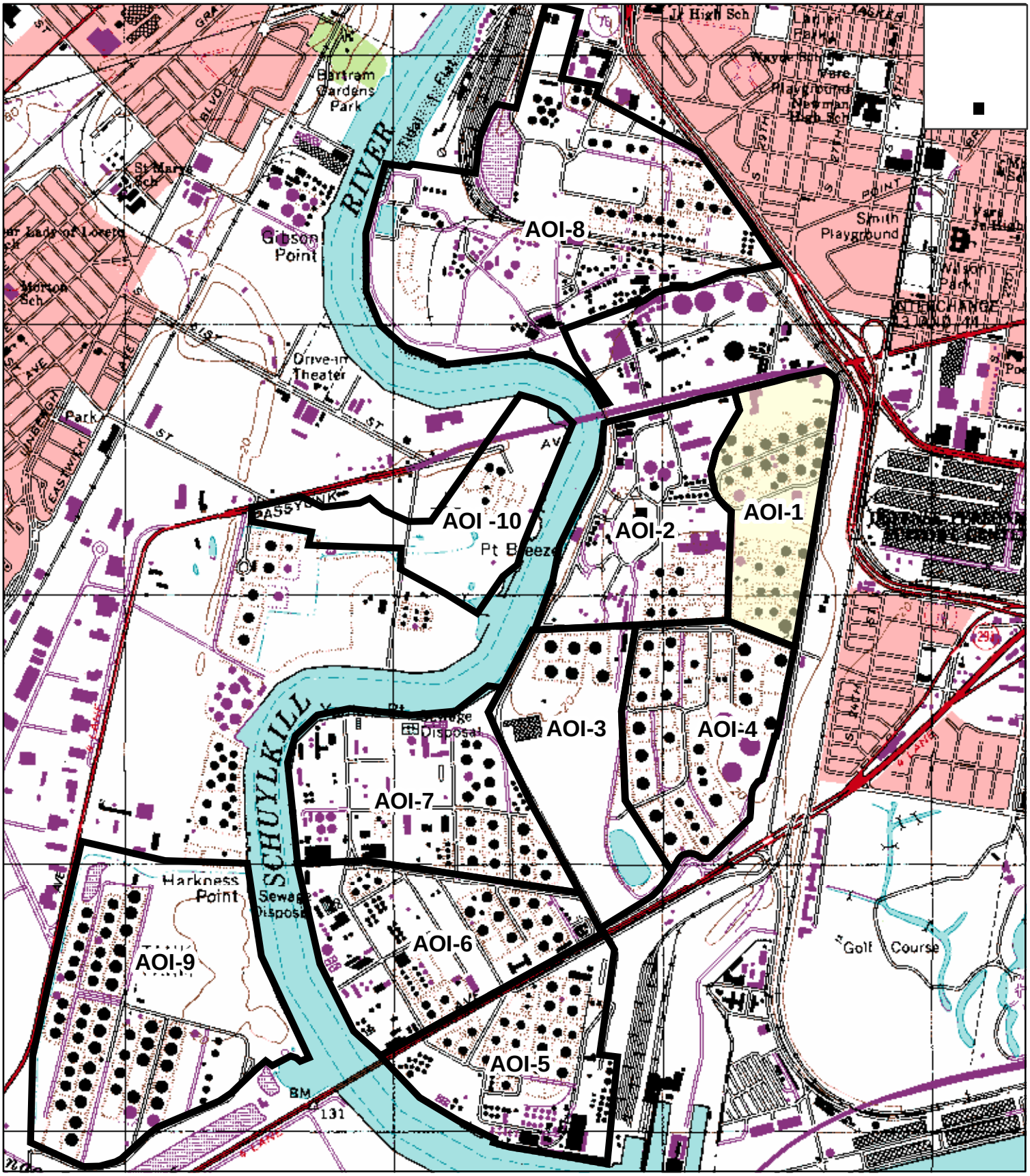
AOI 1 Remedial Action Plan
Philadelphia Refinery

