AOI 10 Ecological Risk Assessment Report for Sediment in Lands Creek

Philadelphia Energy Solutions Refining and Marketing LLC (PES) Refinery

Philadelphia, Pennsylvania

Evergreen Resources Management

410 Eagleview Boulevard, Suite 110, Exton, Pennsylvania, 19341

11109606 | Report No 1 | June 2016

Table of Contents

1. Introduction 1
2. Site Description 1
   - 2.1 Site Location and Description 1
   - 2.2 Site History / Background 2
3. Summary of Previous Site Characterization Activities 2
   - 3.1 Sampling Activities 2
   - 3.2 Site Assessments 3
     - 3.2.1 2011 Ecological Screening Assessment 3
4. 2015 Site Characterization Activities 5
   - 4.1 Habitat Assessment 5
   - 4.2 Sediment Evaluation 6
     - 4.2.1 Metals 6
     - 4.2.2 PAHs 7
5. PA Act 2 Ecological Screening Assessment 8
   - 5.1 Steps 1 through 5 8
   - 5.2 Step 6 - For Environments with Identified Site-Specific CPECs, are there habitats of species of concern potentially affected? 9
   - 5.3 Step 7 - Are there complete exposure pathways between Site-specific CPECs and species or habitats of concern? 10
   - 5.4 Step 8 - Documentation of Attainment of Standard 10
6. SLERA to Address Step 8 of PA Act 2 Ecological Screening Process 11
   - 6.1 Step 1: Screening Level Problem Formulation and Ecological Effects Evaluation 11
     - 6.1.1 Environmental Setting 11
     - 6.1.2 Threatened and Endangered Species Assessment 11
     - 6.1.3 Known and Suspected COPECs 11
     - 6.1.4 Potentially Complete Exposure Pathways 11
     - 6.1.5 Assessment and Measurement Endpoints 11
   - 6.2 Step 2: Screening Level Exposure Estimate and Risk Calculation 12
     - 6.2.1 Exposure Estimates 12
     - 6.2.2 Screening Risk Calculation 12
7. Summary and Conclusions 13
8. References 14
9. Certification 15

Figure Index

Figure 2.1 USGS Site Location Map

Figure 2.2 Aerial Location Map

Figure 4.1 Habitat Cover Type Map

Figure 5.1 PA Act 2 Ecological Screening Flow Chart

Table Index

Table 4.1 Lands Creek 2015 Sediment AVS-SEM Metals Results and Screening

Table 4.2 Lands Creek 2011 Sediment PAH Results and Re-Screening

Appendices

Appendix A Site Photographs

Appendix B Pennsylvania Natural Diversity Inventory (PNDI) Database Receipt and Agency Correspondence

Appendix C 2011 SCR/RIR Report for AOI 10 (Langan 2011)

Appendix D Laboratory Analysis Report (Eurofins Lancaster Laboratories Environmental)

1. Introduction

This Report is being submitted to the Pennsylvania Department of Environmental Protection (PADEP) to document the ecological evaluation of Lands Creek in Area of Investigation 10 (AOI 10) within a portion of the Philadelphia Energy Solutions Refining and Marketing LLC (PES) Refinery located in Philadelphia, Pennsylvania.

A Site Characterization Report/Remedial Investigation Report (SCR/RIR) for AOI 10, prepared by Langan Engineering & Environmental Services, Inc. (Langan) was submitted to PADEP on June 29, 2011. To evaluate the ecological conditions within AOI 10, an Ecological Screening Assessment was performed in accordance with the Act 2 Technical Guidance Manual (TGM) and presented in the SCR/RIR. Langan's 2011 Ecological Screening Assessment determined that initial Constituents of Potential Ecological Concern (CPECs)[1] occur in groundwater, soil and sediment in AOI 10 and that further ecological assessment of Lands Creek was necessary. This further assessment was needed to determine if species of concern or habitats of concern are likely to exist within AOI 10 or within 1,000 feet of AOI 10. If so, additional analyses would be needed to assess whether complete exposure pathways exist from CPECs to these species or habitats, and where present, whether these complete exposure pathways could cause significant ecological impacts.

PADEP approved Langan's assessment and recommendation for further evaluation of Lands Creek in an approval letter dated January 6, 2012. GHD conducted a habitat assessment and additional sediment sampling in Lands Creek in September and October 2015. GHD's study area consisted of Lands Creek and habitats adjoining Lands Creek. The results of these additional activities are presented below and discussed in this Ecological Risk Assessment Report for Sediment in Lands Creek within AOI 10.

2. Site Description

2.1 Site Location and Description

AOI 10, also known as the Point Breeze West Yard (West Yard), is comprised of approximately 80 acres and is located west of the Schuylkill River and south of Passyunk Avenue (Figure 2.1). The majority of AOI 10 is open space and is bounded by Passyunk Avenue to the north-northwest, the Schuylkill River to the east-southeast, and industrial properties to the south and west (Figure 2.2).

Lands Creek, a small tributary of the Schuylkill River, traverses the southern portion of AOI 10. Lands Creek originates in the western portion of AOI 10 and is characterized by a series of straight segmented channels and open water / ponded areas, which have resulted from historical grading (channelization, earth moving, filling, etc.) in AOI 10. Lands Creek is separated from the Schuylkill River by an earthen berm (no pipe or visible connection was observed). No real or tidal flow was observed in Lands Creek during a site investigation conducted by GHD on September 30 and October 19 and 20, 2015, which occurred during periods of both high and low tides. Although Lands Creek does not appear to be tidally influenced, it likely receives water from the River during flood events. Photographs of AOI 10 and adjoining areas are provided in Appendix A.

1 Langan's 2011 SCR/RIR refers to contaminants of potential ecological concern as COCs. Following the nomenclature of Act 2, this document refers to these contaminants as initial CPECs (Constituents of Potential Ecological Concern).

2.2 Site History / Background

AOI 10 is a portion of the Philadelphia Refinery Complex on the west side of the Schuylkill River and south of Passyunk Avenue. The refinery complex was previously owned by Sunoco and is now owned and operated by Philadelphia Energy Solutions (PES).

Four past disposal areas (PDAs 1 through 4) exist in AOI 10 and consist of former lagoons and landfills that received wastes from the refinery under ownership by the Atlantic Richfield Company during the 1950s and 1960s. PDAs 1 and 2 were capped with clay materials and PDAs 3 and 4 were capped with clay and vegetative cover materials in the 1980s. The PDAs were investigated as part of the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) performed by ENSR Consulting and Engineering (ENSR) in 1992. As part of the RFI activities, the PDAs were grouped into one corrective action management unit (CAMU). This CAMU is the only RCRA waste management unit in AOI 10.

In addition to the PDAs, historic use areas in AOI 10 include a tank area and associated pump houses in the northeast portion of the Site and two fuel docks along the River, which makes up the eastern boundary of the Site. The structures associated with the tanks and pump houses were demolished prior to 2005. Currently, activities in AOI 10 include maintenance of an existing Sunoco pipeline that is mostly above grade and extends along much of the northern boundary of AOI 10, and an aboveground manifold area that connects underground and aboveground lines between the refinery and the Schuylkill River Tank Farm. AOI 10 is located within a fenced and secured area to prevent unauthorized access.

3. Summary of Previous Site Characterization Activities

Site characterization activities were performed between April and May 2011 by Aquaterra Technologies, Inc. (Aquaterra) and Langan in coordination with Sunoco. In addition, Stantec completed site cleanup activities to address a release of vacuum gas oil (VGO) in April 2010.

3.1 Sampling Activities

The 2010 and 2011 site characterization activities included the following:

- Soil borings and sampling outside of CAMU areas;
- Soil borings and sampling within CAMU areas;
- Installation, monitoring and sampling of shallow and intermediate groundwater monitoring wells;
- Surface water and sediment sampling in Lands Creek;
- LNAPL sampling; and
- VGO release cleanup and post excavation soil sampling

The results of the sampling activities are discussed in Section 4.1.5

3.2 Site Assessments

The 2011 SCR/RIR for AOI 10 also included the following site assessments:

- Fate and Transport Analysis;
- Site Conceptual Model;
- Human Health Exposure Assessment / Risk Assessment; and
- Ecological Assessment.

3.2.1 2011 Ecological Screening Assessment

The Ecological Screening Assessment was conducted by Langan under PA Act 2 for all media (groundwater, soil, surface water, and sediment). Each environmental medium was analyzed for selected volatile organic compounds (VOCs), selected semi-volatile organic compounds (SVOCs) and Target Analyte List metals, as were originally identified for each medium in the Current Conditions Report[2].

Groundwater

The results of the groundwater samples collected from shallow and intermediate monitoring wells were initially screened by Langan against the PADEP non-residential use aquifer (TDS<2,500) groundwater MSCs (SCR/RIR Tables 10 and 11 provided in Appendix C).

Langan's screening determined initial CPECs at concentrations above their respective non-residential groundwater MSCs included benzene, chrysene, naphthalene, and lead in the shallow wells. All other CPECs were below their respective non-residential groundwater MSCs. No CPECs were detected in the intermediate wells above their respective nonresidential groundwater MSCs. Langan noted that one well had concentrations of benzene that had the potential to reach Land's Creek but that surface water in Land's Creek did not have any constituent detected above Chapter 93 water quality criteria.

Soil

All of the soil samples collected, regardless of location were initially screened by Langan against the PADEP non-residential soil MSCs for unsaturated soils (SCR/RIR Tables 4 through 9 provided in Appendix C).

Soil outside CAMU Areas

All of the soil samples outside of the CAMU areas were collected between 0 to 2 feet below grade. Langan's screening determined initial CPECs in soil above their respective non-residential soil MSCs included benzene, benzo(a)pyrene, PCE, arsenic, manganese, and lead. Langan also calculated site-specific standards for soil and identified that any of the soil results that exceeded the site-specific standards would be addressed in the Cleanup Plan. All other CPECs were below their respective nonresidential soil MSCs.

2 Footnote to Current Condition Report tables: 1. Constituents are from Pennsylvania Corrective Action Process (CAP) Regulation Amendments effective December 1, 2001; provided in Chapter VI, Section E (pgs. 29-30) of PADEP Document, *Closure Requirements for Underground Storage Tank Systems,* effective April 1, 1998.

Soil within CAMU Areas

The soil samples within the CAMU Areas were collected from 0 to 2 feet below the ground surface above the waste (shallow soil samples). All soil results were screened against the PADEP non-residential soil MSCs in the SCR/RIR. Initial CPECs detected in shallow soil above their respective non-residential soil MSCs included: benzo(a)pyrene, dibenzo(a,h)anthracene, manganese and lead. Langan also calculated site-specific standards for soil and identified that any of the soil results that exceeded the site-specific standard would be addressed in the Cleanup Plan. All other CPECs were below their respective non-residential soil MSCs.

Soil within Vacuum Gas Oil Release Area (Post Excavation Soil Samples)

Post excavation soil samples were collected following excavation of VGO-impacted surface soil. The samples were analyzed for selected volatile organic compounds, selected semi-volatile organics and lead and screened against PADEP non-residential soil MSCs. Langan's screening determined that all samples were below their respective non-residential soil MSCs.

Surface Water

Concentrations of chemicals detected in surface water samples collected from Lands Creek were screened by Langan against the 25 Pa. Code, Chapter 93 Fish and Aquatic Life Criteria (SCR/RIR Table 12 provided in Appendix C). The more conservative chronic aquatic life criteria were used. To calculate the criteria for constituents that require hardness data, site-specific hardness data collected at each sampling location was used.

Surface water samples were analyzed for select VOCs, select SVOCs, and metals (total and dissolved). Based on Langan's screening, no initial CPECs, either organic or metals (both total and dissolved) were detected in the surface water. That is, no chemicals were detected at concentrations above their respective Chapter 93 screening criteria. Therefore, surface water was determined not to be a media of concern.

Sediments

Results of sediment samples collected from Lands Creek were initially screened by Langan against the EPA Region 3 Biological Technical Assistance Group (BTAG) sediment and the LEL and calculated SEL values for each of the constituents (SCR/RIR Table 13 provided in Appendix C). Total organic carbon data was collected at each sample location and was used by Langan to calculate sample-specific SEL criteria for organic constituents. Based on Langan's initial screening, no VOCs exceeded the sediment screening criteria. Several SVOCs (PAHs) and metals were above the sediment screening criteria calculated by Langan: anthracene, benzo(ghi)perylene, chrysene, phenanthrene, pyrene, arsenic, chromium (total), copper, iron, lead, manganese, mercury, nickel, and zinc. These were retained as initial CPECs and are addressed in Step 8 of the Ecological Screening Assessment.

In a correspondence dated January 6, 2012, the PADEP concurred with Langan's ecological assessment and recommendation to complete an ecological evaluation for Lands Creek in accordance with Act 2. As such, GHD conducted additional site characterization activities in 2015 to complete the ecological evaluation for Lands Creek in AOI 10. The results of these additional activities are presented below.

4. 2015 Site Characterization Activities

GHD completed the following activities to complete the Ecological Evaluation for AOI 10:

- Habitat assessment to document the habitat types present within and adjoining AOI 10 and the suitability of these habitats to support species of concern based on the results of a Pennsylvania Natural Diversity Inventory (PNDI) database search;
- Collection of sediment samples in Lands Creek for analysis of acid volatile sulfides and simultaneously extracted metals (AVS-SEM) to assess the bioavailability of metals; and
- Evaluation of the 2011 Lands Creek sediment PAH results and calculation of the Severe Effects Level (SEL) and Lowest Effects Level (LEL) concentrations for PAHs adjusting for the amount of carbon present in sediments in Lands Creek.

4.1 Habitat Assessment

As part of the ecological screening process, GHD conducted an assessment of AOI 10 to determine if any of the sensitive receptors listed at PA Chapter 250.311 (a) were present. A Pennsylvania Natural Diversity Inventory (PNDI) database search (Appendix B) indicated no potential conflicts with any Federally listed threatened or endangered species as designated by the United States Fish and Wildlife Service (USFWS) under the Endangered Species Act (16 U.S.C.A. § § 1531 5544).

The PNDI identified a potential conflict with one (1) threatened species under the jurisdiction of the Pennsylvania Fish and Boat Commission (PFBC). Given the location of the Study Area along the Schuylkill River, the species of concern was assumed to be the eastern redbelly turtle (*Pseudemys rubriventris*). Note that the PFBC does not identify species by name on the PNDI receipt. The PNDI also identified a potential conflict with two (2) threatened plant species under the jurisdiction of the Pennsylvania Department of Conservation and Natural Resources (DCNR). The two plant species of concern listed on the PNDI receipt are River Bulrush (*Schoenoplectus fluviatilis*) and Waterhemp Ragweed (*Amaranthus cannabinus*), also referred to as Salt-marsh Water-hemp.

On September 30, 2015, Ms. Christine Miller and Mr. Christopher Andes, GHD Biologists, conducted a site assessment to identify habitat cover types, evidence of habitat for species of concern, presence of any species of concern and, as appropriate, evidence of stress to ecological receptors from Site-related constituents of concern.

Currently, the habitat within AOI 10 consists of several segments of creek channel and areas of ponded water (Lands Creek), forested wetlands, dense stands of *Phragmites*, upland woods, access roads and upland/wetland fallow fields (periodically mowed in areas along existing pipeline right-of-ways). AOI 10 is located in a highly industrialized area and is surrounded by oil storage facilities, automobile junk yards and commercial businesses. The habitat cover types identified within and adjoining AOI 10 are shown on Figure 4.1.

During the site investigation, GHD observed ample basking structure in Lands Creek which consisted of downed trees, logs, rocks, tires and other debris. GHD also observed numerous eastern painted turtles (*Chrysemys picta picta*) and red-eared sliders (*Trachemys scripta elegans*) basking in Lands Creek. Although GHD did not positively identify any eastern redbelly turtles, the presence of numerous basking turtles of all age and size classes indicates that the eastern redbelly turtle is also likely present in Lands Creek. Additionally, the eastern redbelly turtle is known to occur in the Schuylkill River, which occurs along the eastern boundary of AOI 10. Evidence of turtle

nesting was observed in fill material in the uplands adjoining Lands Creek in an area with an open canopy. Additionally, mowed fallow field within AOI 10 has the potential to provide nesting habitat for the eastern redbelly turtle.

During the site investigation, GHD did not observe the plant species of concern or suitable habitat for these plant species within the Lands Creek portion of AOI 10. The majority of Lands Creek is dominated by *Phragmites* or areas of deep open water that would limit the establishment of the plant species of concern.

Although the Schuylkill River shoreline and associated mudflats along the eastern boundary of AOI 10 could provide potentially suitable habitat for the plant species of concern, GHD did not observe these plants. The banks of the Schuylkill River are generally steep with some portions bulk headed. The non-bulkheaded sections of shoreline are comprised of concrete, boulders, debris, cobble, bricks and gravel. A wooded riparian corridor occurs along the shoreline of the River. The dominant species consist of eastern cottonwood (*Populus deltoides*), red mulberry (*Morus rubra*), silver maple (*Acer saccharinum*), box elder (*Acer negundo*), green ash (*Fraxinus pennsylvanica*), black locust (*Robinia pseudoacacia*), false indigo bush (*Amorpha fruticosa*), speckled alder (*Alnus rugosa*), bush honeysuckle (*Diervilla lonicera*), oriental bittersweet (*Celastrus orbiculatus*), Asiatic tearthumb (*Persicaria perfoliata*), white snakeroot (*Ageratina altissima*), green foxtail (*Setaria viridis*), mugwort (*Artemisia vulgaris*) and goldenrod species (*Solidago* spp.). The intertidal zone was predominately unvegetated with the exception a few scattered sycamore (*Platanus occidentalis*) saplings, smartweed (*Polygonum pensylvanicum*), water pepper (*Polygonum hydropiper*), and northern bugleweed (*Lycopus uniflorus*). The mud flats, exposed at low tide, were predominantly unvegetated. GHD concluded that Lands Creek and the shoreline of the Schuylkill River (within the AOI 10 study area) do not provide suitable habitat for the plant species of concern.

GHD submitted habitat assessment reports to both the PFBC and DCNR on November 23, 2015. DCNR provided a response on December 18, 2015 indicating no project impact was anticipated but requested coordination prior to any remedial activities. PFBC provided a response on December 15, 2015 indicating that further coordination would be necessary if wetlands, vernal pools, open water areas, streams, or ponds or the area within 300 feet of these water features are to be disturbed from future project-related activities. Correspondence with the PFBC and DCNR is provided in Appendix B.

4.2 Sediment Evaluation

4.2.1 Metals

The initial sediment screening conducted by Langan in 2011 identified arsenic, chromium (total), copper, iron, lead, manganese, mercury, nickel, and zinc as being present in sediments at concentrations of potential ecological concern (SCR/RIR Table 13 provided in Appendix C). Many of these metals (copper, lead, mercury, nickel, and zinc) are primarily present as divalent cations, which preferentially bind to sulfide, resulting in an effectively insoluble and non-toxic precipitate (USEPA 2005). If bound to sulfide, these metals, although detectable from laboratory analysis, are not bioavailable for uptake by ecological receptors. Even those metals not bound to sulfide will bind to organic carbon, which will further ameliorate toxicity. Therefore, in order to further evaluate Lands Creek, GHD collected five (5) additional sediment samples on October 19, 2015 from the same 2011 sample locations within Lands Creek. Sediment was collected from the 0-6 inch depth interval (biologically active zone) and submitted for analysis of acid volatile sulfides / simultaneously

extracted metals (AVS-SEM), hexavalent chromium, organic carbon and total solids. Two representative samples were also analyzed for grain size distribution.

The 2015 AVS-SEM results are presented in Table 4.1. As shown in this table, cadmium, chromium (total), copper, lead, nickel, mercury and zinc were detected in the 2015 samples. Hexavalent chromium was not detected. The Laboratory Analysis Report prepared by Eurofins Lancaster Laboratories Environmental is provided as Appendix D. GHD's screening of the 2015 AVS-SEM results is discussed in Step 8 of the Ecological Screening Assessment.

4.2.2 PAHs

The 2011 sediment PAH results are presented in Table 4.2. As shown in this table, many of the polycyclic aromatic hydrocarbons (PAHs) were detected at concentrations that were above the more conservative ecological screening value (ESV), usually a lowest effects level (LEL). Several PAHs (anthracene, benzo(ghi)perylene, chrysene, phenanthrene and pyrene) were detected above a sample-specific severe effects level (SEL), as calculated by Langan.

The sediment data from the 2011 SCR/RIR identified high concentrations of OC, ranging from 1.6 to 30%, with an average of 10%. These concentrations of OC are higher than typically found at most sites, and the higher organic carbon content impacts the calculation of LEL and SEL screening criteria for organic compounds. Although not described as functions of organic carbon, published LEL values, originally from Persaud et al. (1993), were based on an assumed sediment carbon concentration of 1%[3]. Comparatively, PAH toxicity in the Lands Creek sediment is ameliorated by the high carbon concentrations that occur in the sediments (site-specific average of 10%) because PAHs have a low solubility and exhibit an affinity for sorption in carbon (USEPA 2008). Therefore, to further evaluate PAHs in Lands Creek sediment, GHD evaluated the 2011 sediment data using carbon-normalized LEL and SEL values based on the organic carbon data also collected in 2011 as summarized in Table 4.2. No additional PAH sediment data were collected in 2015.

LEL and SEL values are co-occurrence sediment benchmarks, in which benchmarks for individual chemicals were identified as concentrations which co-occurred with toxic effects. Therefore, these sediment benchmark values for individual PAHs (i.e. LELs and SELs) are not based on the individual effect of the particular compound, but rather reflect the typical concentration of that compound when, all of the co-occurring chemicals, caused some effect. Because the different PAHs pose additive toxicity and always occur in mixtures, the specific LEL or SEL value for any one PAH already includes the additive toxicity of the other PAHs. Thus, each PAH ESV is a surrogate indicator for the combined toxicity of the spectrum of PAHs. Because the ESVs for total PAHs effectively sum the concentrations of all the PAHs that co-occurred with toxicity, the ESVs for total PAH are a more reliable indicator of potential toxicity than ESVs for individual PAHs. Hence, the ESV for total PAHs was used as the determinative value in assessing potential risks, as shown in Table 4.2.

As shown in this table, LEL and SEL values were adjusted to the high Site-specific OC concentrations, no individual PAH compound, or more importantly, the total PAHs for any sample does not come close to exceeding the carbon-corrected LEL. As would be expected since SELs > LELs, all PAH concentrations were even further below SEL values. Hence, this rescreening

3 Both LEL and SEL values for organic chemicals are based on carbon-normalized concentrations. However, in the source guidance document (Persaud et al. 1993), the LELs were converted to bulk sediment values based on an assumed organic carbon concentration of 1%. The SELs are published in their native units as carbon-normalized values.

eliminates PAHs as CPECs in Lands Creek sediments. Therefore, no further screening or discussion of PAHs in sediments was carried forward in the Ecological Screening Assessment.

5. PA Act 2 Ecological Screening Assessment

The Pennsylvania Act 2 guidance for assessing ecological impacts is a decision tree intended to prevent unnecessary analyses at Sites that contain little to no habitat or few compounds at concentrations that could potentially affect ecological receptors. The overall goal of the Ecological Assessment (EA) is to minimize, to the extent practicable, the number of sites which require detailed ecological risk assessment, while retaining protection of the environment. At the end of the Act 2 screening, a site will be identified as either:

- Not a source of substantial ecological impact and, therefore, not requiring further ecological evaluation, or
- Having the potential to cause substantial ecological impact and, therefore, requiring further ecological evaluation.

More specifically, the EA has been divided into eight (8) discrete steps, as described below and following a decision tree presented as Figure 5.1.

5.1 Steps 1 through 5

Based on knowledge of Site history and the 2011 sampling of aquatic areas, Steps 1 through 5 of the Ecological Assessment were previously conducted in 2011 by Langan in accordance with the Act 2 Technical Guidance Manual (TGM). A summary of Steps 1 through 5 is provided below.

Step 1 - Are Site-related chemicals limited to light petroleum products?

Step 1 considers whether risks can be dismissed because Site-related chemicals are entirely light petroleum products that have low persistence and low ecotoxicity.

Previous AOI 10 investigations determined the AOI 10-related chemicals, which include several heavy metals and PAHs, are those associated with petroleum transportation, storage, and processing. Because the AOI 10-related chemicals include heavy petroleum products as well as light petroleum products, the EA proceeded to Step 2.

Step 2 - Are areas of contamination *de minimis*?

Step 2 of an EA considers whether the area of contamination pertains to a *de minimis* area, defined in Act 2 as less than two acres of exposed soil or less than 1,000 square feet of contaminated sediment.

Neither applies. AOI 10 is approximately 80 acres in size and the surface water/sediment area of Lands Creek is greater than 1,000 square feet, and it is not a permitted open water management area. Lands Creek is a freshwater tidally influenced drainage feature which (under certain high water conditions) drains into the Schuylkill River. Thus, areas of potential soil and sediment contamination are both above their respective *de minimis* areas. Hence, the screening analysis continued to Step 3.

Step 3 - Do Site-Specific Factors Preclude Exposure to Ecological Receptors?

Step 3 considers whether factors such as buildings, parking lots, or graveled or paved areas will obviously eliminate exposure pathways between Site-related chemicals and ecological receptors.

There are no site-specific factors that eliminate exposure pathways between Site-related chemicals and ecological receptors. Hence, the screening analysis continued to Step 4.

Step 4 - Have there been releases of CPECs at the Site?

Step 4 assesses whether there are CPECs at AOI 10. The media screened in the 2011 SCR/RIR for AOI 10 included groundwater, soil, surface water, and sediment. The sources of ESVs and results of the 2011 screening for each media were previously discussed in Section 3.0, Screening tables for each media, prepared by Langan for the 2011 SCR/RIR, are provided in Appendix C. As shown in the referenced tables, elevated levels of several metals and PAHs were found in samples of AOI 10's soil, groundwater, and sediments, but not in surface water.

GHD's re-evaluation of the sediment PAHs was previously discussed in Section 4.2.2. GHD conducted an additional sediment evaluation for metals in 2015, the results of which are presented and discussed in Step 8 of the Ecological Screening Assessment.

Step 5 - For Environments with No Site-Specific CPECs, does an onsite evaluation identify potential ecological concerns?

Site-specific CPECs were identified in groundwater, soil and sediments. Thus, an investigation of these ecosystems proceeds to Step 6 as discussed below. No Site-specific CPECs were identified in surface water. Following Act 2 guidance, a preliminary habitat survey was conducted by Langan in April 2011. Langan confirmed that true sediment exists within the creek and no stressed vegetation was observed. No evidence of ecological effects of chemicals in surface water was noted; therefore, it was determined that no further EA activities for surface water were necessary.

PADEP concurred with Langan's assessment (Steps 1 through 5) and conclusion that an ecological evaluation specific to Lands Creek sediment was necessary, in accordance with Act 2 (PADEP approval letter dated January 6, 2012). Based on Langan's conclusions in Steps 1 through 5 and PADEP's concurrence, GHD continued the Ecological Assessment by completing Steps 6 through 8 for sediment in Lands Creek. A summary of the continued step-wise progression is described below.

5.2 Step 6 - For Environments with Identified Site-Specific CPECs, are there habitats of species of concern potentially affected?

GHD continued the EA and proceeded to Step 6, a detailed Onsite Evaluation. GHD completed a Pennsylvania Natural Diversity Inventory (PNDI) database search for the Site. The PNDI listed 1 reptile species and 2 plant species as potential conflicts on the Site. These species include the eastern redbelly turtle, river bulrush (*Schoenoplectus fluviatilis*) and waterhemp ragweed (*Amaranthus cannabinus*), also referred to as salt-marsh water-hemp. All of these species are water/wetland dependent.

On September 30, 2015, GHD Biologists conducted a site assessment to identify habitat cover types, evidence of habitat for species of concern, presence of any species of concern and, as

appropriate, evidence of stress to ecological receptors from Site-related constituents of concern. The results of the habitat assessment were previously discussed in Section 3.1. The habitat cover types identified on the Site are shown on Figure 4.1.

5.3 Step 7 - Are there complete exposure pathways between Site-specific CPECs and species or habitats of concern?

GHD re-evaluated the 2011 Lands Creek sediment data using carbon-normalized LEL and SEL values based on the organic carbon data also collected in 2011 (previously discussed in Section 4.4.2). When the LEL and SEL values were adjusted to the high Site-specific OC concentrations, no individual PAH compound, and more importantly, no total PAHs for any sample exceeding the conservative screening criteria (carbon-corrected LEL). Thus, the rescreening eliminates PAHs as CPECs in Lands Creek sediments. Therefore, no further screening or discussion of PAHs in sediments was carried forward in the EA.

The surface sediments in Lands Creek (legacy sediments which also include near shore soil) do contain Site-specific CPECs (metals) and are also a potential habitat of concern. Currently complete exposure pathways do exist. Thus, the EA continued for sediments.

5.4 Step 8 - Documentation of Attainment of Standard

Based on the results of the previous steps in the EA, AOI 10 in its current and intended use contains complete pathways such that species of concern could potentially be impacted, specifically to sediment in Lands Creek. Screening of Site-related chemicals against conservative ESVs concluded that a handful of divalent metals (chromium, copper, iron, lead, mercury, nickel, and zinc) and total chromium could potentially be problematic in sediment. As per Act 2 guidance, further evaluation of sediment in Lands Creek was completed by means of a Screening Level Risk Assessment (SLERA) which is part of the ERA 8-step process established by the USEPA (1997) which is presented in Section 5.0. Steps 1 and 2 constitute the SLERA and are described as follows:

- **Screening Level Problem Formulation (Step 1)** - This step includes a Site reconnaissance to document the following: ecological setting of the assessment area, identification of known or suspected sources of impact, discussion of the fate and transport of Site related constituents, identification of potentially complete exposure pathways, development of a preliminary Conceptual Site Model (CSM), selection of assessment and measurement endpoints, and an ecological effects evaluation. The presence or absence of important habitats and species of concern are also considered at this step.

- **Screening Level Exposure Estimate and Risk Calculation (Step 2)** - This step includes completion of preliminary exposure estimates and risk calculations. Constituents with concentrations in one or more media that potentially pose risk to ecological receptors are identified as preliminary COPECs. Preliminary COPECs are identified based on three criteria: 1) the comparison of contaminant levels to conservative Ecological Screening Values (ESVs), 2) frequency of detection (FOD), and 3) comparison to appropriate background levels. Step 2 ends with a Scientific Management Decision Point (SMDP), at which point the risk assessor communicates results of the assessment at that stage to a risk manager. Decisions on the next action(s) are made by the risk assessor and risk manager.

6. SLERA to Address Step 8 of PA Act 2 Ecological Screening Process

6.1 Step 1: Screening Level Problem Formulation and Ecological Effects Evaluation

This initial step of the ERA determines which components of an ecosystem (the sum of all the living organisms, their interactions, and the physical factors in a particular area) should be protected, and, therefore, which species and communities should be the focus of the ERA.

6.1.1 Environmental Setting

The environmental setting was previously discussed in Sections 2.1 and 4.1.7. Figure 4.1 identifies the primary habitat cover types within the AOI 10 assessment area.

6.1.2 Threatened and Endangered Species Assessment

GHD's threatened and endangered species assessment and coordination with the resource agencies was previously discussed in Section 4.1.7.

6.1.3 Known and Suspected COPECs

Based on site characterization activities and available data, arsenic, chromium (total), copper, iron, lead, manganese, mercury, nickel, and zinc appear to be the primary metal COPECs associated with sediment in Lands Creek.

Most heavy metals are particle-reactive substances. That is, these metals tend to form insoluble salts or to adsorb to organic matter or charged inorganic ligands in soils and sediments. Once in aquatic systems, most heavy metals tend to be carried downstream with suspended sediments or, in slow moving waters, deposit to and persist in aquatic sediments.

6.1.4 Potentially Complete Exposure Pathways

Previous site characterization activities have demonstrated that the only remaining media of concern is legacy sediments (i.e., in place sediments) in Lands Creek. Based on the Act 2 ecological process described above, divalent metals (chromium, copper, iron, lead, mercury, nickel, and zinc) are the only remaining COPECs in Lands Creek sediments. These will be further evaluated in Step 2 of the SLERA.

6.1.5 Assessment and Measurement Endpoints

Assessment endpoints are explicit expressions of environmental values or characteristics to be protected at a site. The remaining COPECs are metals that do not readily bioaccumulate in food chains. Thus, the primary assessment endpoint for these metals is benthic macroinvertebrate facing direct toxicity from legacy sediment inventories of heavy metals. A secondary assessment endpoint for these metals is avian and mammalian piscivores.

6.2 Step 2: Screening Level Exposure Estimate and Risk Calculation

6.2.1 Exposure Estimates

Surface sediment in Lands Creek is considered to be sediment collected from the depth interval of 0 to 0.5 ft below top of sediment, which, by convention, represents the primary zone of biological activity. To address uncertainty about potential effects of metals (identified during Langan's initial screening in 2011), GHD collected 5 additional surface sediment samples at the same locations as the 2011 samples and analyzed these samples for AVS/SEM (acid volatile sulfide/simultaneously extracted metals). The AVS/SEM analyses more accurately address bioavailability of divalent metals (USEPA 2005).

6.2.2 Screening Risk Calculation

Divalent Metals

Several divalent metals (chromium, copper, iron, lead, mercury, nickel, and zinc) were detected at concentrations above Langan's calculated SELs in the Lands Creek sediment samples collected in 2011. AVS/SEM analysis was conducted in 2015 to determine the net molar balance of divalent metal cations versus sulfides. Divalent metals will preferentially form sulfide compounds with chemically available sulfides. Metallic sulfides typically have a very high stability and weather extremely slowly under ambient conditions. The AVS/SEM analysis determines the amount of divalent metals present with the sulfides. Metals have to be present in excess of the capacity of available sulfide binding capacity for the metals to be biologically available and potentially toxic to ecological receptors. The balance is calculated on the basis of equivalents (moles divided by valence). If present in excess, the number of equivalents of metals is then normalized to organic carbon, which will also bind to free divalent metals that are not bound to sulfide (Allen et al. 1993).

The 2015 divalent metals were screened based on their AVS/SEM results (Table 4.1). The AVS/SEM analyses are mostly applicable to fine, oxygen poor sediments where AVS and organic carbon are the primary ligands for divalent metals. For the AVS/SEM data, USEPA guidance (USEPA 2005) indicates that values of carbon normalized excess SEM (CNE-SEM) less than 130 umol/gram organic carbon (OC) are not toxic to benthic invertebrates. Values above 130 umol/gram OC but below 3,000 umol/gram OC are potentially toxic to benthic invertebrates, and values above 3,000 umol/gram OC have a high potential to be toxic.

As shown in Table 4.1, all of the concentrations of CNE-SEM in the 2015 Lands Creek sediment samples are below 130 umol/gram OC, the threshold above which toxicity is possible. All are obviously an order of magnitude or more below 3,000 umol/gram OC, at which toxicity is routinely expected. Thus, these AVS/SEM data support a conclusion that the chance for ecological effect of divalent metals is negligible.

Other Metals

Chromium

The 2011 sediment samples were analyzed for total chromium. The AVS/SEM results can also be used to dismiss chromium toxicity. As described in USEPA (2005), "In sediments with substantial AVS, risks of chromium toxicity should be low, because the chromium will be present in the form of Cr (III)." Chromium III has very low solubility and very low aquatic toxicity. Further, the 2015

sediment samples were analyzed for hexavalent chromium, the more bioavailable and toxic form. Hexavalent chromium was not detected in these samples (Table 4.1).

Arsenic

Arsenic was detected in all 2011 sediment samples above the LEL. This is not surprising since the LEL is a background concentration for the Great Lakes watershed (Smith 2008), and the background concentrations in southeast Pennsylvania and New Jersey are higher than in many other areas. Only one of five samples exceeded the SEL at a concentration of 91.7 mg/kg.

Since arsenic is not readily amenable to AVS/SEM analyses, potential arsenic toxicity in sediments was assessed by a weight of evidence analysis that considered co-occurring water samples, basic sediment water partitioning, and arsenic toxicity. Lands Creek is very shallow, usually 1 to 2 feet deep. Thus, the sediment pore water in upper sediment horizons, where benthos live, will be close to equilibrium with the overlying surface water. All surface water samples for arsenic were non-detect at a detection limit of 20 ug/L. Assuming the true concentration was ½ the detection limit, all surface water concentrations were less than 1/15th the chronic water quality criteria (150 ug/L). Thus, the water quality data indicate little potential for impact to even more sensitive ecological receptors.

Moreover, the benthic species that actually live in the sediments are much less sensitive to arsenic than the sensitive species that determined the WQC. For example, midge larvae are dominant benthos in these types of sediments, and they are 140 times less sensitive to arsenic than the most sensitive organism that forms the basis of the arsenic WQC (USEPA 1984). Therefore consideration of the potential concentrations in sediment pore water (as approximated by surface water results) and the less sensitive species in sediments such as those in Land's Creek, lead to the conclusion that arsenic is not likely to be of significant ecological concern in AOI 10 sediments and thus not retained as a CPEC.

7. Summary and Conclusions

Previous characterization activities demonstrated that the only remaining media of concern is legacy sediments (i.e., in place sediments) in Lands Creek based on historical releases. This conclusion was approved by PADEP.

Based on Langan's initial sediment screening, several SVOCs (PAHs) and metals were above the sediment screening criteria calculated by Langan (anthracene, benzo(ghi)perylene, chrysene, phenanthrene, pyrene, arsenic, chromium (total), copper, iron, lead, manganese, mercury, nickel, and zinc). GHD conducted a rescreening of the PAHs using carbon-normalized LEL and SEL values, based on the high Site-specific organic carbon concentrations. No individual PAHs (or total PAHs) exceeded the carbon-corrected LEL. Therefore, PAHs were eliminated as CPECs in Lands Creek sediments.

Additional sampling, using more refined analytical methods (AVS/SEM) to address bioavailability of metals, was performed by GHD in 2015. GHD collected additional sediment samples from the same 2011 sample locations and analyzed these samples for AVS-SEM. The rescreening of divalent metals based on normalized total organic carbon determined that none of the initial CPECs are toxic at their detected concentrations. Therefore, none of the initial metal CPECs were retained as final CPECs.

Langan's initial screening did not consider Site-specific factors that would further reduce potential toxicity. The Site sediments are rich in organic carbon and low in dissolved oxygen, conditions which render chemicals less bioavailable and less toxic (USEPA 2003, 2005, 2008). The weight of evidence, therefore, indicates no significant potential for impacts to ecological receptors in Lands Creek. Based on current Site conditions, results of Site characterization activities and previous assessments, and evaluation of potential receptors and exposure pathways, no further ecological evaluation of Lands Creek is necessary. Lands Creek does provide potentially suitable habitat for species of concern, specifically the eastern redbelly turtle. Any future disturbances (remediation activities or redevelopment) in AOI 10 will be coordinated with the appropriate resource agencies.