S-232		1/5/2006	20.65	905	-89	7.7	0.73	17.3													
Injection Well		6/1/2006	21.52	425	28	6.49	>20	19.6													
		6/6/2006	20.16	506	43	6.52	>20	17.4													
		6/13/2006	21.21	578	10	6.97	>20	19.4													
		6/22/2006	21.63	448	64	6.65	18.09	19.78													
		6/29/2006	17.28	422	24	6.88	9.64	20.92													
		7/7/2006	20.09	399	49	6.63	14.56	19.38													
		7/20/2006	21.25	660	27	6.07	12.21	19.69													
		7/31/2006	21.13	490	63	6.1	19.20	22.5													
		8/9/2006	21.30	405	36	6.6	16.8	20.9													
		8/18/2006	21.32	591	53	6.6	19.11	20.8													
		8/23/2006	21.33	1746	11	6.6	14.96	20.7													
		9/7/2006	20.25	1220	180	6.9	11.62	21.2													
		9/19/2006	20.69	328	129	9.63	4.05	21.6													
		9/26/2006	20.94	443	-34	6.4	0.93	21.8													
		10/6/2006	15.05	749	-69	6.9	4.08	18.8													
		10/13/2006	20.54	453	-102	7	11.91	20.5													
		10/19/2006	20.75	597	-95	7	13.94	20.6													
		10/26/2006	20.85	523	-50	6.9	14.21	17.2													
		11/2/2006	20.68	661	-45	7.3	15.40	17.9													
		11/9/2006	20.04	1110	-96	7.1	8.94	19.5													
		11/16/2006	20.17	587	-52	6.9	9.84	17.2													
		11/22/2006	20.46	700	-74	7.1	15.20	16.5													
		12/1/2006	20.26	685	-50	7.1	12.88	20.2													
		12/6/2006	20.46	510	-52	7.1	2.94	17.6													
		12/11/2006	20.61	537	-57	7.5	0.94	17.5													
		1/12/2007	20.50	OVER	-80	7.7	0.75	16.1													
		1/18/2007	20.64	2583	-88	7.3	0.79	16.7													
		1/26/2007	20.67	653	-121	7.5	0.91	13.7													
		2/2/2007	20.61	1926	-75	7.5	0.75	16.8													
		3/1/2007	21.25	2319		6	>20	17.2													
		3/9/2007	21.20	1684		6.4	>20	17.2													
		3/16/2007	20.98	606	-3	7.9	>20	15.2													
		3/23/2007	20.95		62	7.1	>20	17.5													
		3/30/2007	20.85	OVER	22	7.3	>20	18.6													
		5/23/2007	20.41	359	83	7.1	>20	19.6													
		7/6/2007	20.55	692	-84	7.7	3.96	19.4													
		7/27/2007	20.60	1881	-152	7.4	0.89	21.0													
		8/3/2007	20.71	615	46	6.9	>20	21.0													
		8/10/2007	20.69	1393	28	7.0	>20	21.4													
		8/22/2007	20.72	404	58	6.5	0.90	18.9													
		9/7/2007	20.94	409	39	6.8	>20	21.3													
		9/14/2007	20.98	406	39	6.4	39	20.6	30,000	NA	972	12.2	15.2	90.5	1,690	<0.50	NA	320	11	69	79	43
		9/27/2007	21.02	345	2	6.6	>20	20.7													
		10/12/2007	21.25	2102	26	6.7	14.14	18.7													
		10/24/2007	21.32	464	-9	6.7	16.49	20.2	41,000	NA	798	19.2	15.5	113	1,480	0.79	NA	220	<10	17	31	68

NA- Not analyzed

S-210 - DTP = 23.51 10/13/06, 23.07 11/16/06, 23.43 11/2/06, 23.12 11/22/06, 23.18 11/9/06, 23.54 3/30/2007, 23.01 5/23/07, 23.08 7/6/07, 23.12 7/27/07, 23.22 8/3/07, 23.18 8/10/07, 23.38 8/22/07, 23.48 9/7/07, 23.54 9/14/07, 23.58 9/27/07, 23.75 10/12/07, 23.80 10/24/07