8. References

Allen, H.E., G. Fu and B. Deng. 1993. Analysis of Acid-Volatile Sulfide (AVS) and Simultaneously Extracted Metals (SEM) for the Estimation of Potential Toxicity in Aquatic Sediments. Environmental Toxicology and Chemistry, Vol. 12 pp. 1441-1453, 1993.

Langan Engineering & Environmental Services, Inc. 2011. Site Characterization Report/Remedial Investigation Report, AOI 10.

PADEP. 2002. Final Draft of the Land Recycling Program Technical Guidance Manual.

Persaud, D.R., R. Jaagumagi, and A. Hayton. 1993. Guidelines for the protection and management of aquatic sediments in Ontario. Standards Development Branch. Ontario Ministry of Environment and Energy. Toronto, Canada.

Smith, D.W. 2008. "Co-Occurrence Sediment Quality Benchmarks Are Biased Randomness, Not Toxicity." Society for Toxicology and Chemistry Annual Meeting, Jacksonville, Fla., Nov. 2008.

USEPA. 1984. Ambient aquatic life water quality criterion for arsenic.

USEPA. 1997. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments - Interim Final. EPA 540-R-97-006, OSWER 9285.7-25, PB97-963211.

USEPA. 2003. Procedures for the derivation of equilibrium partitioning sediment benchmarks (ESBs) for the protection of benthic organisms: PAH Mixtures. EPA-600-R-02-013.

USEPA. 2005. Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: Metal Mixtures (Cadmium, Copper, Lead, Nickel, Silver and Zinc). EPA-600-R-02-011.

USEPA. 2008. Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: Compendium of Tier 2 Values for Non-ionic Organics. EPA 600-R-02-016. Office of Research and Development, Washington, DC 20460.

9. Certification

By affixing my seal to this document, I am certifying that the information is true and correct. I further certify that I am licensed to practice in the Commonwealth of Pennsylvania and that it is within my professional expertise to verify the correctness of the information.

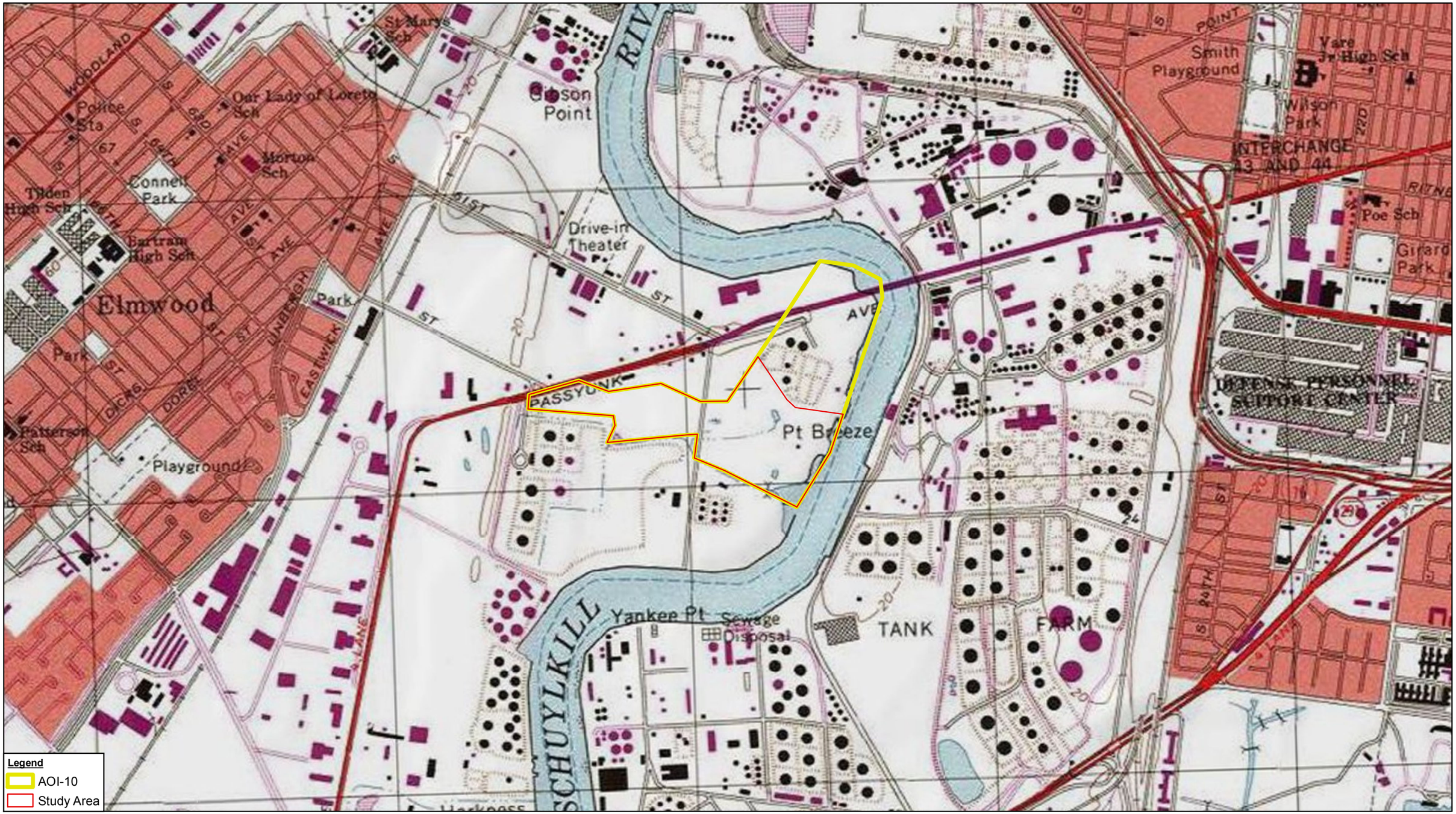
Colleen Costello

Colleen Costello, P.G.
Pennsylvania PG-003736-G

June 9, 2016
Date



Figures



Source: ESRI Data.

0 400 800 1,200
Feet

Coordinate System:
NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet

PHILADELPHIA REFINERY OPERATIONS,
A SERIES OF EVERGREEN RESOURCES GROUP, LLC
PHILADELPHIA AOI-10

USGS LOCATION MAP
CITY OF PHILADELPHIA, PENNSYLVANIA

11109606
Nov 3, 2015

FIGURE 2.1

GIS File: I:\Project Work Area\11109606 Evergreen Phila AOI-10\ECO\GIS\Figure 1 - USGS Map.mxd

Legend

- AOI-10
- Study Area
- 1,000 Foot Buffer

Source: ESRI Data.

0 250 500 750

Feet

Coordinate System:
NAD 1983 StatePlane Pennsylvania
South FIPS 3702 Feet

N

GHD

PHILADELPHIA REFINERY OPERATIONS,
A SERIES OF EVERGREEN RESOURCES GROUP, LLC
PHILADELPHIA AOI-10

AERIAL LOCATION MAP
CITY OF PHILADELPHIA, PENNSYLVANIA

11109606
Nov 3, 2015

FIGURE 2.2

GIS File: I:\Project Work Area\11109606 Evergreen Phila AOI-10\ECO\GIS\Figure 2 - Aerial Location Map.mxd

Legend

- AOI-10
- Study Area
- Forested Wetlands
- Open Water (Former Containment Area)
- Lands Creek (Non-tidal)
- Fallowfields (Upland/Wetland)
- Phragmites (Upland/Wetland)
- Schuylkill River (Tidal)
- Forested Uplands

Source: ESRI Data.

0 80 160 240
Feet

Coordinate System:
NAD 1983 StatePlane Pennsylvania
South FIPS 3702 Feet

N

PHILADELPHIA REFINERY OPERATIONS,
A SERIES OF EVERGREEN RESOURCES GROUP, LLC
PHILADELPHIA AOI-10

HABITAT COVER TYPE MAP
CITY OF PHILADELPHIA, PENNSYLVANIA

11109606
Nov 3, 2015

FIGURE 4.1

GIS File: I:\Project Work Area\11109606 Evergreen Phila AOI-10\ECO\GIS\Figure 3 - Habitat Location Map.mxd

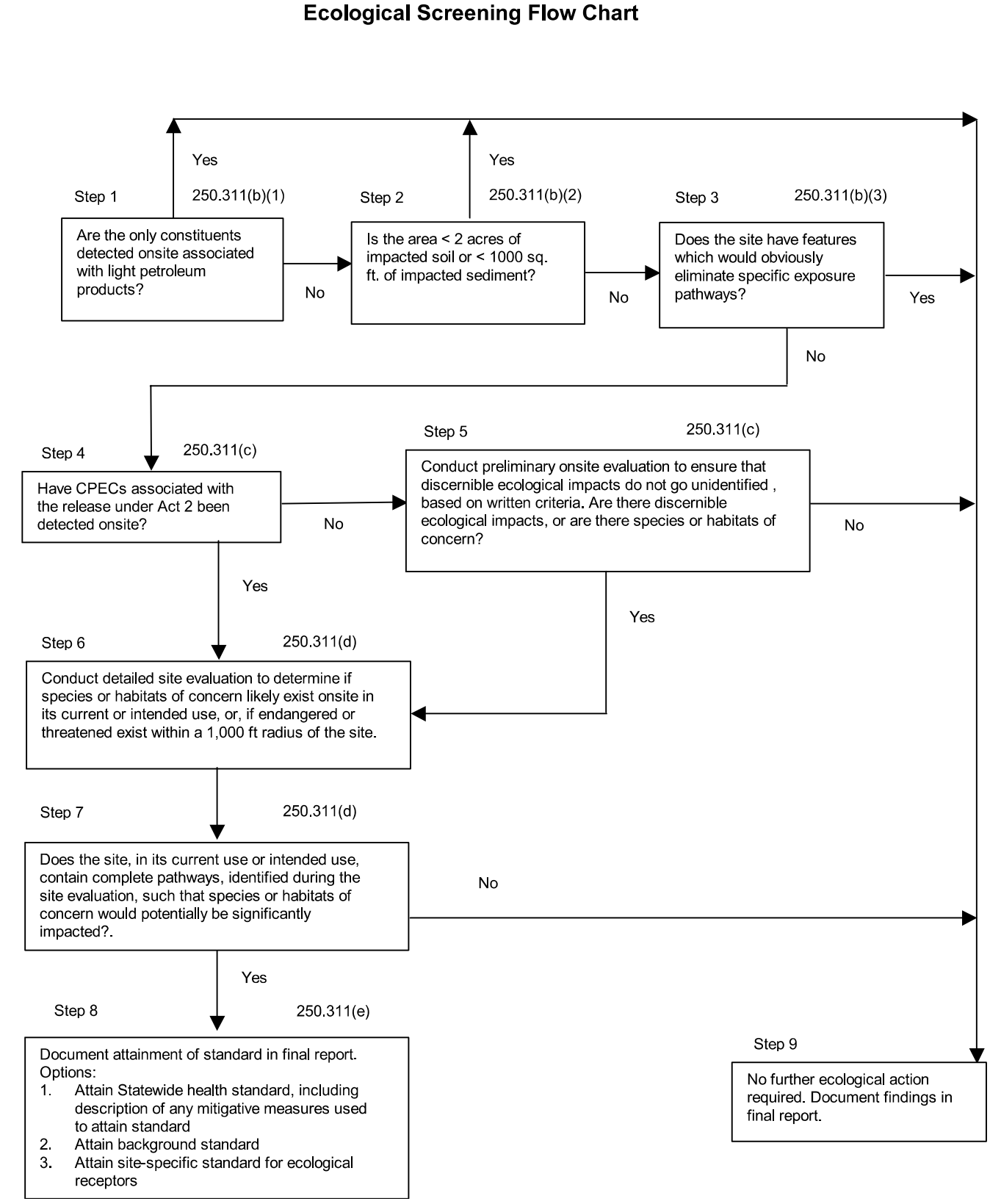


FIGURE 5.1 - PA ACT 2 ECOLOGICAL SCREENING FLOW CHART

Tables

TABLE 4.1
LANDS CREEK 2015 SEDIMENT - AVS/SEM METALS RESULTS AND SCREENING

PHILADELPHIA AOI 10
PHILADELPHIA, PENNSYLVANIA

Lab Sample ID:		8100977/8		8100979/80		8100976		8100981/2		8100983/4		8100985/6	
GHD Sample ID:		SD-11109606-101915-CJM-AOI-10-01		SD-11109606-101915-CJM-AOI-10-06 (Duplicate of -01)		SD-11109606-101915-CJM-AOI-10-02		SD-11109606-101915-CJM-AOI-10-03		SD-11109606-102015-CJM-AOI-10-04		SD-11109606-102015-CJM-AOI-10-05	
Parameter	*Units*	*Result*	*Qual*	*Result*	*Qual*	*Result*	*Qual*	*Result*	*Qual*	*Result*	*Qual*	*Result*	*Qual*
Cadmium	umol/g	0.0146	J	0.0159		0.0332		0.0139		0.00417		0.00249	
Chromium	umol/g	0.573	J	0.617		0.532		0.552		2.05		0.151	
Copper	umol/g	5.83	J	6.43	J	0.69	J	0.982	J	0.00875	J	0.399	J
Lead	umol/g	11.8		12.2		1.66		2.27		1.85		0.928	
Nickel	umol/g	0.888	J	0.534	J	1.97		0.323	J	1.37	J	0.164	J
Zinc	umol/g	8.12		7.66		18.70	J	5.79		3.78		2.77	
Mercury	umol/g	0.00002	J	0.000034	J	0.0073U	RU	0.035U	RU	0.0334U	RU	0.0227U	RU
TOC Solids/Sludges Combustion	mg/kg	183,000		235,000		106,000		64,000		47,900		80,700	J
75 mm	% Passing	100		--		--		--		100		--	
37.5 mm	% Passing	100		--		--		--		100		--	
19 mm	% Passing	100		--		--		--		99.8		--	
4.75 mm	% Passing	90.7		--		--		--		92.4		--	
3.35 mm	% Passing	87.5		--		--		--		87.2		--	
2.36 mm	% Passing	83.2		--		--		--		81.2		--	
1.18 mm	% Passing	76.2		--		--		--		73.4		--	
0.6 mm	% Passing	68.4		--		--		--		65.3		--	
0.3 mm	% Passing	59.7		--		--		--		55.2		--	
0.15 mm	% Passing	51.8		--		--		--		47.4		--	
0.075 mm	% Passing	43.9		--		--		--		42.5		--	
0.064 mm	% Passing	40		--		--		--		40		--	
0.05 mm	% Passing	33		--		--		--		34		--	
0.02 mm	% Passing	19.5		--		--		--		23		--	
0.005 mm	% Passing	8		--		--		--		8		--	
0.002 mm	% Passing	5		--		--		--		5		--	
0.001 mm	% Passing	2		--		--		--		2		--	
Acid Volatile Sulfide	umoles/g	5.1	J	5.2	J	253	J	27.2	J	17.2	J	6.9	J
Hexavalent Chromium (SOLIDS)	mg/kg	3.1	U	3.3	U	7.5	U	3.5	U	3.4	U	2.3	U
Moisture	%	51.9		55		80.1		57.6		55.7		34.6	
SEM	umol/g	27.23		27.46		23.59		9.93		9.06		4.41	
AVS	umol/g	5.10		5.2		253.00		27.20		17.2		6.9	
Excess SEM	umol/g	22.13		22.26		-229.41		-17.27		-8.14		-2.49	
g/g OC		0.18		0.24		0.11		0.06		0.0479		0.0807	
Carbon Normalized Excess SEM (CNE-SEM)	umol/g/gOC	120.91		94.71		-2164.26		-269.83		-169.88		-30.80	

Notes:
Parameter not analyzed --
CNE-SEM < 130 umol/g/g OC = not toxic to benthic invertebrates.
130 umol/g/g OC < CNE-SEM < 3,000 umol/g/g OC = potentially toxic to benthic invertebrates.
CNE-SEM > 3,000 umol/g/g OC = more likely to be toxic than non-toxic.

TABLE 4.2
LANDS CREEK 2011 SEDIMENT - PAH RESULTS AND RE-SCREENING

PHILADELPHIA AOI 10
PHILADELPHIA, PENNSYLVANIA

Parameter	SEL Bulk Sediment mg/kg carbon	SEL Bulk Sediment Carbon Adjusted mg/kg	LEL mg/kg at 1% OC	LEL mg/kg at 9.6% OC	Units	Location ID: SED-1	SED-2	SED-3	SED-4	SED-5
						Sample ID: SED-1_040711	SED-2_040711	SED-3_040711	SED-4_040711	SED-5_040711
						Sample Date: 4/7/2011	4/7/2011	4/7/2011	4/7/2011	4/7/2011
						Sample Matrix: Sediment	Sediment	Sediment	Sediment	Sediment
Semi-Volatile Organic Compounds										
Anthracene	370	35.65	0.22	2.12	mg/kg	0.66	ND (0.039)	0.18	0.15	0.15
Benzo(A)Anthracene	1480	142.58	0.32	3.08	mg/kg	0.52	ND (0.039)	0.6	0.38	0.28
Benzo(A)Pyrene	1440	138.73	0.37	3.56	mg/kg	0.54	ND (0.039)	0.37	0.32	0.25
Benzo(B)Fluoranthene	NS				mg/kg	0.55	ND (0.039)	0.64	0.42	0.38
Benzo(G,H,I)Perylene	320	30.83	0.17	1.64	mg/kg	0.64	ND (0.039)	0.19	0.21	0.18
Benzo(K)Fluoranthene	1340	129.10	0.24	2.31	mg/kg	ND (3.1)	ND (4)	ND (2.4)	ND (2.4)	ND (2.8)
Chrysene	460	44.32	0.34	3.28	mg/kg	0.89	ND (0.039)	1.1	0.44	0.35
Dibenz(A,H)Anthracene	130	12.52	0.06	0.58	mg/kg	ND (3.1)	ND (4)	ND (2.4)	ND (2.4)	ND (2.8)
Fluoranthene	1020	98.27	0.75	7.23	mg/kg	ND (3.1)	ND (4)	ND (2.4)	ND (2.4)	ND (2.8)
Fluorene	160	15.41	0.19	1.83	mg/kg	0.36	ND (0.039)	0.046	0.046	0.04
Naphthalene	NS				mg/kg	7.7	ND (0.039)	0.07	0.53	0.68
Phenanthrene	950	91.52	0.56	5.40	mg/kg	2.3	ND (0.039)	0.43	0.53	0.46
Pyrene	850	81.89	0.49	4.72	mg/kg	1.2	ND (0.039)	1.6	0.63	0.41
Sum PAHs	**10000**	**963.40**	**4.00**	**38.54**	**mg/kg**	**20.01**	**6.195**	**8.826**	**7.256**	**7.38**
General Chemistry										
Total Organic Carbon (TOC)	NS		9.6%		mg/kg	302000	16100	55900	47800	59900

Notes:
SEL - Severe Effect Level
LEL - Lowest Effect Level; Site-specific LEL calculated based on TOC
NS - No standard currently available.
ND - Parameter not detected (laboratory
Average TOC = 96,340 mg/kg

Appendices

Appendix A
Site Photographs



Photo 1 – View south of an existing gravel roadway along the eastern portion of the Study Area.



Photo 2 – View east of fallow field and dense stand of *Phragmites* in the eastern portion of the Study Area.

Site Photographs



Photo 3 – View east of the narrow wooded riparian zone along the Schuylkill River.



Photo 4 – View west of the Schuylkill River shoreline along the study area at low tide.



Photo 5 – View looking upstream along the Schuylkill River at low tide.



Photo 6 – View looking downstream along the Schuylkill River at low tide.



Photo 7 – View looking downstream of the predominantly unvegetated mud flat exposed at low tide, near the former outlet of Lands Creek (non-tidal).



Photo 8 – View of the mudflats near the former outlet of Lands Creek (non-tidal) at low tide.



Photo 9 – View of the Schuylkill River shoreline near the former outlet of Lands Creek (non-tidal) at low tide.



Photo 10 – View towards the Schuylkill River from the former outlet of Lands Creek (non-tidal) at low tide.



Photo 11 – View looking west of the berm across the former outlet of Lands Creek (non-tidal) at low tide. The berm separates Lands Creek (non-tidal) from the tidal Schuylkill River.



Photo 12 – View looking northwest of wetlands and pipeline near the former outlet of Lands Creek (non-tidal).



Photo 13 – View looking northwest along the southeastern property line at wetlands, pipeline and the main channel of Lands Creek (non-tidal) near the former outlet of Lands Creek.



Photo 14 – View looking northwest of wooded uplands and dense stand of *Phragmites* near the former outlet of Lands Creek (non-tidal).



Photo 15 – View looking northwest of typical historically disturbed wooded uplands along Lands Creek (non-tidal) within the Study Area.



Photo 16 – View looking northwest along the southeastern property line within the main channel of Lands Creek (non-tidal)



Photo 17 – View looking north of the main channel of Lands Creek (non-tidal) along the access road in the central portion of the Study Area. The channel is bermed at both ends.



Photo 18 – View looking north of the main channel of Lands Creek (non-tidal) near the access road in the central portion of the Study Area.



Photo 19 – View looking north at forested wetlands in the eastern portion of the Study Area.



Photo 20 – View looking north at typical fallow fields in the northern portion of the Study Area.



Photo 21 – View looking east of fallowfields and access road in the northern portion of the Study Area.



Photo 22 – View east of the narrow wooded riparian zone along the Schuylkill River.



Photo 23 – View east of fallow field/maintained right-of-way in the western portion of the Study Area.



Photo 24 – View east of pipeline and fallow field/maintained right-of-way in the western portion of the Study Area.



Photo 25 – View east of fallow field /maintained right-of-way and dense stands of *Phragmites* in the western portion of the Study Area.



Photo 26 – View east of typical wooded uplands in the western portion of the Study Area.



Photo 27 – View east of the upper reach of Lands Creek (non-tidal) in the western portion of the Study Area.



Photo 28 – View west of the upper reach of Lands Creek (non-tidal) in the western portion of the Study Area.



Photo 29 – View south of the upper reach of Lands Creek (non-tidal) in the western portion of the Study Area.



Photo 30 – View east of the upper reach of Lands Creek (non-tidal) in the western portion of the Study Area.

Appendix B
PNDI Database Receipt and Agency Correspondence

1. PROJECT INFORMATION

Project Name: **AOI-10 Evergreen Eco RI**
Date of review: **8/20/2015 8:38:20 AM**
Project Category: **Hazardous Waste Clean-up, Site Remediation, and Reclamation,Spill (e.g., oil, chemical)**
Project Area: **86.1** acres
County: **Philadelphia** Township/Municipality: **Philadelphia**
Quadrangle Name: **PHILADELPHIA** ~ ZIP Code: **19145,19153**
Decimal Degrees: **39.915068 N, -75.213750 W**
Degrees Minutes Seconds: **39° 54' 54.2" N, -75° 12' 49.5" W**



2. SEARCH RESULTS

Agency	Results	Response
PA Game Commission	No Known Impact	No Further Review Required
PA Department of Conservation and Natural Resources	**Potential Impact**	**FURTHER REVIEW IS REQUIRED, See Agency Response**
PA Fish and Boat Commission	**Potential Impact**	**FURTHER REVIEW IS REQUIRED, See Agency Response**
U.S. Fish and Wildlife Service	No Known Impact	No Further Review Required

As summarized above, Pennsylvania Natural Diversity Inventory (PNDI) records indicate there may be potential impacts to threatened and endangered and/or special concern species and resources within the project area. If the response above indicates "No Further Review Required" no additional communication with the respective agency is required. If the response is "Further Review Required" or "See Agency Response," refer to the appropriate agency comments below. Please see the DEP Information Section of this receipt if a PA Department of Environmental Protection Permit is required.

RESPONSE TO QUESTION(S) ASKED

Q1: Aquatic habitat (stream, river, lake, pond, etc.) is located on or adjacent to the subject property and project activities (including discharge) may occur within 300 feet of these habitats
Your answer is: **1. Yes**

Q2: "Accurately describe what is known about wetland presence in the project area or on the land parcel by selecting ONE of the following. ""Project"" includes all features of the project (including buildings, roads, utility lines, outfall and intake structures, wells, stormwater retention/detention basins, parking lots, driveways, lawns, etc.), as well as all associated impacts (e.g., temporary staging areas, work areas, temporary road crossings, areas subject to grading or clearing, etc.). Include all areas that will be permanently or temporarily affected -- either directly or indirectly -- by any type of disturbance (e.g., land clearing, grading, tree removal, flooding, etc.). Land parcel = the lot(s) on which some type of project(s) or activity(s) are proposed to occur ."
Your answer is: **"4. Someone qualified to identify and delineate wetlands has investigated the site, and determined that wetlands ARE located in or within 300 feet of the project area. (A written report from a wetland specialist, and detailed project maps should document this.) "**

3. AGENCY COMMENTS

Regardless of whether a DEP permit is necessary for this proposed project, any potential impacts to threatened and endangered species and/or special concern species and resources must be resolved with the appropriate jurisdictional agency. In some cases, a permit or authorization from the jurisdictional agency may be needed if adverse impacts to these species and habitats cannot be avoided.

These agency determinations and responses are **valid for two years** (from the date of the review), and are based on the project information that was provided, including the exact project location; the project type, description, and features; and any responses to questions that were generated during this search. If any of the following change: 1) project location, 2) project size or configuration, 3) project type, or 4) responses to the questions that were asked during the online review, the results of this review are not valid, and the review must be searched again via the PNDI Environmental Review Tool and resubmitted to the jurisdictional agencies. The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer impacts than what is listed on this PNDI receipt. The jursidictional agencies **strongly advise against** conducting surveys for the species listed on the receipt prior to consultation with the agencies.

PA Game Commission

RESPONSE: No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

PA Department of Conservation and Natural Resources

RESPONSE: Further review of this project is necessary to resolve the potential impacts(s). Please send project information to this agency for review (see WHAT TO SEND).

DCNR Species: (Note: The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below. After desktop review, if a botanical survey is required by DCNR, we recommend the DCNR Botanical Survey Protocols, available here: http://www.gis.dcnr.state.pa.us/hgis-er/PNDI_DCNR.aspx.)
Scientific Name: Amaranthus cannabinus
Common Name: Waterhemp Ragweed
Current Status: Special Concern Species*

Proposed Status: Special Concern Species*

Scientific Name: Schoenoplectus fluviatilis
Common Name: River Bulrush
Current Status: Special Concern Species*
Proposed Status: Special Concern Species*

PA Fish and Boat Commission

RESPONSE: Further review of this project is necessary to resolve the potential impacts(s). Please send project information to this agency for review (see WHAT TO SEND).

PFBC Species: (Note: The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below.)
Scientific Name: Sensitive Species**
Common Name:
Current Status: Threatened

U.S. Fish and Wildlife Service

RESPONSE: No impacts to **federally** listed or proposed species are anticipated. Therefore, no further consultation/coordination under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.* is required. Because no take of federally listed species is anticipated, none is authorized. This response does not reflect potential Fish and Wildlife Service concerns under the Fish and Wildlife Coordination Act or other authorities.

* Special Concern Species or Resource - Plant or animal species classified as rare, tentatively undetermined or candidate as well as other taxa of conservation concern, significant natural communities, special concern populations (plants or animals) and unique geologic features.
** Sensitive Species - Species identified by the jurisdictinal agency as collectible, having economic value, or being susceptible to decline as a result of visitation.

WHAT TO SEND TO JURISDICTIONAL AGENCIES

If project information was requested by one or more of the agencies above, send the following information to the agency(s) seeking this information (see AGENCY CONTACT INFORMATION).

Check-list of *Minimum* Materials to be submitted:

____**SIGNED** copy of this Project Environmental Review Receipt
____Project narrative with a description of the overall project, the work to be performed, current physical characteristics of the site and acreage to be impacted.
____Project location information (name of USGS Quadrangle, Township/Municipality, and County)
____USGS 7.5-minute Quadrangle with project boundary clearly indicated, and quad name on the map

The inclusion of the following information may expedite the review process.
____A basic site plan(particularly showing the relationship of the project to the physical features such as wetlands, streams, ponds, rock outcrops, etc.)
____Color photos keyed to the basic site plan (i.e. showing on the site plan where and in what direction each photo was taken and the date of the photos)
____Information about the presence and location of wetlands in the project area, and how this was determined (e.g., by a qualified wetlands biologist), if wetlands are present in the project area, provide project plans showing the location of all project features, as well as wetlands and streams

4. DEP INFORMATION

The Pa Department of Environmental Protection (DEP) requires that a signed copy of this receipt, along with any required documentation from jurisdictional agencies concerning resolution of potential impacts, be submitted with applications for permits requiring PNDI review. For cases where a "Potential Impact" to threatened and endangered species has been identified before the application has been submitted to DEP, the application should not be submitted until the impact has been resolved. For cases where "Potential Impact" to special concern species and resources has been identified before the application has been submitted, the application should be submitted to DEP along with the PNDI receipt. The PNDI Receipt should also be submitted to the appropriate agency according to directions on the PNDI Receipt. DEP and the jurisdictional agency will work together to resolve the potential impact(s). See the DEP PNDI policy at http://www.naturalheritage.state.pa.us.

5. ADDITIONAL INFORMATION

The PNDI environmental review website is a **preliminary** screening tool. There are often delays in updating species status classifications. Because the proposed status represents the best available information regarding the conservation status of the species, state jurisdictional agency staff give the proposed statuses at least the same consideration as the current legal status. If surveys or further information reveal that a threatened and endangered and/or special concern species and resources exist in your project area, contact the appropriate jurisdictional agency/agencies immediately to identify and resolve any impacts.

For a list of species known to occur in the county where your project is located, please see the species lists by county found on the PA Natural Heritage Program (PNHP) home page (www.naturalheritage.state.pa.us). Also note that the PNDI Environmental Review Tool only contains information about species occurrences that have actually been reported to the PNHP.

6. AGENCY CONTACT INFORMATION

PA Department of Conservation and Natural Resources
Bureau of Forestry, Ecological Services Section
400 Market Street, PO Box 8552, Harrisburg, PA. 17105-8552
Fax:(717) 772-0271

U.S. Fish and Wildlife Service
Pennsylvania Field Office
110 Radnor Rd; Suite 101, State College, PA 16801
NO Faxes Please.

PA Fish and Boat Commission
Division of Environmental Services
450 Robinson Lane, Bellefonte, PA. 16823-7437
NO Faxes Please

PA Game Commission
Bureau of Wildlife Habitat Management
Division of Environmental Planning and Habitat Protection
2001 Elmerton Avenue, Harrisburg, PA. 17110-9797
Fax:(717) 787-6957

7. PROJECT CONTACT INFORMATION

Name: Scott Bush
Company/Business Name: GHD Services, Inc.
Address: 410 Eagleview Blvd, STE 110
City, State, Zip: Exton, PA 19341 USA
Phone:(610) 321-1800 Fax:(610) 321 2763
Email: Scott.Bush@GHD.com

8. CERTIFICATION

I certify that ALL of the project information contained in this receipt (including project location, project size/configuration, project type, answers to questions) is true, accurate and complete. In addition, if the project type, location, size or configuration changes, or if the answers to any questions that were asked during this online review change, I agree to re-do the online environmental review.

applicant/project proponent signature

11/23/2015
date

pennsylvania
DEPARTMENT OF CONSERVATION
AND NATURAL RESOURCES

BUREAU OF FORESTRY

December 8, 2015 **PNDI Number: 20150820528218**

Scott Bush
GHD Services, Inc.
410 Eagleview Blvd., Suite 110
Exton, PA 19341
Email: scott.bush@ghd.com (hard copy will not follow)

Re: AOI-10 Evergreen Eco RI
Philadelphia Township, Philadelphia County, PA

Dear Scott Bush,

Thank you for the submission of the Pennsylvania Natural Diversity Inventory (PNDI) Environmental Review Receipt Number **20150820528218** for review. PA Department of Conservation and Natural Resources screened this project for potential impacts to species and resources under DCNR's responsibility, which includes plants, terrestrial invertebrates, natural communities, and geologic features only.

No Impact Anticipated. Please coordinate with DCNR for any necessary remedial activities.

PNDI records indicate species or resources under DCNR's jurisdiction are located in the vicinity of the project. However, based on the information you submitted concerning the nature of the project, the immediate location, and our detailed resource information, DCNR has determined that no impact is likely. No further coordination with our agency is needed for this project.

This response represents the most up-to-date review of the PNDI data files and is valid for two (2) years only. If project plans change or more information on listed or proposed species becomes available, our determination may be reconsidered. Should the proposed work continue beyond the period covered by this letter, please resubmit the project to this agency as an "Update" (including an updated PNDI receipt, project narrative and accurate map). As a reminder, this finding applies to potential impacts under DCNR's jurisdiction only. Visit the PNHP website for directions on contacting the Commonwealth's other resource agencies for environmental review.

Should you have any questions or concerns, please contact Jaci Braund, Ecological Information Specialist, by phone (717-214-3813) or via email (c-jbraund@pa.gov).

Sincerely



Greg Podniesinski, Section Chief
Natural Heritage Section

Pennsylvania Fish & Boat Commission
established 1866

Division of Environmental Services
Natural Diversity Section
450 Robinson Lane
Bellefonte, PA 16823
814-359-5237

December 15, 2015

IN REPLY REFER TO
SIR# 45263

GHD Services Inc.
Scott Bush
410 Eagleview Blvd.
Exton , Pennsylvania 19341

RE: Species Impact Review (SIR) – Rare, Candidate, Threatened and Endangered Species
PNDI Search No. 20150820528218
AOI-10 Evergreen Eco RI
PHILADELPHIA County: Philadelphia City

Dear Mr. Bush:

This responds to your inquiry about a Pennsylvania Natural Diversity Inventory (PNDI) Internet Database search "potential conflict" or a threatened and endangered species impact review. These projects are screened for potential conflicts with rare, candidate, threatened or endangered species under Pennsylvania Fish & Boat Commission jurisdiction (fish, reptiles, amphibians, aquatic invertebrates only) using the Pennsylvania Natural Diversity Inventory (PNDI) database and our own files. These species of special concern are listed under the Endangered Species Act of 1973, the Wild Resource Conservation Act, and the Pennsylvania Fish & Boat Code (Chapter 75), or the Wildlife Code.

Eastern Redbelly Turtle (*Pseudemys rubriventris*, Threatened)

You conducted a habitat assessment on the subject site and identified potential habitat for Eastern Redbelly Turtle within the confines of the project area. Both aquatic habitats and upland nesting habitats were identified. The presence of other aquatic turtle species and the known occurrence of the Eastern Redbelly within the vicinity of the project area show it likely that the site could be occupied by this species.

If wetlands, vernal pools, open water areas, streams, or ponds or the area within 300ft of these water features are to be disturbed from the project activity, we will need to conduct a more thorough evaluation of the potential adverse impacts to the species of concern. Items **such as:** basic project plans, project narrative, general habitat descriptions, and color photographs keyed to a site map or diagram of the project area would expedite our review process. Pending the review of information, a survey targeting the presence of the species of concern may be warranted.

However, if wetlands, vernal pools, or water bodies or the area within 300ft of these water features are not to be disturbed in any way by the proposed activity, and provided that best management practices are employed and strict erosion and sedimentation measures are maintained, I do not foresee any adverse impacts to the Eastern Redbelly Turtle (*Pseudemys rubriventris*) from the proposed project.

This response represents the most up-to-date summary of the PNDI data and our files and is valid for two (2) years from the date of this letter. An absence of recorded species information does not necessarily imply species absence. Our data files and the PNDI system are continuously being updated with species occurrence information. Should project plans change or additional information on listed or proposed species become available, this determination may be reconsidered, and consultation shall be re-initiated.

If you have any questions regarding this review, please contact Kathy Gipe at 814-359-5186 and refer to the SIR # 45263. Thank you for your cooperation and attention to this important matter of species conservation and habitat protection.

Sincerely,



Christopher A. Urban, Chief
Natural Diversity Section

CAU/KDG/dn

Appendix C
2011 SCR/RIR Report for AOI 10 (Langan 2011)

SITE CHARACTERIZATION/REMEDIAL INVESTIGATION REPORT AOI 10

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



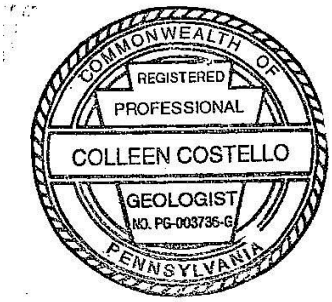
Sunoco, Inc. (R&M)
3144 Passyunk Avenue
Philadelphia, Pennsylvania 19145

Prepared by:
Langan Engineering & Environmental Services, Inc.
30 South 17th Street
Suite 1300
Philadelphia, Pennsylvania 19103

June 29, 2011
2574601

SITE CHARACTERIZATION/REMEDIAL INVESTIGATION REPORT AOI 10

Prepared by:
Langan Engineering & Environmental Services, Inc.
30 South 17th Street
Suite 1300
Philadelphia, Pennsylvania 19103



Colleen Costello, P.G.
Senior Principal
PG-003736-E

Jason Hanna
Senior Project Manager

Dennis E. Webster
Project Manager

June 29, 2011
2574601

TABLE OF CONTENTS

Page No.