FIGURES



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

Sunoco, Inc. (R&M)

Philadelphia Refinery

3144 Passyunk Avenue
Philadelphia, PA. 19145

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

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

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

Legend

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

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

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

0 125 250 Feet

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

Q:\Data\62574601\ArcGIS\Map\Documents\AOI 1 Remedial Action Plan\Figure 2 - AOI 1 RAP Site Plan.mxd

Belmont Remedial System

Frontage Road Remedial System

Belmont Biofilter

MW-35
OW-18
TW-8
MW-36
MW-37
TW-10
RW-15
OW-12
OW-20
MW-44
TW-5
MW-34
RW-28
RW-26
OW-16
OW-2
OW-13
TW-9
RW-30
TW-11
RW-31
RW-1
RW-27
S-74
OW-9
RW-4
TW-3
OW-17
RW-7
RW-6
MW-33
OW-10
MW-30
RW-32
RW-31
RW-25
MW-38
RW-21
RW-22
MW-32
RW-24
MW-39
RW-400
RW-23
MW-40
MW-41
MW-43
MW-31
MW-28
MW-42
S-75
MW-26
PZ-400
MW-27
S-191
S-192
S-76
S-198
MW-29
S-190
S-200
S-188
S-77
S-189
S-187
S-77P
S-81
AOI 1
S-201
S-186
S-185

Legend

- Deep Monitoring Well
- Intermediate Monitoring Well
- Shallow Monitoring Well
- Other Monitoring Well
- Piezometer
- Deep Recovery Well
- Intermediate Recovery Well
- Shallow Recovery Well
- Other Recovery Well
- Damaged Well
- ? Abandoned
- Staff Gauge
- Belmont Property Boundary
- AOIs
- Site Remedial Systems

Figure 3: Belmont Terminal Groundwater and LNAPL Recovery Systems
AOI 1 Remedial Action Plan
Sunoco Refinery
Philadelphia, Pennsylvania

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

0 50 100 Feet

SCALE: 1" = 50'
DATE: December 21, 2007
DRN. BY: MH
CKD. BY:
JOB#: 2574601

Q:\Data\0\2574601\ArcGIS\MapDocuments\AOI 1 Remedial Action Plan\Figure 3 - Belmont Terminal GW & LNAPL.mxd

AOI 1

S-52
S-209
S-51
S-117
S-230
S-226
S-50
S-127
S-210
S-231
62
S-232
S-46
S-47I
S-45
S-212
S-260
S-44
S-255
S-259
S-228
S-118
S-258
S-256
S-43
S-227
S-257
S-195
S-42I
S-41

Q:\Data6\2574601\ArcGIS\MapDocuments\AOI 1 Remedial Action Plan\Figure 4 - AOI 1 ISOC Testing Area.mxd

Legend

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

S-43 and S-50 Approximate iSOC Testing Areas

Figure 4: iSOC Testing Areas
AOI 1 Remedial Action Plan
Sunoco Refinery
Philadelphia, Pennsylvania

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

0 25 50 100
Feet

SCALE: 1" = 100'
DATE: December 21, 2007
DRN. BY: MH
CKD. BY: JH
JOB#: 2574601

APPENDIX A

Activities, System Deployment, Test Methodology and Field Procedures for iSOC Testing

Appendix A

Activities, System Deployment, Test Methodology and Field Procedures for iSOC Testing

Sunoco Philadelphia Refinery

Activities

Two separate iSOC™ gas delivery systems were installed. One system was installed in the S-43 test area and one in the S-50 test area. Locations of the two test areas are shown in Figure 4. Prior to test startup, baseline water quality was analyzed for the following parameters:

- Dissolved Oxygen (DO);
- $CO_{2;}$
- pH;
- Temperature;
- ORP;
- BOD;
- VOC's;
- Nitrate;
- Alkalinity to pH 8.3;
- Alkalinity to pH 4.5;
- Total Inorganic Carbon (TOC);
- Total Organic Carbon;
- Total Dissolved Solids;
- Heterotrophic Plate Counts; and
- Hydrocarbon Degrading Bacteria, Plate Counts.

iSOC™ System Deployment

Prior to system deployment, the maximum head that the unit will be subjected to was determined. The following equation is used to determine this pressure:

$$\text{Head Pressure (psi)} = \frac{Max\_ \not/ Water\_Height\_Above\_iSOC}{2.306}$$

This calculation determines the final pressure required to maintain positive gas flow to the delivery unit in the well.

The delivery system was installed within six inches of the bottom of each well. An inflatable packer was installed at five feet above the delivery system. The oxygen cylinder was then installed and plumbed to the control panel. The gas cylinder regulator valve was opened so that the control panel reaches 12-15 psi. The flow valve was set at 20cc/min. All tubing to fitting connections was tested to ensure no oxygen leaks. The delivery system was then lowered slowly into the well to ensure that positive gas flow is maintained at all times. The gas inlet pressure remained higher than the gas outlet pressure. The unit was then tied off at the desired deployment depth and the packer was inflated. The gas outlet pressure was set at the pressure determined in the previous equation. The gas flow rate was set at 15 cc/min.

Test Methodology

Field Testing was performed for the following parameters after 24 hours from the beginning of the test, and weekly thereafter.

- Dissolved Oxygen (DO);
- $CO_{2;}$
- pH;
- Temperature; and
- ORP.

Laboratory testing was performed at the termination of the test for the following parameters:

- BOD;
- VOC's (BTEX and MTBE);
- Nitrate;
- Total Inorganic Carbon (TOC);
- Total Organic Carbon;
- Total Dissolved Solids; and
- Heterotrophic Plate Counts.

Field Procedures

A.1. Liquid Level Acquisition

Responsible Personnel: Technicians and Geologists

Training Qualifications:

All field personnel involved in liquid level acquisition shall have, as a minimum, completed OSHA 40 HOUR HAZWOPER training and completed the 3-day minimum field training requirements as specified within the Corporate Health and Safety Plan. Prior to solo performance of liquid levels, all field personnel will have performed a minimum of three site visits under the direct supervision of experienced personnel.

Health and Safety Requirements:

Personal Protective Equipment (PPE) Required:

Level D attire including steel toe/steel shank boots. Based on previous site visits or current air monitoring results, Level C attire may be required. The PPE required to upgrade to Level C may include: nitrile gloves, disposable outer boots, Tyvek coveralls, and a respirator. Safety glasses or hard hats may also be required in certain areas.

Site Controls:

Safety cones and or caution tape should be used in high traffic areas. The "Buddy system" may also be employed in high traffic areas.

Potential Hazards:

Traffic, pinch and trip, chemical (airborne and physical contact) and biological. Additional hazards are mentioned in site-specific HASP.

Materials and Equipment Necessary for Task Completion:

Electronic oil/water interface probe or conductivity water line, decontamination supplies (Liquinox, deionized-distilled water, appropriate containers, scrub brush, and sorbent pads or paper towels), air monitoring instrument (optional, based on previous site visits).

Methodology:

The task involves the deployment of a liquid sensing probe into a well (in most cases), recording the reading, and decontaminating the probe. The recorded field readings can then be utilized for one of several applications including: well sampling, water table gradient mapping, separate-phase hydrocarbon occurrence, thickness, and or gradient mapping, and various testing procedures.