1.0 INTRODUCTION 1
1.1 Site History and Background 2
1.2 Selection of Constituents of Concern and Applicable Standards 2
1.3 Overview of Investigative Framework and Remedial Approach for AOI 10 6
2.0 ENVIRONMENTAL SETTING 7
2.1 Historic and Current Use 7
2.2 Geology 8
2.3 Hydrogeology 10
2.3.1 Shallow Groundwater Occurrence and Flow 10
2.3.2 Intermediate Groundwater Occurrence and Flow 11
2.4 Surface Water 12
3.0 SITE CHARACTERIZATION ACTIVITIES 12
3.1 Soil Borings and Sampling Outside of CAMU Areas 12
3.2 Soil Borings and Sampling within CAMU Areas 13
3.3 Vacuum Gas Oil Release Cleanup 13
3.4 Installation of Groundwater Monitoring Wells 13
3.4.1 Shallow Groundwater Monitoring Wells 14
3.4.2 Intermediate Groundwater Monitoring Wells 14
3.5 Groundwater Monitoring 14
3.6 Groundwater Sampling 15
3.7 Surface Water and Sediment Sampling 15
3.8 LNAPL Sampling 16
3.9 Surveying Activities 16
4.0 SITE CHARACTERIZATION ANALYTICAL RESULTS 16
4.1 Soil Analytical Results for Samples Collected Outside of CAMU Areas 17
4.2 Soil Results within CAMU Areas 17
4.3 Vacuum Gas Oil Release Area - Post Excavation Soil Sample Results 18
4.4 Groundwater Results 18
4.5 Surface Water and Sediment Results 19
4.6 LNAPL Characterization Results 20
5.0 REMEDIAL SYSTEMS 20
6.0 FATE AND TRANSPORT ANALYSIS 21
6.1 Soil 21
6.2 Groundwater 21
6.3 Surface Water 22
6.4 LNAPL 22
6.5 Vapor Intrusion into Indoor Air 22
7.0 SITE CONCEPTUAL MODEL 23
7.1 Description and Site Use 23
7.2 Geology and Hydrogeology 24
7.3 Constituents of Concern 25
7.4 LNAPL Distribution and Mobility 27

7.5 FATE AND TRANSPORT OF COCS....27
7.6 POTENTIAL MIGRATION PATHWAYS AND SITE RECEPTORS....28
8.0 HUMAN HEALTH EXPOSURE ASSESSMENT/RISK ASSESSMENT....29
8.1 SURFACE WATER/SEDIMENT....30
8.2 SHALLOW SOILS (0-2 FEET BELOW GRADE)....30
8.2.1 Direct Contact Exposure....30
8.3 GROUNDWATER....32
8.4 LNAPL....33
8.5 VAPOR....33
9.0 ECOLOGICAL ASSESSMENT....33
10.0 COMMUNITY RELATION ACTIVITIES....36
11.0 CONCLUSIONS AND RECOMMENDATIONS....36
12.0 SCHEDULE....39
13.0 SIGNATURES....39
14.0 REFERENCES....40

LIST OF TABLES

Table 1a	Constituents of Concern for Groundwater
Table 1b	Constituents of Concern for Soil
Table 1c	Constituents of Concern for Surface Water
Table 1d	Constituents of Concern Sediments
Table 2	Existing Well Summary
Table 3	Summary of AOI 10 Groundwater and LNAPL Elevations
Table 4	Summary of Shallow Soil Sample Analytical Results Outside CAMU Areas
Table 5	Summary of Shallow Soil Sample Analytical Results for CAMU Horizontal Delineation Samples
Table 6	Summary of Shallow Soil Sample Analytical Results: CAMU Area Soil Samples
Table 7	Summary of Analytical Results for Waste in CAMU Areas
Table 8	Summary of Soil Sample Analytical Results for Vertical Delineation Soil Samples Beneath Waste in CAMU
Table 9	Summary of Post-Excavation Soil Analytical Results – VGO Release Area
Table 10	Summary of Shallow Groundwater Analytical Results
Table 11	Summary of Intermediate Groundwater Analytical Results
Table 12	Summary of Surface Water Analytical Results
Table 13	Summary of Sediment Analytical Results
Table 14	Summary of Soil Analytical Results Screened for Protection of Indoor Air
Table 15	Summary of Groundwater Analytical Results Screened for Protection of Indoor Air

LIST OF FIGURES

Figure 1	Site Location Map
Figure 2	Site Plan
Figure 3	Completed Activities
Figure 4a	Geologic Cross Section DD-DD'
Figure 4b	Geologic Cross Section EE-EE'
Figure 5	Shallow Groundwater Elevation Contour Plan
Figure 6	Intermediate Groundwater Elevation Contour Plan
Figure 7	Summary of Soil Sample Exceedances: Non CAMU Areas
Figure 8	Summary of Soil Sample Exceedances: CAMU Area
Figure 9	VGO Release Area Post Excavation Soil Sample Results
Figure 10	Summary of Groundwater Sample Exceedances
Figure 11	Summary of Sediment and Surface Water Exceedances
Figure 12	Apparent LNAPL Thickness and Type

LIST OF APPENDICES

Appendix A Current and Historic Use Figure
Appendix B Notice of Intent to Remediate and Report Notifications
Appendix C Soil Boring Logs and Monitoring Well Construction Summaries
Appendix D Soil, Groundwater, Sediment, and Surface Water Analytical Reports (on CD)
Appendix E Groundwater Sampling Field Summary Report
Appendix F LNAPL Characterization Data
Appendix G Fate and Transport Analysis
Appendix H Development of Site-Specific Standards and Risk Assessment

1.0 INTRODUCTION

A Current Conditions Report and Comprehensive Remedial Plan (CCR) prepared by Sunoco Inc. (R&M) (Sunoco), dated June 30, 2004, proposed Phase II site characterization and corrective action activities for Sunoco's Philadelphia Refinery (refinery), including preparation of site characterization reports (SCRs) for individual Areas of Interest (AOIs). The CCR presented a prioritization of all eleven AOIs based on specific risk factors. To date, site characterization activities have been completed for nine AOIs at the Refinery. These include: AOI 1 (Belmont Terminal, #1 and #2 Tank Farm), AOI 2 (Point Breeze Processing Area), AOI 3 (Impoundment Area), AOI 4 (#4 Tank Farm), AOI 5 (Girard Point South Tank Field Area), AOI 6 (Girard Point Chemicals Processing Area), AOI 7 (Girard Point Fuels Processing Area), AOI 8 (Point Breeze Process Area North Yard) and AOI 9 (Schuylkill River Tank Farm). Site Characterization Work Plans and Site Characterization Reports for these nine AOIs were submitted to the Pennsylvania Department of Environment Protection (PADEP) and the United States Environmental Protection Agency (EPA).

This Site Characterization/Remedial Investigation Report (SCR/RIR) has been prepared by Langan Engineering and Environmental Services, Inc. (Langan), on behalf of Sunoco for AOI 10 at the refinery. This report has been prepared in accordance with the 2003 Consent Order and Agreement (CO&A) between Sunoco and PADEP and the CCR.

AOI 10, also known as the Point Breeze West Yard (West Yard), is comprised of approximately 80 acres and is located west of the Schuylkill River and south of Passyunk Avenue (Figures 1 and 2). AOI 10 is mostly open space and bounded by Passyunk Avenue to the north-northwest, the Schuylkill River to the east-southeast, and industrial properties to the south and west. Lands Creek, a small tributary of the Schuylkill River, traverses the southern portion of AOI 10 (Figure 1). The current and future intended use of AOI 10 is non-residential.

Four past disposal areas (PDAs 1 through 4) exist in AOI 10. These past disposal areas consist of former lagoons and landfills that received wastes from the refinery under Atlantic Richfield Company ownership during the 1950s and 1960s. PDAs 1 and 2 were capped with clay materials and PDAs 3 and 4 were capped with clay and vegetative cover materials in the 1980s. The PDAs were investigated as part of the 1992 Resource, Conservation and Recovery Act (RCRA) Facility Investigation (RFI) performed by ENSR Consulting and Engineering (ENSR). As part of the RFI activities, the PDAs were grouped into one corrective action management unit (CAMU). This CAMU is the only RCRA waste management unit in AOI 10.

1.1 Site History and Background

The refinery is located in southwest Philadelphia. The refinery has a long history of petroleum transportation, storage, and processing. The oldest portion of the refinery started petroleum-related activities in the 1860s when the Atlantic Refining Company established an oil distribution center. In the 1900s, 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 refinery for a time. Current operations at the refinery are limited to the production of fuels and basic petrochemicals for the chemical industry. The current and historic uses of AOI 10 are illustrated in a figure provided in Appendix A.

In addition to the PDAs, historic use areas in AOI 10 include a tankage area and associated pump houses in the northeast portion and two fuel docks along the eastern boundary with the river. The structures associated with the tanks and pump houses were demolished prior to 2005. Currently, activities in AOI 10 include maintenance of an existing Sunoco pipeline that is mostly above grade and extends along much of the northern AOI 10 boundary, and an aboveground manifold area that connects underground and aboveground lines between the refinery and the refinery's Schuylkill River Tank Farm.

AOI 10 is located within a fenced and secured area to prevent unauthorized access. Prior to any work being completed within AOI 10, appropriate work permits, safety and security measures must be approved by Sunoco refinery personnel. AOI 10 is under the control of Sunoco's health and safety administrative procedures and is regulated by the Occupational Safety and Health Administration (OSHA). Direct contact to site soils (soils greater than two feet beneath the ground surface) is controlled by Sunoco's on-site permit and personal protective equipment (PPE) procedures.

1.2 Selection of Constituents of Concern and Applicable Standards

The soil and groundwater constituents of concern (COCs) for AOI 10 are listed in Tables 1a and 1b of this report. These COCs are the same as those listed in the CCR, with the exception of two additional constituents: 1,2,4-trimethylbenze and 1,3,5-

trimethylbenzene. These two constituents were added to the list of COCs based on the PADEP's recent revisions to the petroleum short list of constituents.

Soil samples collected in and around the CAMU were analyzed for Target Compound List (TCL) volatile constituents, semi-volatile constituents, and Target Analyte List (TAL) metals to characterize the waste materials in the CAMU. Surface water samples were analyzed for a modified site COC list that includes total and dissolved TAL metals and hardness as listed in Table 1c. Sediment samples were analyzed for a modified site COC list that included TAL metals, total organic carbon (TOC), particle grain size, and pH as listed in Table 1d.

Data collected from the above-listed activities were evaluated following PA Act 2 procedures as part of the site characterization process.

Media of Concern

The media of concern for AOI 10 include groundwater, soil, surface water, and sediment. The potential indoor air quality and off-site vapor migration exposure pathways were evaluated through application of PADEP's vapor intrusion guidance, even though no vapor intrusion receptors currently exist onsite.

Act 2 Remediation Standards

The approach for attaining Act 2 remediation standards for the media of concern is described below by media.

Groundwater

Groundwater sample results were screened against the PADEP non-residential, used-aquifer (TDS<2,500) statewide health groundwater medium-specific concentrations (MSCs). As summarized in the CCR, where constituent concentrations are above these statewide health MSCs, Sunoco evaluated application of the site-specific remediation standard using either the pathway elimination or calculated risk-based standard options.

Shallow Soil – 0 to 2 Feet Interval

Shallow (0-2 feet) soil samples were collected at each soil boring/well location inside and outside the CAMU areas that represents a potential complete direct contact exposure pathway to site workers (e.g., unpaved areas). These shallow soil results

were screened against the PADEP, non-residential statewide health soil MSCs. Based on the depth to groundwater at AOI 10, all shallow soil samples collected were unsaturated; therefore, the MSCs for unsaturated conditions were used when evaluating these data.

As summarized in the CCR, where constituent concentrations are above the MSCs, Sunoco evaluated application of the site-specific remediation standard using either the pathway elimination or calculated risk-based standard options.

Soil – 2 to 15 Feet Interval

The site-specific remediation standard using the pathway elimination option was applied for soil between 2 and 15 feet beneath the ground surface within the boundaries of AOI 10 based on Sunoco's existing permit program governing excavations. This permit program serves as an institutional control that prevents potential exposure to impacted soils greater than two feet beneath the ground surface. Soil at this depth is evaluated through the groundwater data.

Soil borings extending beyond two feet were advanced inside and around the perimeters of the CAMU areas to characterize the waste material in the CAMU and the soil conditions beneath and around the perimeters. Samples of the waste materials in the CAMU areas were collected, as were soil samples from beneath the waste. These waste and soil samples were screened against the PADEP, non-residential statewide health soil MSCs. Based on the depth to groundwater at AOI 10, all soil samples collected at depths greater than two feet were considered to be saturated; therefore, the MSCs for saturated conditions were used when evaluating these data.

Vapor Intrusion into Indoor Air

Currently there are no buildings in AOI 10. Therefore, there are no potential receptors to vapor intrusion (VI) into indoor air within AOI 10. Soil and groundwater samples collected in AOI 10 were evaluated in accordance with the current Act 2 Vapor Intrusion Guidance, where applicable. The groundwater table is less than five feet below the ground surface in several areas of AOI 10. Soil and groundwater samples collected in these areas were not screened against the default screening numbers in the guidance. In addition, the waste in the CAMU areas is not considered soil-like; therefore, analytical data from the waste samples was not screened.

The refinery is regulated under OSHA; therefore, the appropriate OSHA standard was applied when evaluating the potential indoor air pathway. No soil gas sampling was completed as part of this site characterization, but if future development is proposed for the areas that were not able to be screened using the PADEP vapor screening criteria, soil gas sampling would be completed in these areas.

Surface Water

Surface water sample results collected in Lands Creek were screened against the Pennsylvania State Code Title 25, Chapter 93 Water Quality Standards. Direct contact to surface water in Lands Creek is prevented by Sunoco's existing permitting and PPE program; therefore surface water quality was evaluated with respect to potential ecological receptors.

Sediment

Sediment sample results from samples collected in Lands Creek were screened using the Severe Ecological Level (SEL) and Low Ecological Level (LEL) sediment screening criteria. Below is a summary of the hierarchy used in selecting the appropriate screening criteria.

- SEL
    - Calculated site-specific SEL using site-specific total organic carbon values.
    - Ontario sediment SEL (if no site specific SEL was available).
- LEL
    - Ontario sediment LEL.
    - National Oceanic Atmospheric Administration (NOAA) effects range low (ERL) sediment benchmark (if no Ontario sediment LEL was available).
    - Sediment EPA Region 5 sediment benchmark (if no NOAA ERL was available).

Direct contact to sediment in Lands Creek is prevented by Sunoco's existing permitting and PPE program; therefore sediment quality was evaluated with respect to potential ecological receptors.

1.3 Overview of Investigative Framework and Remedial Approach for AOI 10

The current remediation program for the Refinery is performed under the 2003 CO&A between PADEP and Sunoco. In April 2004, the PADEP and EPA signed an agreement entitled "One Cleanup Program Memorandum of Agreement (MOA or One-Cleanup Program)," which clarifies how sites remediated under Pennsylvania's Act 2 program may satisfy RCRA corrective action requirements through characterization and attainment of Act 2 remediation standards pursuant to Pennsylvania's Act 2. On November 22, 2005, Sunoco and its representatives met with officials of the PADEP and EPA to discuss the applicability of the Sunoco Philadelphia Refinery to the One Cleanup Program. During the November 22, 2005 meeting, all parties agreed that the One Cleanup Program would benefit the project by merging the remediation obligations under the various programs into one streamlined approach which would be conducted under the existing 2003 CO&A.

As a follow up to the November 22, 2005 meeting, Sunoco submitted a letter dated December 2, 2005 to EPA and PADEP documenting the discussions at the meeting. Sunoco submitted a notice of intent to remediate (NIR) for the Refinery, excluding the Belmont Terminal, to the PADEP on October 12, 2006 and held a public involvement meeting in South Philadelphia on September 19, 2007. A copy of this NIR and the Act 2 report notifications for this SCR/RIR are included in Appendix B.

On March 5, 2009, Sunoco and its representatives met again with EPA to discuss Sunoco Philadelphia Refinery's remediation progress and path forward under the One Clean-Up Program. As a follow up to the meeting, Sunoco submitted a letter dated March 11, 2009 to EPA and PADEP documenting the discussions at the meeting. The major points of this letter are as follows:

- EPA will provide a formal letter that acknowledges that there is a One Clean Up Program Agreement with Sunoco and it's currently operating under one EPA ID Number (PAD049791098) for Point Breeze, Girard Point and Schuylkill River Tank Farm;
- EPA will add in a Corrective Action Module to the Sunoco-submitted Draft Part B RCRA Permit. The module will reference the One Clean-Up Program agreement and the current remediation work being completed under the existing CO&A between PADEP and Sunoco, Inc.; and

- EPA will issue a letter to Sunoco for each characterized SWMU that lists a non-leaded tank bottom designation for which no further action is required.

Sunoco is also developing a report entitled, *Work Plan for Sitewide Approach Under the One Cleanup Program* (Work Plan for Sitewide Approach), to document the Sitewide remedial approach extending beyond the requirements of the 2003 CO&A. DEP and EPA have reviewed and provided input to this report and the final report is expected to be submitted to DEP and EPA in July 2011. In accordance with the Work Plan for Sitewide Approach, all SCRs that have been prepared under the 2003 CO&A will be repackaged as SCR/RIRs and re-submitted to allow for the reports submitted earlier under the CO&A process to be updated with current Act 2 standards and to satisfy the appropriate public and municipal notice provisions of Act 2. To date, SCR/RIRs have been prepared for AOIs 2, 3 and 7. This report is the fourth consecutive report to be submitted as an SCR/RIR.

2.0 ENVIRONMENTAL SETTING

AOI 10 is comprised of approximately 80 acres and is located west of the Schuylkill River and south of Passyunk Avenue (Figures 1 and 2). AOI 10 is mostly open space and bounded by Passyunk Avenue to the north-northwest, by the Schuylkill River to the east-southeast, and by industrial and open properties to the south and west. Lands Creek traverses the southern portion of AOI 10 (Figure 1).

2.1 Historic and Current Use

Historic Use

A detailed review of historical aerial photographs for AOI 10 is provided in Appendix B of the Work Plan. Based on a review of historical aerial photographs, several ASTs once existed in the northeastern and western portions of AOI 10 (Figure A-1 in Appendix A). Four PDAs exist in the topographically high areas of AOI 10 (Figure A-1 in Appendix A). PDAs 3 and 4 received primarily trash construction rubble, leaded tank bottom and separator sludges and spent catalyst during the 1950s. PDAs 1 and 2 received acid wastes, caustic waste, asphalt, coal slag, paraffin, bender catalyst and leaded sludge in the 1950s and 1960s. PDAs 1 and 2 were capped with clay materials and PDAs 3 and 4 were capped with clay and vegetative cover materials in the 1980s. The PDAs were

investigated as part of the 1992 RFI performed by ENSR. As part of the RFI activities, the PDAs were grouped into a CAMU. This CAMU is the only RCRA waste management unit in AOI 10. Other historic use areas in AOI 10 include a tankage area and associated pump houses in the northeast portion and two fuel docks along the eastern boundary with the river (Figure A-1 in Appendix A). The structures associated with the tanks and pump houses were demolished prior to 2005.

Currently, activities in the West Yard include maintenance of an existing Sunoco pipeline that is mostly above grade and extends along much of the northern AOI 10 boundary, and an aboveground manifold area that connects underground and aboveground lines between the refinery and Schuylkill River Tank Farm.

2.2 Geology

To further characterize geology at AOI 10, Sunoco advanced seven shallow and two intermediate monitoring wells. Shallow well borings were advanced into the fill/alluvium materials beneath AOI 10. Intermediate well borings were advanced into the Trenton Gravel beneath the fill/alluvium and above bedrock. Each shallow and intermediate boring was continually logged by a field geologist. The boring logs are provided in Appendix C. To illustrate the geology at AOI 10, two geologic cross sections were prepared and are provided as Figures 4a and 4b in this report. The cross section location lines are shown in plain view on these figures.

The following paragraphs describe the primary geologic units beneath AOI 10 beginning with the deepest unit to the shallowest unit:

Wissahickon Formation – Bedrock beneath the refinery and AOI 10 is identified as the Wissahickon Schist. This formation is a metamorphosed greenish-gray micaceous schist and quartzite. The competent bedrock of the Wissahickon Formation is overlain by weathered bedrock consisting of micaceous clay, which becomes increasingly sandy as the degree of weathering lessens and competent bedrock is encountered. Based on deep well and soil borings completed in AOI 10, the Wissahickon Schist ranges between approximately 30 and 80 feet beneath the ground surface. The bedrock elevation rises to the west. This range in bedrock depth is illustrated in Figures 4a and 4b.