The proper procedure for liquid level acquisition from a well is as follows:

1) The wells should be gauged in order of least to most contaminated based on existing sampling data or separate-phase hydrocarbon occurrence
2) The gauging instrument is decontaminated prior to initial deployment and after each well to prevent cross contamination between wells
3) Decontamination procedures include the following steps:
    a) Remove gross contaminants with sorbent pad or towel.
    b) Rinse/scrub equipment with water.
    c) Scrub equipment in Liquinox@/deionized-distilled water solution.
    d) Double rinse with deionized-distilled water.
    e) Air dry.
4) The well(s) to be gauged may need to be marked off with safety cones and or caution tape in order to protect personnel from auto traffic; the "Buddy system" may also be employed.
5) The manhole cover is then lifted off of the well head. A pry bar may be needed to prevent personal injury in the case of large manhole covers.
6) The probe is lowered into the well until the instrument signals contact with liquid.
7) The corresponding reading is recorded when the instrument signals either water or product. A clear bailer may be used to verify the existence or approximate amount and appearance of product.
8) The probe is then retracted from the well and decontaminated accordingly.
9) The well is then secured appropriately.
10) Note the start and stop time for gauging round in the field book.

A.2. GROUNDWATER MONITORING PROCEDURES

Responsible Personnel: Technicians and Geologists

Health and Safety Requirements:

Site specific HASP must be completed and reviewed by field personnel. Ambient air monitoring will be performed quarterly at all treatment areas to determine the necessity of PPE upgrade. As a minimum, level "D" attire will be worn. No persons shall enter any structure with a background air concentration over 10% or less than 19% oxygen.

Training Qualifications:

All field personnel involved in groundwater monitoring shall have, as a minimum completed OSHA 40 HOUR HAZWOPER training and completed the 3 day minimum field training requirements. Prior to groundwater monitoring, all field personnel will have sampled a minimum of three sites under the direct supervision of experienced personnel. Field personnel will also have experience in vapor monitoring techniques and sampling equipment decontamination.

Materials and Equipment Necessary for Task Completion:

A list of equipment required to access, gauge, purge, and sample site monitoring wells is presented below. Also listed are materials necessary to store, label, preserve, and transport groundwater samples.

- Current site map detailing well locations.
- Field data book for recording site data.
- Liquid level gauging device (graduated, optical interface probe).
- Keys and tools to provide well access.
- Appropriate sample containers and labels: volatile samples will be collected in laboratory provided 40 milliliter (ml) glass vials with plastic caps fitted with Teflon ® lined septa; all sample bottles will be laboratory sterilized and will contain the appropriate preservative, if applicable.
- Appropriate well purging apparatus as determined by volume of groundwater to be purged and compounds to be analyzed.
- Teflon ® (or equivalent) bottom-loading bailer to extract groundwater sample.
- Clean nylon or polypropylene bailer cord.
- Disposable nitrile sampling gloves.
- Decontamination supplies.
- Calibrated five-gallon bucket and watch or stopwatch to determine discharge rate during purging.

- Blank chain-of-custody forms.
- Cooler and ice for sample preservation.

Methodology for Three Well Volume Sampling:

Prior to actual site visitation for the groundwater sampling event, the following data will be reviewed to ensure proper preparation for field activities:

- Most recent liquid level data from all wells.
- Most recent analytical data from all wells to determine gauging and sampling sequence.
- Well construction characteristics.

The sequence of obtaining site groundwater samples will be based upon available historical site data for existing wells and soil organic vapor analyzer (OV A) readings for newly installed wells. Site wells will be sampled in order from the lowest to highest concentration of water quality indicator parameters based upon the most recent available set of laboratory analyses to reduce the potential for sample cross-contamination. Groundwater samples will not be obtained for analysis from any well containing a measurable free product layer.

Each monitoring well to be sampled will be gauged to obtain liquid level data immediately prior to initiation of the sampling process. Refer to Liquid Level Gauging SOP for appropriate well gauging procedures. Liquid level data will be recorded in a field book. Should free-phase petroleum product be detected by the gauging process and verified through inspection in a pre-cleaned acrylic bailer, groundwater sampling will not be conducted at that location.

The sampling procedure will be initiated by purging from the well a minimum of three well volumes, except in cases where the well is pumped dry, as referenced below. Well purging is performed to remove stagnant water and to draw representative water from the aquifer into the well for subsequent sampling and analysis for the established parameters. In extreme cases where a well is pumped dry and/or shows little recharge capacity, the well will be evacuated once prior to sample procurement. Well volume calculations will be based on total well depth as determined during well installation and depth-to-water measurements obtained immediately prior to sampling.

Well purging is performed with various equipment including 1) a dedicated bailer for hand bailing low volumes of water, 2) a surface mounted electric centrifugal pump with dedicated polyethylene tubing, or 3) submersible pump (when the depth to water is greater than 20 feet) with dedicated polyethylene tubing. During pumping, the intake will be placed directly below the static water surface and slowly lowered during the purging process. This procedure may not prove necessary in low-yielding wells but is important in high-yielding, permeable strata where an intake initially placed deep in a well may draw laterally and have little influence in exchanging water from shallower depths within the well bore.

Flow rate during well purging will be approximated by the bucket and stop watch method. The duration of pumping required to remove three well volumes will be calculated directly from this flow rate. After purging, the well will be allowed to recover for a period of approximately two hours prior to sample collection. This action will permit a consistent groundwater flux into each well and allow for VOC stabilization prior to sample extraction. All fluids removed during purging will be treated on-site with activated carbon.

The following sequence of procedures will be implemented for the collection of groundwater samples from monitoring wells.

1) Establish a clean work area where sampling equipment will not come in contact with the ground or any potentially contaminated surfaces.
2) Use a laboratory, pre-cleaned Teflon@ sampling bailer for each well.
3) Don an unused, clean pair of nitrile gloves.
4) Attach an appropriate length of unused, clean nylon or polypropylene cord to the designated sampling bailer.
5) Select appropriate laboratory-sterilized sample containers.
6) Slowly lower sampling bailer into well until water surface is encountered; continue to lower the sampling bailer into the standing water column to one foot below the water surface.
7) Retrieve bailer at a steady rate to avoid excess agitation.
8) Visually inspect bailed sample to ensure that no free product or organic detritus has been collected.
9) Uncap first designated sample vial and fill from bailer as rapidly as possible but minimizing agitation; secure septum and lid.
10) Inspect sealed sample for entrapped air; if air is present within sample vial. Remove lid and repeat vial filling, sealing and inspection process until no air is present.
11) Repeat Steps 9 and 10 for the second designated vial; all volatile parameter samples will be collected in duplicate.
12) Complete and attach labels to sample containers noting sample collector, date, time, and location of sample; record same data in field book.
13) Place samples in ice-filled cooler in such a manner as to avoid breakage. Samples collected for VOC analysis will be maintained at a temperature of 4oC.

Discard gloves and bailer cord and move to next sample location.

Decontamination Requirements:

Numerous practices are employed throughout the processes of site investigation and sampling to assure the integrity of the resulting data. Of particular significance to the procedures of groundwater measurement and sampling is the limitation, whenever possible, of materials inserted into a well bore and, even more importantly, of materials transferred from well to well.

Many items can be discarded between well sampling and/or gauging locations without significantly impacting project costs. Dedicated sampling equipment which can be discarded between well sampling locations without significantly impacting project costs, will be used whenever possible to preclude decontamination requirements. Sampling equipment included in this category are Teflon ® bailers, nitrile gloves, and bailer cord. However, other investigative and sampling equipment, including such items as liquid level probes, must be reused from well to well.

The danger in multi-well equipment applications lies in the potential of cross-contamination. While the threat of cross-contamination is always present, it can be minimized through the implementation of a consistent decontamination program during sensitive site measurement and data collection activities. The decontamination procedure is outlined below:

All site equipment used in a multi-well capacity will be decontaminated immediately prior to initial use and between each well. Standard site decontamination procedures for the optical interface probes between wells will be performed according to the following schedule:

- Initial rinse with clean tap water to remove excess residuals.
- Scrub equipment with sponge or clean, soft cloth in a distilled water/Liquinox@ (or equivalent) solution.
- Double rinse with deionized/distilled water.

Rinse water generated during decontamination procedures will be treated on-site by passing the water through a bucket filled with activated carbon prior to disposal.