Lower Sand Unit of the PRM – Throughout the majority of the Refinery, the Wissahickon Formation is overlain by the Lower Sand, which is the lowest member of the Potomac-Raritan Magothy (PRM) Aquifer System. Based on recent geologic data collected in AOI 10, the Lower Sand does not exist beneath AOI 10.

Middle/Lower Clay – The Middle/Lower Clay, where present beneath the refinery, is characterized by very low permeability reddish-brown, brown or gray clays and sandy clays. Based on recent geologic data collected in AOI 10, the Middle/Lower Clay does not exist beneath AOI 10. As shown in Figures 4a and 4b, some clay is present immediately above bedrock. The clay is absent in the western portions of AOI 10. As shown in Figures 4a and 4b, the clay, where present, ranges in thickness between approximately 2 feet to 5 feet.

Trenton Gravel – Throughout most of the refinery, the Trenton Gravel typically overlies the Middle/Lower Clay and Lower Sand with thicknesses up to 80 feet and a typical thickness of 40 feet. The Trenton Gravel is of Pleistocene Age (Ice Age; less than 2 million years) and is a very heterogeneous unit comprised of a predominant brown to gray sand, gravel and minor amounts of clay (Owens and Minard, 1979). As shown in Figures 4a and 4b, Trenton Gravel is present throughout AOI 10 above bedrock and beneath alluvium. The Trenton Gravel is approximately 10 feet thick in the western portion of AOI 10 and thickens to approximately 30 feet along the eastern portion of AOI 10.

Recent Fill/Alluvium - The alluvium deposits in AOI 10 generally consist of dark gray organic clayey mud or silt and fine sand. As shown in Figures 4a and 4b, alluvium deposits are approximately 50 to 65 feet thick in the eastern and northeastern portions of AOI 10 and thin to between 10 to 35 feet in the western and southern portions of AOI 10. As shown in Figures 4a and 4b, the alluvium thickens in the eastern portion of AOI 10 where the Pleistocene age deposits have been eroded and replaced. At these locations, the alluvium deposits are in direct contact with the Trenton Gravel.

Fill type varies across AOI 10 and includes various sands and gravels, brick and wood fragments, and cinder ash. Fill overlies the native alluvium throughout AOI 10 and ranges between 5 and 25 feet in thickness.

Based on the soil borings advanced through the CAMU areas, cover materials over the waste are present at thicknesses ranging between 2.5 and 12 feet. Waste materials in the CAMU areas range in thickness between 5 and 20 feet and lie on top of the alluvium (Figures 4a and 4b).

In addition to the above descriptions, the following general observations can be made concerning the geology in AOI 10:

- Fill materials are present throughout AOI 10;
- Alluvium is present beneath AOI 10 and thickens in a wedge shape towards the river;
- Trenton Gravel is present in all portions of AOI 10 beneath the alluvium and thins towards the river where the gravel has been eroded and replaced by the alluvium;
- The Middle/Lower Clay is absent in AOI 10; however, some clay is present immediately above bedrock in some locations;
- The Lower Sand is absent in AOI 10; and
- The depth to bedrock beneath AOI 10 increases towards the east. The shallowest depth to bedrock in the west is approximately 30 feet and the deepest depth to bedrock in the east is approximately 80 feet.

2.3 Hydrogeology

2.3.1 Shallow Groundwater Occurrence and Flow

Shallow groundwater in AOI 10 refers to unconfined groundwater that occurs in either the fill or alluvium (or both). Well construction details for these monitoring wells are provided in Table 2 and boring/well construction logs for the newly-installed wells are provided in Appendix C of this report. Groundwater gauging data collected by Stantec in April 2011 was used to generate a groundwater flow figure for the shallow zone in AOI 10 (Figure 5). The groundwater elevation data from this gauging event is provided in Table 3. Historic boring/well logs for wells installed prior to the site characterization activities are provided in Appendix D of the CCR.

Shallow groundwater flow within AOI 10 is described below:

- Groundwater in the shallow zone of AOI 10 occurs at depths ranging between 1 and 13 feet below the ground surface under unconfined conditions;
- Groundwater flow in the eastern portion of AOI 10 is to the east towards the Schuylkill River and groundwater flow in the western portion of AOI 10 is to the south;
- The hydraulic gradient in the western portion of AOI 10 is relatively flat (average gradient= 0.003 ft/ft) and steepens along the Schuylkill River (average gradient = 0.016 ft/ft);
- The vertical hydraulic gradient between the shallow and intermediate (Trenton Gravel) zones is downward at an average of 0.325 ft/ft.

2.3.2 Intermediate Groundwater Occurrence and Flow

Intermediate groundwater at AOI 10 refers to unconfined groundwater that occurs in Trenton Gravel situated beneath the alluvium. Six intermediate wells are located in AOI 10. These include: W-1D, W-9, W-13, W-19, W-26, and W-32D. Well construction details for these wells are provided in Table 2 and the available logs for these wells are provided in Appendix D of the CCR. Groundwater gauging data collected by Stantec in April of 2011 was used to generate a groundwater flow figure for the intermediate groundwater zone in AOI 10 (Figure 6). The groundwater elevation data from this gauging event is provided in Table 3.

Intermediate groundwater flow within AOI 10 is described below:

- Intermediate groundwater in AOI 10 occurs at depths ranging between 6 to 10 feet below the ground surface;
- Groundwater flow in the intermediate zone is towards the southwest under a low hydraulic gradient (average gradient = 0.0006 ft/ft); and
- The vertical hydraulic gradient between the shallow and intermediate (Trenton Gravel) zones is downward at an average of 0.325 ft/ft.

2.4 Surface Water

AOI 10 is mostly open space and bounded by Passyunk Avenue to the north-northwest, by the Schuylkill River to the east-southeast. Lands Creek traverses the southern portion of AOI 10 (Figure 1). As shown on Figure 1, Lands Creek is shown as a blue line stream. The surface water area of the creek is greater than 1,000 square feet and is not a permitted open water management area. The creek is a freshwater tidally influenced drainage feature which drains into the Schuylkill River. The creek is designated by PA as a warm water fishes stream. The confluence of Lands Creek and the Schuylkill River is in the southeast corner of AOI 10.

3.0 SITE CHARACTERIZATION ACTIVITIES

The following sections summarize the site characterization activities that were completed in AOI 10 in support of this SCR/RIR. Site characterization activities were performed between April and May 2011, by Aquaterra Technologies, Inc. (Aquaterra) and Langan in coordination with Sunoco. These activities were executed in accordance with the AOI 10 Work Plan for Site Characterization. In addition to the activities performed under the work plan, Stantec completed site characterization activities to address a vacuum gas oil (VGO) release in April 2010. All site characterization activities are discussed in the following sections.

3.1 Soil Borings and Sampling Outside of CAMU Areas

A total of 45 soil samples were collected for analysis of site COCs from areas within AOI 10 outside the CAMU. The locations of all soil and monitoring well borings are shown on Figure 3 and the boring logs are provided in Appendix C. Soil samples were collected utilizing macrocore sampling techniques. Soil borings outside the CAMU areas were advanced from depths ranging between 2 to 20 feet below grade using hollow-stem auger techniques in accordance with the Work Plan for Site Characterization.

Soil samples collected from these borings were submitted to Lancaster Laboratories, Inc. (LLI) of Lancaster, Pennsylvania for analysis of site COCs. A summary of the soil analytical results screened against the PADEP non-residential soil MSCs is provided in

Tables 4 and 5, and the results are discussed in Section 4.1. The laboratory analytical reports are provided as Appendix D.

3.2 Soil Borings and Sampling within CAMU Areas

A total of nine soil borings ranging in depths between 20 and 30 ft bgs were completed in the CAMU areas in accordance with the Work Plan. The purpose of these soil borings was to characterize the potential direct contact to shallow soil exposure pathway, characterize and delineate the waste material in the CAMU and characterize the soil beneath the waste in the CAMU. Soil borings were advanced utilizing hollow stem augers and macrocore sampling device. The locations of all soil and monitoring well borings are shown on Figure 3 and the boring logs are provided in Appendix C.

Soil samples were submitted to LLI of Lancaster, Pennsylvania for analysis of site COCs. A summary of the soil analytical results screened against the PADEP non-residential soil MSCs is provided as Tables 6, 7 and 8 and the results are discussed in Section 4.2. The laboratory analytical reports are provided as Appendix D.

3.3 Vacuum Gas Oil Release Cleanup

A release of VGO from a manifold area located in the northeastern portion of AOI 10 occurred in March 2010. The release was reported to be up to approximately 1,500 barrels of VGO. Remediation and post postremediation sampling programs were implemented by Sunoco. Sunoco directed the cleanup operations which included recovery of VGO by vacuum truck and excavation and disposal of impacted soils. Stantec performed post-excavation confirmatory soil sampling. Post-excavation soil samples were analyzed for site COCs as listed in the CCR. Locations of the post-excavation soil samples are illustrated on Figure 9 and the results of the sampling are discussed in Section 4.3. The laboratory analytical report for the samples is included in Appendix D.

3.4 Installation of Groundwater Monitoring Wells

Well installation activities were performed in April 2011 by Parrat Wolff, Inc. (PWI) of East Syracuse, New York under direct supervision of Aquaterra and Langan, and in coordination with Sunoco. The locations of all monitoring wells installed are shown on

Figure 3. Monitoring wells were installed to monitor the water table aquifers beneath AOI 10. The well installation activities are discussed in the following sections.

3.4.1 Shallow Groundwater Monitoring Wells

PWI installed seven shallow monitoring wells (fill/alluvium) under the direct supervision of Aquaterra and Langan. All wells were installed and constructed in accordance with the Work Plan. Locations of these wells are shown on Figure 3. Well borings were advanced utilizing 8.25-inch inside diameter hollow stem augers and macrocore samplers to record lithology. Monitoring wells were constructed to a maximum depth of 12 feet below grade with screen intervals between 2 and 12 feet, with the maximum screen length being 10 feet. Boring logs depicting monitoring well construction details and lithology are provided as Appendix C. Monitoring wells were constructed with a stickup steel casing for protection. Well construction details are provided in Table 2.

Following construction, the wells were developed in accordance with the Work Plan.

3.4.2 Intermediate Groundwater Monitoring Wells

Four intermediate groundwater monitoring wells previously existed in AOI 10. These wells include: W-9, W-13, W-19, and W-26. Two new intermediate wells (W-1D and W-32D) were installed as part of the site characterization activities. The locations of these intermediate monitoring wells are shown on Figure 3. Well construction details are provided in Table 2 and soil boring/well construction logs are provided in Appendix C. Geologic information obtained from the deep soil borings completed in AOI 10 was used to prepare geologic cross sections provided as Figures 4a and 4b.

3.5 Groundwater Monitoring

On April 27, 2011, Aquaterra performed monitoring well gauging activities to collect liquid levels from monitoring points within AOI 10. Monitoring points were gauged for depth-to-water, and if applicable, depth-to-product in accordance with the Work Plan. All monitoring point gauging readings are summarized in Table 3.

The groundwater monitoring data from Table 3 was used to generate shallow and intermediate groundwater elevation contours provided as Figures 5 and 6, respectively.

3.6 Groundwater Sampling

Aquaterra performed a round of groundwater sampling from all accessible wells in AOI 10 between April 26 and 27, 2011. All groundwater sampling activities were completed using three well volume purging techniques in accordance with the AOI 10 Work Plan. The monitoring well sampling summary data sheets are provided as Appendix E.

Following well purging activities, groundwater samples were collected by lowering a disposable bailer slowly into the monitoring well to minimize excess agitation. The bailer was filled with water from the top of the water table and retrieved. Samples were then collected in laboratory-prepared bottleware and immediately placed on ice. Samples were submitted to LLI for analysis of site COCs listed in Table 1b. Once the sample was collected, the bailer, bailer cord, and nitrile gloves used to obtain the sample were discarded. Sample date, time, number, and site name were recorded on the chain-of-custody and in field books. For groundwater samples analyzed for lead, LLI filtered the samples to analyze for dissolved concentrations.

The groundwater analytical results for shallow wells were screened against the PADEP non-residential groundwater MSCs and are presented in Table 9. The groundwater analytical results for the intermediate wells are presented in Table 10. The laboratory analytical reports are included as Appendix D.

3.7 Surface Water and Sediment Sampling

On April 7, 2011, Aquaterra and Langan performed surface water and sediment sampling activities at Lands Creek. Sediment and surface water samples were collected from five locations. These sample locations are shown on Figure 3. All samples were collected in accordance with the Work Plan.

Surface water and sediment samples were submitted to LLI of Lancaster, Pennsylvania for analysis of COCs as listed in Table 1c and 1d, respectively. A summary of the analytical results screened against the appropriate screening criteria is provided as

Tables 11 and 12 and the results are discussed in Section 4.5. The laboratory analytical reports are provided as Appendix D.

3.8 LNAPL Sampling

Light non-aqueous phase liquid (LNAPL) samples for select wells in AOI 10 were previously characterized as described in the CCR. As part of the site characterization activities, Aquaterra collected LNAPL samples from three existing monitoring wells in AOI 10 to further characterize LNAPL in AOI 10. The wells included W-8, W-14, and W-18. LNAPL samples were collected using a direct sampling method in accordance with the Work Plan. LNAPL samples were packaged in certified hazardous material shipping boxes and shipped to Torkelson Laboratories (Torkelson) of Tulsa, Oklahoma for LNAPL characterization. LNAPL characterization data included product types, density, proportions of product, degree of weathering, and similarities to other LNAPL samples collected at the Refinery.

Appendix F summarizes the LNAPL characterization results for all samples collected in AOI 10 as well as previous results from the CCR.

3.9 Surveying Activities

Following completion of well installation and soil boring activities, the newly-installed monitoring wells and soil boring locations were surveyed by Langan to establish the location and elevation of the inner and outer casing and ground surface at each point. All well elevations were determined to the nearest 0.01 foot relative to mean sea level. All survey activities were performed by a Pennsylvania-licensed surveyor and tied to the NAVD 88 datum. The new survey data for the monitoring wells is presented in Table 2. This new survey data was used to update the Geographic Information System (GIS) and site wide database for the Refinery.

4.0 SITE CHARACTERIZATION ANALYTICAL RESULTS

The following sections discuss the results of the site characterization activities performed in AOI 10.

4.1 Soil Analytical Results for Samples Collected Outside of CAMU Areas

The results of the soil samples collected outside of the CAMU areas are provided in Tables 4 and 5. Table 4 includes soil sample results from samples that were collected from shallow borings outside the CAMU areas. These soil samples were analyzed for the site COCs only (Table 1b). Table 5 includes shallow soil sample results from samples collected around the perimeter of the CAMU areas (horizontal delineation borings). These soil samples were analyzed for TCL VOC, SVOC and TAL Metals lists, which are broader than the site COC list. All of the soil samples were collected between zero to two feet below grade and no saturated soils were observed in this interval. The soil sample results were screened against the PADEP non-residential soil MSCs for unsaturated soils. Soil samples with results above their respective soil MSCs are shown in Figure 7.

Below is a general summary of the screening results:

- COCs detected in soil above their respective non-residential soil MSCs included: benzene, benzo(a)pyrene, PCE, arsenic, manganese, and lead; and
- All other COCs analyzed in Tables 4 and 5 were below their respective non-residential soil MSCs.

4.2 Soil Results within CAMU Areas

The results of the samples collected inside the CAMU are provided in Tables 6, 7 and 8. Table 6 includes results from soil samples that were collected from 0 and 2 feet below the ground surface above the waste. Table 7 includes results from waste samples collected from the waste inside the CAMU areas (cover materials). Table 8 includes results from soil samples collected beneath the waste inside the CAMU areas (vertical delineation borings). These soil samples were analyzed for TCL VOC, SVOC and TAL Metals lists, which is an expanded list from the site COC list. The soil sample results were screened against the PADEP non-residential soil MSCs. Soil samples with results above their respective soil MSCs are shown in Figure 8. Below is a summary by depth interval of the screening results:

Shallow Soil Samples:

- COCs detected in shallow soil above their respective non-residential soil MSCs included: benzo(a)pyrene, dibenzo(a,h)anthracene, manganese and lead.
- All other COCs were below their respective non-residential soil MSCs.

Waste Samples:

- COCs detected in waste samples above the non-residential soil MSCs included: benzene, methylene chloride, PCE, ethylbenzene, toluene, 1,2-DCE, 2-methylnaphthalene, benzo(a)pyrene, naphthalene, dibenzofuran, antimony, arsenic, barium, cobalt, lead, manganese, mercury, nickel, thallium, and zinc.
- All other COCs analyzed were below their respective non-residential soil MSCs.

Vertical Delineation Soil Samples:

- COCs detected in the vertical delineation soil samples (collected beneath the waste) above the non-residential soil MSCs included: benzene, benzo(a)pyrene, naphthalene, arsenic, barium, cobalt, lead, manganese, mercury, nickel, and thallium.
- All other COCs analyzed were below their respective non-residential soil MSCs.

4.3 Vacuum Gas Oil Release Area - Post Excavation Soil Sample Results

Stantec collected a total of 10 unsaturated, post-excavation soil samples following the excavation of VGO-impacted soil. The locations of the soil samples are shown in Figure 9. The samples were analyzed for site COCs as listed in the CCR. The results of the soil samples are screened against the DEP non-residential soil MSCs in Table 9. All soil samples analyzed for site COCs were below their respective non-residential soil MSCs.

4.4 Groundwater Results

The results of the groundwater samples collected from shallow and intermediate monitoring wells are provided in Tables 10 and 11, respectively. The results were screened against the PADEP non-residential used aquifer (TDS<2,500) groundwater MSCs. Locations with concentrations above the groundwater MSCs are illustrated in

Figure 10. A summary of the COC concentrations observed in both the shallow and intermediate wells is provided below.

Shallow Wells

- COCs at concentrations above their respective non-residential groundwater MSCs included: benzene, chrysene, naphthalene, and lead.
- All other COCs analyzed in Table 10 were below their respective non-residential groundwater MSCs.

Intermediate Wells

- There were no COCs detected in intermediate wells above their respective non-residential groundwater MSCs.

4.5 Surface Water and Sediment Results

Surface Water

The locations of the five surface water samples collected from Lands Creek are shown in Figure 3. The samples were submitted for analysis of COCs listed in Table 1c. The results of the samples were screened against the 25 Pa. Code, Chapter 93 Fish and Aquatic Life criteria in Table 12. To calculate the criteria for constituents that require hardness data, site-specific hardness data collected at each sampling location was used. Total and dissolved surface water samples were analyzed.

Based on the results of the screening, no COCs (both total and dissolved) were detected in the surface water samples at concentrations above their respective Chapter 93 screening criteria.

Sediment

The locations of the five sediment samples collected from Lands Creek are shown in Figure 3. The sediment samples were collected at the same locations as the surface water samples and were submitted for analysis of COCs listed in Table 1d. Results of the samples were screened against the EPA Region 3 Biological Technical Assistance Group (BTAG) sediment and surface water benchmarks and the LEL and SEL in Table 13. Sample locations exhibiting COC concentrations above these sediment screening criteria are depicted on Figure 11. Total organic carbon data was collected at

each sample location and was used to calculate site-specific SEL criteria where required.

Based on the results of the screening, no volatile organic constituents exceeded the sediment screening criteria. Below is a summary of the semi-volatile organic constituents and metal results that were above the sediment screening criteria:

- COCs which were detected above the SEL included: anthracene, benzo(ghi)perylene, chysene, phenanthrene, pyrene, arsenic, chromium (total), copper, iron, lead, manganese, mercury, nickel, and zinc.

4.6 LNAPL Characterization Results

During the April 2011 gauging event, three monitoring wells in AOI-10 (W-8, W-14, and W-18) had measurable LNAPL ranging in thickness between 0.01 and 0.59 ft. As part of the site characterization activities, LNAPL samples were collected from each of the three wells and submitted to Torkelson Geochemistry, Inc. of Tulsa, Oklahoma for characterization. Appendix F summarizes the LNAPL characterization results from the CCR and the recent site characterization activities and also includes the laboratory data reports for the sampled wells. Based on the LNAPL characterization performed by Torkelson, the LNAPL types present in AOI 10 include extremely weathered residual oil in W-8 and extremely weathered residual oil/middle distillate in monitoring wells W-14 and W-18.

LNAPL modeling, using the API model was completed as part of the 2004 CCR to evaluate specific volume and LNAPL mobility for product in some of these wells. The LNAPL type, absence of LNAPL in the surrounding monitoring wells, groundwater flow direction, and the LNAPL modeling performed as part of the CCR, all suggest LNAPL in these wells is stable and immobile. Therefore, no additional LNAPL modeling was completed as part of this SCR/RIR.

LNAPL occurrence in AOI 10 is illustrated in Figure 12.

5.0 REMEDIAL SYSTEMS

There are no active remediation systems currently operating in AOI 10.

6.0 FATE AND TRANSPORT ANALYSIS

The following sections describe fate and transport modeling activities performed as part of AOI 10 site characterization.

6.1 Soil

No fate and transport modeling was completed for the soil analytical results since the only potential exposure pathway to soil is by direct contact to shallow soil. The soil-to-groundwater pathway is evaluated through groundwater data. Potential exposure pathways for AOI 10 are discussed in more detail in Section 8.0.

6.2 Groundwater

Fate and transport modeling was completed for eight wells in AOI 10 (W-1, W-12, W-23, W-28, W-31, W-32, W-33, and W-34) that exhibited concentrations of COCs above their respective PADEP non-residential groundwater MSCs. The modeling was performed to evaluate whether concentrations of COCs in groundwater, above MSCs, have the potential to reach the AOI boundary or Lands Creek.

Fate and transport modeling was performed using the Quick Domenico (QD) model. The QD Version 2 spreadsheet model and either PADEP default or site-specific data were used to perform the fate and transport calculations. A more detailed description of QD model input parameters and results are presented in Appendix G. Input and result summary spreadsheets for each monitoring well modeled are included in Appendix G (Tables G.1 through G.9). The results of the QD screening are located in Table G.5. A comparison between the model-predicted downgradient transport distance and the distance to the nearest property boundary and/or surface water receptor is also included in these tables.

The modeling results indicate concentrations above the groundwater MSCs in shallow wells W-1, W-12, W-23, W-28, W-31, W-32, and W-34 are not predicted to migrate beyond the AOI 10 boundary, with the exception of one well, W-33, which contains a concentration of benzene that has the potential to reach Lands Creek. However, the

predicted benzene concentration at the Lands Creek boundary is below the 25 Pa. Code Chapter 93 surface water quality criteria for benzene.

6.3 Surface Water

Based on the results of the QD simulations, groundwater concentrations above the MSCs are not expected to reach the Schuylkill River. In addition, surface water samples collected from Lands Creek exhibited no COC concentrations above the 25 Pa. Code Chapter 93 screening criteria.

6.4 LNAPL

Wells W-8, W-14, and W-18 were the only wells in AOI 10 that contained measurable LNAPL. Based on the LNAPL type and mobility, degree of severe LNAPL weathering, absence of LNAPL in the surrounding monitoring wells, groundwater flow/gradients, and the LNAPL mobility modeling performed as part of the CCR, LNAPL in these wells is considered to be stable and immobile. Therefore, no additional LNAPL modeling was completed as part of this SCR/RIR.

6.5 Vapor Intrusion into Indoor Air

Currently there are no occupied buildings in AOI 10. Therefore, there are no potential receptors to vapor intrusion (VI) into indoor air within AOI 10. Soil and groundwater samples collected in AOI 10 were evaluated in accordance with the current Act 2 Vapor Intrusion Guidance, where applicable. The groundwater table is less than five feet below the ground surface in several areas of AOI 10. Groundwater and soil samples collected in these areas were not screened against the default screening numbers in the guidance. In addition, the waste in the CAMU areas is not considered soil-like; therefore, analytical data from the waste samples was not screened. The refinery is regulated under OSHA; therefore, the appropriate OSHA standard was applied when evaluating the potential indoor air pathway. The screening evaluation using applicable soil and groundwater data indicated that no soil or groundwater analytical results in AOI 10 are above the non-residential EPA/PADEP default screening values or the OSHA PEL screening values.

No soil gas sampling was completed as part of this site characterization, but if future development is proposed for the areas that were not able to be screened using the PADEP vapor screening criteria, soil gas sampling would be completed in these areas.

7.0 SITE CONCEPTUAL MODEL

A preliminary site conceptual model (SCM) for the Refinery, including AOI 10, was presented in the CCR. Data collected from the recent site characterization activities performed in AOI 10 were used to refine the SCM for this area. The revised SCM for AOI 10 is described in the following sections:

7.1 Description and Site Use

The current and future intended use of AOI 10 is non-residential. AOI 10 is located west of the Schuylkill River across from the northern portion of the South Yard. It is bordered by Passyunk Avenue to the North, the Schuylkill River to the Southeast and other industrial properties to the southwest. Lands Creek traverses the southern portion of AOI 10.

Based on a review of historical aerial photographs, several ASTs once existed in the northeastern and western portions of AOI 10 (Figure A-1 in Appendix A). Four PDAs exist in the topographically high areas of AOI 10 (Figure A-1 in Appendix A). PDAs 3 and 4 received primarily trash construction rubble, leaded tank bottom and separator sludges and spent catalyst during the 1950s. PDAs 1 and 2 received acid wastes, caustic waste, asphalt, coal slag, paraffin, bender catalyst and leaded sludge in the 1950s and 1960s. PDAs 1 and 2 were capped with clay materials and PDAs 3 and 4 were capped with clay and vegetative cover materials in the 1980s. Other historic use areas in AOI 10 include a tankage area and associated pump houses in the northeast portion and two fuel docks along the eastern boundary with the river (Figure A-1 in Appendix A). The structures associated with the tanks and pump houses were demolished prior to 2005.

Currently, activities in the West Yard include maintenance of an existing Sunoco pipeline that is mostly above grade. The pipeline extends along much of the northern AOI 10

boundary and an aboveground manifold area that connects underground and aboveground lines between the refinery and Schuylkill River Tank Farm.

AOI 10 is located within a fenced and secured area to prevent unauthorized access. Prior to any work being completed within AOI 10, appropriate work permits, safety and security measures must be approved by Sunoco Refinery personnel. AOI 10 is under the control of Sunoco's health and safety administrative procedures and is regulated by OSHA. Direct contact to site soils (soils greater than two feet beneath the ground surface) is controlled by Sunoco's on-site permit and personal protective equipment (PPE) procedures.

7.2 Geology and Hydrogeology

The following summarizes relevant information concerning geology and hydrogeology in AOI 10:

Geology

- Fill materials are present throughout AOI 10;
- Waste materials in the PDAs range in thickness between 5 and 20 feet thick;
- Alluvium is present beneath AOI 10 and thickens in a wedge shape towards the river;
- Trenton Gravel is present in all portions of AOI 10 beneath the alluvium and thins towards the river where the gravel has been eroded and replaced by the alluvium;
- The Middle/Lower Clay is absent in AOI 10; however, some clay is present immediately above bedrock in some locations;
- The Lower Sand is absent in AOI 10; and
- The depth to bedrock beneath AOI 10 increases towards the east. The shallowest depth to bedrock in the west is approximately 30 feet and the deepest depth to bedrock in the east is approximately 80 feet.

Hydrogeology

- Groundwater in the shallow zone of AOI 10 occurs at depths ranging between 1 and 13 feet below the ground surface under unconfined conditions;

- Groundwater flow in the eastern portion of AOI 10 is to the east towards the Schuylkill River and groundwater flow in the western portion of AOI 10 is to the south;
- The hydraulic gradient in the western portion of AOI 10 is relatively flat (average = 0.003 ft/ft) and steepens along the Schuylkill River (average gradient = 0.016 ft/ft);
- Intermediate groundwater in AOI 10 occurs at depths ranging between 6 to 10 feet below the ground surface;
- Groundwater flow in the intermediate zone is towards the southwest under a low hydraulic gradient (average gradient = 0.0006 ft/ft); and
- The vertical hydraulic gradient between the shallow and intermediate (Trenton Gravel) zones is downward at an average of 0.325 ft/ft.

7.3 Constituents of Concern

The following summarizes relevant information concerning COCs in AOI 10:

Soil Samples Collected Outside of CAMU Areas

Shallow soil samples were collected outside the CAMU areas and deeper soil samples were collected around the perimeter of the CAMU areas to horizontally delineate the extent of the waste in the CAMUs. In addition, post-excavation soil samples were collected from the area of the VGO release. The results of these soil samples are summarized below:

- COCs detected in soil above their respective non-residential soil MSCs included: benzene, benzo(a)pyrene, PCE, arsenic, manganese, and lead; and
- All other COCs were below their respective non-residential soil MSCs, including all of the post-excavation samples.

Soil Samples Collected Inside CAMU Areas

Soil samples were collected from three depth intervals inside the CAMU areas. These intervals correspond to soil materials above the waste, waste and soil materials beneath the waste. The results of the soil samples are summarized below by corresponding depth interval:

Shallow Soil Samples:

- COCs detected in shallow soil above their respective non-residential soil MSCs included: benzo(a)pyrene, dibenzo(a,h)anthracene, manganese and lead.
- All other COCs were below their respective non-residential soil MSCs.

Waste Samples:

- COCs detected in waste samples above the non-residential soil MSCs included: benzene, methylene chloride, PCE, ethylbenzene, toluene, 1,2-DCE, 2-methylnaphthalene, benzo(a)pyrene, naphthalene, dibenzofuran, antimony, arsenic, barium, cobalt, lead, manganese, mercury, nickel, thallium, and zinc.
- All other COCs analyzed were below their respective non-residential soil MSCs.

Vertical Delineation Soil Samples:

- COCs detected in the vertical delineation soil samples (collected beneath the waste) above the non-residential soil MSCs included: benzene, benzo(a)pyrene, naphthalene, arsenic, barium, cobalt, lead, manganese, mercury, nickel, and thallium.
- All other COCs analyzed were below their respective non-residential soil MSCs.

Groundwater

Groundwater samples were collected from all wells that did not contain LNAPL. This included wells that screen both the shallow and intermediate zones. The results of the groundwater samples are summarized below by corresponding hydrogeologic zone:

Shallow Wells

- COCs at concentrations above their respective non-residential groundwater MSCs included: benzene, chrysene, naphthalene, and lead.
- All other COCs were below their respective non-residential groundwater MSCs.

Intermediate Wells

- There were no COCs detected in intermediate wells above their respective non-residential groundwater MSCs.

The exposure assessment completed for the COCs above the MSCs is discussed in Section 8.0 of this report.

Surface Water

Five surface water samples were collected from Lands Creek. None of the samples exhibited concentrations of COCs above their respective 25 Pa. Code Chapter 93 screening criteria.

Sediment

Five sediment samples were collected from Lands Creek at locations corresponding to the surface water samples. The results of the sediment samples are summarized below:

- No VOC concentrations were above the sediment screening criteria.
- SVOCs and metals detected above the SEL included: anthracene, benzo(ghi)perylene, chysene, phenanthrene, pyrene, arsenic, chromium (total), copper, iron, lead, manganese, mercury, nickel, and zinc.

7.4 LNAPL Distribution and Mobility

The following summarizes relevant information concerning LNAPL distribution in AOI 10:

- W-8, W-14, and W-18 contained measurable LNAPL and the product type is identified as extremely weathered residual oil and/or residual oil/middle distillate.
- The occurrence of LNAPL does not correlate with the COC concentrations which were above MSCs in shallow groundwater in these areas.
- Based on LNAPL modeling performed for the CCR, the LNAPL type, degree of weathering, groundwater flow/gradients, the absence of LNAPL in the surrounding monitoring wells, and the occurrence of LNAPL in these wells over time, LNAPL in these wells is considered to be stable and immobile.

7.5 Fate and Transport of COCs

- No fate and transport modeling was completed for the soil analytical results since the only potential exposure pathway to soil is by direct contact. The soil-

to-groundwater pathway is evaluated through groundwater data.

- Fate and transport calculations were completed for groundwater in AOI 10 to evaluate potential migration pathways/potential impacts to receptors. Eight wells (W-1, W-12, W-23, W-28, W-31, W-32, W-33, and W-34) in AOI 10 exhibited concentrations of groundwater COCs above their respective MSCs. The results from these wells were modeled using the QD model to determine whether COC concentrations could potentially reach the AOI 10 boundary. The modeling results indicate concentrations above the groundwater MSCs in shallow wells W-1, W-12, W-23, W-28, W-31, W-32, and W-34 are not predicted to migrate beyond the AOI 10 boundary, with the exception of one well, W-33, which contains a concentration of benzene that has the potential to reach Lands Creek. However, the predicted benzene concentration at the Lands Creek boundary is below the 25 Pa. Code Chapter 93 surface water quality criteria for benzene.

7.6 Potential Migration Pathways and Site Receptors

The following summarizes potential migration pathways and site receptors for AOI 10.

- AOI 10 is situated within a fenced, secured area to prevent unauthorized access. The potential direct contact pathway to soil greater than two feet is deemed incomplete based on Sunoco's existing permitting procedures which protect against exposure to soil encountered in excavations.
- There are no occupied buildings in AOI 10. The potential direct contact pathway to groundwater is deemed incomplete based on Sunoco's existing permitting procedures which prevent exposure to groundwater that may be encountered in excavations.
- Dissolved COCs in groundwater are not predicted to migrate beyond the AOI 10 boundary or trigger a condition in surface water that would exceed a water quality standard.
- COC concentrations above the ecological screening limits in sediment collected from Lands Creek are discussed in more detail Section 9.0.
- Lands Creek is surrounded by fencing and is within the limits of AOI 10. This fencing, in conjunction with Sunoco's permitting procedures which protect

against exposure during activities in the creek, eliminates the human health direct contact pathway to the creek sediments.

- The vapor intrusion screening evaluation using applicable soil and groundwater data indicated that no soil or groundwater analytical results in AOI 10 are above the non-residential EPA/PADEP default screening values or the OSHA PEL screening values;
- No soil gas sampling was completed as part of this site characterization, but if future development is proposed for the areas that were not able to be screened using the PADEP vapor screening criteria, soil gas sampling would be completed in these areas.

8.0 HUMAN HEALTH EXPOSURE ASSESSMENT/RISK ASSESSMENT

Based on the current and future intended non-residential site use for AOI 10, an exposure assessment was conducted for all constituents that were above the non-residential statewide health standards in AOI 10. Potential human health exposures for the Refinery are for an industrial worker scenario. The media evaluated included groundwater, surface soil (less than two feet below grade), and subsurface soil (greater than two feet below grade). As described in Section 6.5, further evaluation of the vapor intrusion pathway is not required based on the lack of receptors and complete exposure pathways.

The potential direct contact pathway for soil (greater than two feet), groundwater and LNAPL under the industrial scenario is eliminated through Sunoco's established excavation procedures, PPE requirements and soil handling procedures described in Appendix K of the CCR. However, because direct contact to surface soils could occur outside of excavation activities, shallow soil samples were collected in non-paved areas of AOI 10 to assess this potential exposure pathway.

The following table serves as a summary of potential human health exposure pathways that can be reasonably expected under the current and intended future non-residential use for AOI 10. The table lists potentially contaminated media, potential receptors for these media, and a summary of whether any potentially-complete exposure pathways exist at AOI 10 from the media to these receptors.

Exposure Pathway Evaluation Summary

Contaminated Media	Residents	Workers	Day Care	Construction	Trespassers	Recreation	Food
Groundwater	NA	No(1)	NA	No(2)	No	NA	NA
Air (indoor)	NA	No(3)	NA	No(3)	No	NA	NA
Soil <2 feet bgs.	NA	Yes	NA	Yes	No	NA	NA
Soil >2 feet bgs.	NA	No(4)	NA	No(4)	No	NA	NA
Surface Water	NA	No(5)	NA	No(5)	NA	NA	NA
Sediment	No	No(5)	NA	No(5)	NA	NA	NA
LNAPL	NA	No(1)	NA	No(2)	NA	NA	NA

Notes:

(1) No complete groundwater or LNAPL pathways exist for workers that are not addressed through on-site permitting procedures and PPE.
(2) No complete groundwater or LNAPL pathway exists for construction workers that are not addressed through on-site permitting procedures and PPE.
(3) No complete pathway to indoor air exists based on the evaluation described in Section 6.5.
(4) No complete pathway exists for site soil >2 feet deep that are not addressed through on-site permitting procedures and PPE.
(5) No complete pathway exists for surface water or sediment that are not addressed through on-site permitting procedures and PPE.

Na - Not applicable
No - No potential complete exposure pathway
Yes – Potential complete exposure pathway

A more detailed evaluation of each of these potential human health exposure pathways is presented in the following sections by media.

8.1 Surface Water/Sediment

Lands Creek is as surface water body located in AOI 10. Lands Creek is located within a fenced and secured area to prevent unauthorized access. Prior to any work being completed within AOI 10, appropriate work permits, safety and security measures must be approved by Sunoco Refinery personnel. These procedures protect against any potential exposures to surface water or sediments in Lands Creek.

8.2 Shallow Soils (0-2 Feet Below Grade)

8.2.1 Direct Contact Exposure

In AOI 10, shallow soil samples were collected from within the CAMU and around the perimeter of the CAMU. To determine if any risk to the industrial worker exists due to direct contact, these samples were compared to the non-residential direct contact medium specific concentrations [PA Code Title 25, Chapter 250.305, Appendix A, Tables 3A and 4A]. Within the CAMU designated area, concentrations of benzo(a)pyrene and dibenzo(a,h)anthracene were

detected above their respective direct contact MSCs. Outside the CAMU designated area, concentrations of arsenic, benzo(a)pyrene, and lead were detected above their respective direct contact MSCs. In accordance with Section IV of the PADEP's Technical Guidance Manual, site-specific standards for the above-mentioned constituents were calculated using PADEP default intake parameters for an onsite worker and a risk level of 10^{-4} (Tables H-1 through H-5 in Appendix H). For calculating a site-specific standard for on-site workers exposed to lead, Sunoco used the Society of Environmental Geochemistry and Health (SEGH) model used by PADEP to develop the non-residential soil MSCs.

The calculated site-specific standards are summarized in the table below:

Compound	**Calculated Site-Specific Standard (mg/kg)**
Arsenic [non-carcinogenic / carcinogenic]	8,520/529*****
Benzo(a)pyrene	109
Dibenzo(a,h)anthracene	109
Lead	1,708

***Note:** Arsenic has both carcinogenic and non-carcinogenic toxicological effects; therefore, both criteria were calculated. For characterization, the lower, more stringent standard was used to screen the analytical data.*

The site-specific screening levels for arsenic, benzo(a)pyrene, and dibenzo(a,h)anthracene were calculated for ingestion based on the calculations specified in 25 Pa. Code § 250.306(b). These calculations used the PADEP's default parameters and an updated target risk level of 1E-4, in consideration of the site-specific conditions (PADEP's default target risk level is 1E-5).

The site-specific screening level for lead was also calculated for ingestion. As presented in 25 Pa. Code § 250.306(e), Appendix A, Table 7, the non-residential soil screening value for lead is based on the method presented in the report 'The Society for Environmental Geochemistry and Health (SEGH) Task Force Approach to the Assessment of Lead in Soil' (Wixson, 1991). The model used by the PADEP and developed by SEGH was also used to calculate the site-specific criterion for the refinery. Based on the SEGH model and PADEP's default parameters, PADEP's non-residential direct contact MSC default value

for lead in surface soil is 1,000 mg/kg. To develop a site-specific criteria for lead, some of the parameters used by the PADEP were updated in consideration of site-specific conditions and updated lead data collected from recent studies. As presented in Appendix H, based on the revised parameters, the derived site-specific standard for lead in soil is 1,708 mg/kg for a refinery worker.

Shallow soil sample results for arsenic, benzo(a)pyrene, dibenzo(a,h)anthracene and lead were compared to the calculated site-specific standards. None of the reported results for arsenic or dibenzo(a,h)anthracene were detected above the site-specific standards; however, the results for benzo(a)pyrene and lead were detected above the site-specific standard in seven samples (one sample for benzo(a)pyrene and six samples for lead). In addition to comparing the individual results to the site-specific standards, the cumulative risk of exposure to arsenic, benzo(a)pyrene, and dibenzo(a,h)anthracene in shallow soil throughout AOI 10 was also calculated (Table H-6). Based on the PADEP's TGM, the total cumulative risk for exposure to carcinogenic compounds should not exceed 1E-4 and the cumulative hazard index for exposure to non-carcinogenic compounds should not exceed 1. Lead exposure is dependent on the blood/lead concentration and not risk based; therefore, lead could not be incorporated into the cumulative risk calculation.

As presented in Table H-6:

- The total cumulative hazard index for exposure to the non-carcinogenic compound [arsenic] is less than the PADEP's requirement of 1.0; and
- The total cumulative risk for exposure to carcinogens is 3.65E-04, greater than the acceptable risk of 1.0E-04.

8.3 Groundwater

Results of the groundwater sampling indicated COCs at concentrations above their respective non-residential groundwater MSCs, including benzene, chrysene, naphthalene, and lead. Concentrations of these COCs are not predicted to migrate beyond the boundaries of AOI 10 or trigger a condition in surface water that would exceed a water quality standard.

Excavations in AOI 10 are governed by Sunoco's permitting procedures which protect against potential exposures to groundwater that could be encountered in an excavation. Previous investigations and well searches verified that no monitoring wells located within 1.5 miles of the refinery are used for drinking water or agricultural use.

8.4 LNAPL

There are no complete direct contact exposure pathways for LNAPL within AOI 10 because of on-site permitting procedures and required PPE.

8.5 Vapor

There are no buildings in AOI 10. The results of the screening evaluation using the PADEP's vapor intrusion guidance indicate, in the areas where the guidance can be applied, no soil or groundwater analytical results exceed the non-residential EPA/PADEP OSHA PEL screening values. No soil gas sampling was completed as part of this site characterization, but if future development is proposed for the areas that were not able to be screened using the PADEP vapor screening criteria, soil gas sampling would be completed in these areas.

9.0 ECOLOGICAL ASSESSMENT

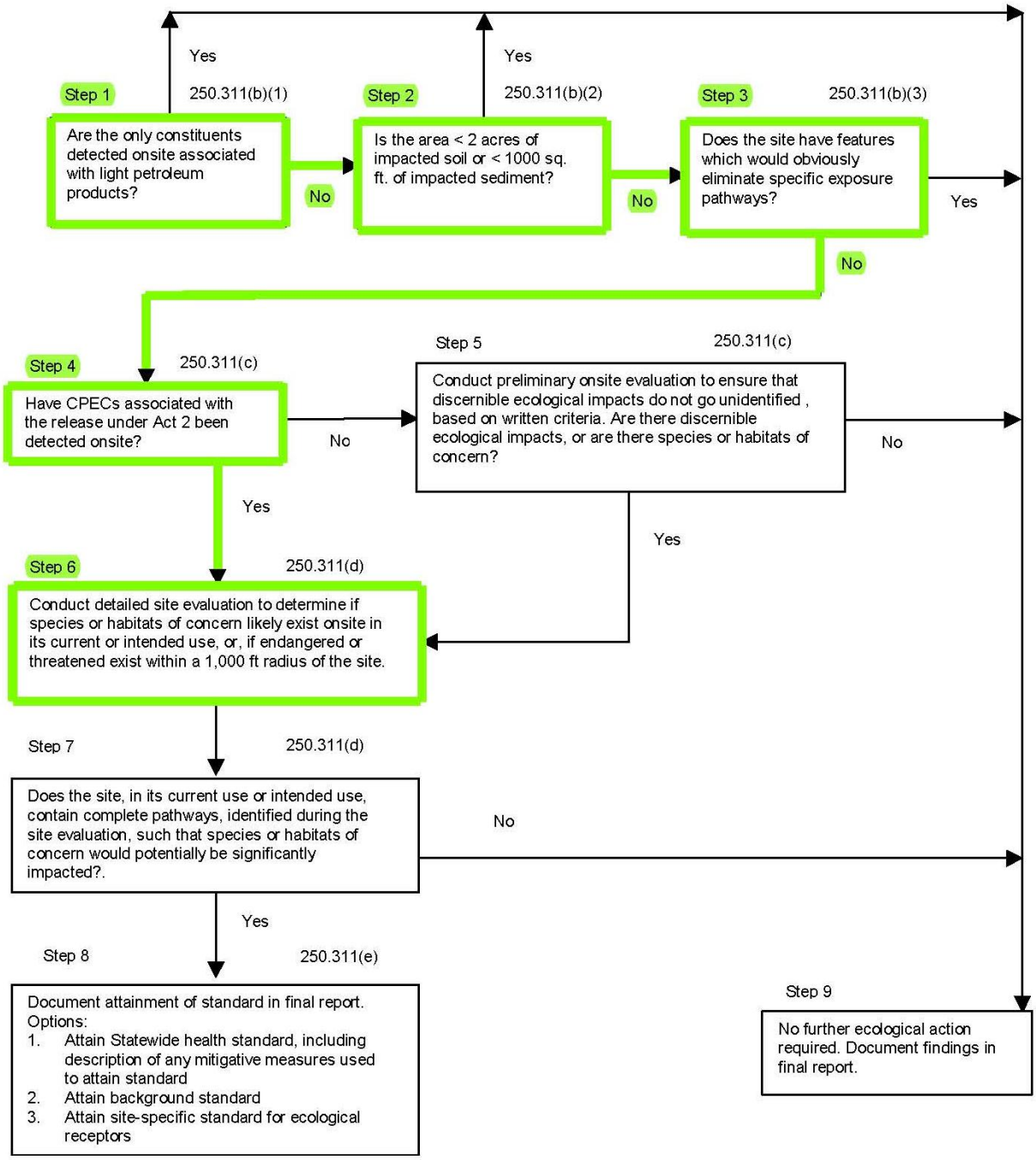
The majority of AOI 10 is covered with soil and gravel. The soil and gravel-covered portions of AOI 10 are not likely to serve as a breeding area, migratory stopover, or primary habitat for wildlife. An inquiry to identify potential endangered, threatened and special concern wildlife was made by submitting a request to the Pennsylvania Natural Diversity Inventory (PNDI) data base. The PNDI search identified two potential impacts that require further review. The first potential impact was for an endangered species identified by the PA Game Commission as the Great Egret. The second is a potential conflict of an unidentified threatened species listed by the PA Fish and Boat Commission.

Lands Creek is a surface water body located within AOI 10 and is identified as a blue line stream on the USGS topographic map (Figure 1). The creek is designated a warm water fishes stream by PA. A fence is located around the perimeter of the creek preventing access to the creek from outside the Sunoco property. A Langan representative completed an on-site

evaluation of the creek area in April 2011 and identified true sediment exists within the creek. No stressed vegetation was observed. The surface water area of the creek is greater than 1,000 square feet and is not a permitted open water management area. The creek is a freshwater, tidally-influenced drainage feature that is separated from the Schuylkill River by an earthen mound.

Five surface water samples were collected from Lands Creek and analyzed for COCs listed in Table 1c. The results indicate that no COCs were above the 25 Pa. Code Chapter 93 screening criteria for ecological receptors. Five sediment samples were also collected and analyzed for COCs listed in Table 1d. The results of the samples are discussed in Section 4.5.

To further evaluate the ecological conditions relating to Lands Creek, an ecological screening assessment was performed in accordance with Act 2 Technical Guidance Manual (TGM). On the following page is the ecological screening flow chart from the TGM. The AOI-10 decision path is highlighted in green.



Based on the ecological screening evaluation, additional work needs to be completed to determine if the threatened and endangered species listed in PNDI receipt, or suitable habitat for these species, exist within a 1,000 foot radius of the site.

10.0 COMMUNITY RELATION ACTIVITIES

A Community Relation Plan (CRP) that includes public involvement with local residents to inform them of the anticipated investigations and remediation activities was completed as part of the NIR submittal in 2006. The purpose of this CRP is to provide a mechanism for the community, government officials, and other interested or affected citizens to be informed of on-site activities related to the investigation activities at the Site. This plan incorporates aspects of public involvement under both PADEP's Act 2 program and EPA's RCRA Corrective Action program. This report and future Act 2 reports will include the appropriate municipal and public notices in accordance with the provisions of Act 2. Notices will be published in the Pennsylvania Bulletin and a summary of the notice will appear in a local newspaper. As part of the CRP, Sunoco intends to hold annual public meetings in the City of Philadelphia give status updates of the project.

EPA will complete its own public involvement through notices under the Corrective Action Program and by updating its online Fact Sheet for the refinery. A copy of the NIR and the Act 2 report notifications for this SCR/RIR are included in Appendix B.

11.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the completed activities, the following conclusions and recommendations have been developed for AOI 10:

SOIL

Shallow Soil

- Shallow soil sample results for arsenic, benzo(a)pyrene, dibenzo(a,h)anthracene and lead were compared to the calculated site-specific standards. None of the reported results for arsenic or dibenzo(a,h)anthracene were detected above the site-specific standards.
- A concentration of benzo(a)pyrene was detected above the site-specific standard in one sample location (BH-10-64). Sunoco will delineate the area where benzo(a)pyrene exceeds the calculated site-specific standard at BH-10-64. Following delineation, Sunoco will consider remedial options to address this area. Remedial options will be presented in the Cleanup Plan for AOI 10.

- Concentrations of lead were detected above its calculated site-specific standard at six sample locations (BH-10-51, BH-10-53, BH-10-57, BH-10-62, BH-10-73, and BH-10-76). Sunoco will delineate the areas where lead exceeds the calculated site-specific standard. Following delineation, Sunoco will consider remedial options to address these areas. Remedial options will be presented in the Cleanup Plan for AOI 10.
- The total cumulative hazard index for exposure to the non-carcinogenic compound [arsenic] is less than the PADEP's requirement of 1.0.
- The total cumulative risk for exposure to carcinogens is 3.65E-04, greater than the acceptable risk of 1.0E-04. The cumulative risk for exposure to carcinogens will be re-evaluated after addressing the areas with lead and benzo(a)pyrene above the calculated site-specific values.

Soil Greater Than 2 Feet Below Grade

- The direct contact pathway to soil greater than 2 feet beneath the ground surface at the refinery is incomplete because of on-site procedures and PPE requirements that protect onsite workers from exposure.

CAMU Area

- Several COCs were detected above the MSCs in the waste material and in the soil beneath the waste material. However, only low concentrations of benzene, chrysene, naphthalene and lead were detected in groundwater beneath or around the CAMU areas. Therefore, the constituents in the waste materials above the MSCs do not appear to have a significant impact on groundwater quality beneath and around the CAMU areas. Therefore; Sunoco is requesting that EPA issue a comfort letter for the CAMU in AOI 10 regarding the characterization work completed.

GROUNDWATER

- Fate and transport calculations were completed for groundwater in AOI 10 to evaluate potential migration pathways/potential impacts to receptors. Eight wells (W-1, W-12, W-23, W-28, W-31, W-32, W-33, and W-34) in AOI 10 exhibited concentrations of groundwater COCs above their respective MSCs. The results from these wells were modeled using the QD model to determine whether COC concentrations could potentially reach the AOI 10 boundary. The modeling results indicate concentrations above the groundwater MSCs in shallow wells W-1, W-12, W-23, W-28, W-31, W-32,

and W-34 are not predicted to migrate beyond the AOI 10 boundary, with the exception of one well, W-33, which contains a concentration of benzene that has the potential to reach Lands Creek. However, the predicted benzene concentration at the Lands Creek boundary is below the 25 Pa. Code Chapter 93 surface water quality criteria for benzene.

- Excavations in AOI 10 are governed by Sunoco's permitting procedures which protect against potential exposures to groundwater that could be encountered in an excavation.

SOIL VAPOR

- There are no occupied buildings in AOI 10.
- The results of the vapor intrusion screening evaluation using the PADEP guidance and the soil data collected (where the groundwater table is greater than five feet) indicate that no soil analytical results in AOI 10 are above the non-residential EPA/PADEP default screening values or the OSHA PEL screening values.
- No soil gas sampling was completed as part of this site characterization, but if future development is proposed for the areas that were not able to be screened using the PADEP vapor screening criteria, soil gas sampling would be completed in these areas.

LNAPL

- LNAPL occurrence in AOI 10 is limited to wells W-8, W-14 and W-18 and is immobile.
- There is poor correlation between areas with LNAPL and dissolved COCs in groundwater nearby.
- There are no complete direct contact exposure pathways for LNAPL within AOI 10 because of on-site permitting procedures and required PPE.

SURFACE WATER

- No COCs were detected in the surface water samples collected from Lands Creek at concentrations above their respective 25 Pa. Code Chapter 93 screening criteria.

SEDIMENT

- Based on the ecological screening evaluation, additional work needs to be completed to determine if the threatened and endangered species listed in PNDI receipt, or suitable habitat for these species, exist within a 1,000 foot radius of the site. This work will be completed in support of, and documented in, the Cleanup Plan for AOI 10.

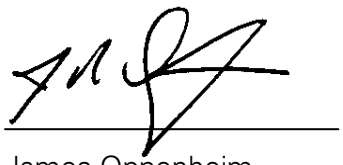
12.0 SCHEDULE

The proposed schedule for future Site activities is:

- Submittal of a Cleanup Plan within 6 to 12 months following PADEP approval of the SCR/RIR;
- Submittal of an Act 2 Cleanup Plan and Final Report; and
- Continue quarterly monitoring activities and reports.

13.0 SIGNATURES

The following parties are participating in the remediation at this time and are seeking relief from liability under Act 2 of 1995:



James Oppenheim
Sunoco Inc. (R&M)

This Act 2 RIR has been prepared in accordance with the final provisions of Act 2 and the June 8, 2002 Land Recycling Program Technical Guidance Manual.

14.0 REFERENCES

Groundwater Resources of the Coastal Plain Area of Southeastern Pennsylvania. Greenman, Topographic and Geologic Survey, Bulletin W-13, 375 pp., David W., Rima, Donald R., Lockwood, William N. and Meisler, Harold. 1961.

Simulation of Ground-Water Flow in the Lower Sand Unit of the Potomac-Raritan-Magothy Aquifer System, Philadelphia, Pennsylvania, U.S. Geological Survey, Water-Resources Investigations Report 86-4055, Sloto, R. A., 1988.

RCRA Facility Investigation Work Plan, Philadelphia Refinery, Sun Refining and Marketing Company, Philadelphia Pennsylvania, CHM2HILL, May 1991.

Phase I Preliminary Review of SWMUs, Sun Company, Inc., Philadelphia Refinery, A.T. Kearney Inc., January 1986.

RCRA Facility Assessment RFA, Sun Company Inc., Philadelphia Refinery, A.T. Kearney Inc., August 1986.

RCRA Facility Investigation Work Plan, Sun Company, Inc., Philadelphia Refinery, PA, CHM2Hill, May 1991.

Results of RCRA Facility Investigation (RFI), Sun Company, Inc., Philadelphia, PA, ENSR Consulting and Engineering, September 30, 1992.

Comprehensive Remedial Plan Sunoco Appendices Volume 1, January 1993.

Investigation of Shallow and Deep Groundwater Quality, Philadelphia Refinery, PA, ENSR Consulting and Engineering, May 1994.

Semi-Annual Groundwater Gauging Event (July-December 1994), Sunoco Philadelphia Refinery, Philadelphia, PA, GES, January 30, 1995.

Corrective Measures Study Work Plan, Sun Company, Inc., Philadelphia Refinery, PA, ENSR Consulting and Engineering, Volume I, April 1997.

Current Conditions Report and Comprehensive Remedial Plan, Sunoco Inc., Philadelphia, PA, prepared by Langan Engineering and Environmental Services June 30, 2004.

West Yard Release Soil Sampling Summary Letter Report, Philadelphia Refinery, Philadelphia, PA, Stantec, Inc., July 7, 2010.

TABLES

Table 1a
Constituents of Concern for Groundwater
AOI 10 Site Characterization/Remedial Investigation Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

METALS	CAS No.
Lead (dissolved)	7439-92-1

VOLATILE ORGANIC COMPOUNDS	CAS No.
1,2-Dichloroethane	107-06-2
1,2,4-Trimethylbenzene	95-63-6
1,3,5-Trimethylbenzene	108-67-8
Benzene	71-43-2
Cumene	98-82-8
Ethylbenzene	100-41-4
Ethylene dibromide	106-93-4
Methyl tertiary butyl ether	1634-04-4
Toluene	108-88-3
Xylenes (total)	1330-20-7

SEMI-VOLATILE ORGANIC COMPOUNDS	CAS No.
Chrysene	218-01-9
Fluorene	86-73-7
Naphthalene	91-20-3
Phenanthrene	85-01-8
Pyrene	129-00-0

Notes:

1. Constituents are from Pennsylvania Corrective Action Process (CAP) Regulation Amendments effective December 1, 2001; provided in Chapter VI, Section E (pgs. 29-30) of PADEP Document, *Closure Requirements for Underground Storage Tank Systems,* effective April 1, 1998 and the March 18, 2008 revised PADEP Petroleum Short List.
2. Select groundwater samples to be collected within the CAMU were analyzed for full TCL VOCs, TCL SVOCs, and TAL metals.

Table 1b
Constituents of Concern for Soil
AOI 10 Site Characterization/Remedial Investigation Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

METALS	CAS No.
Lead (total)	7439-92-1

VOLATILE ORGANIC COMPOUNDS	CAS No.
1,2-Dichloroethane	107-06-2
1,2,4-Trimethylbenzene	95-63-6
1,3,5-Trimethylbenzene	108-67-8
Benzene	71-43-2
Cumene	98-82-8
Ethylbenzene	100-41-4
Ethylene dibromide	106-93-4
Methyl tertiary butyl ether	1634-04-4
Toluene	108-88-3
Xylenes (total)	1330-20-7

SEMI-VOLATILE ORGANIC COMPOUNDS	CAS No.
Anthracene	120-12-7
Benzo(a)anthracene	56-55-3
Benzo (g,h,i) perylene	191-24-2
Benzo(a)pyrene	50-32-8
Benzo(b)fluoranthene	205-99-2
Chrysene	218-01-9
Fluorene	86-73-7
Naphthalene	91-20-3
Phenanthrene	85-01-8
Pyrene	129-00-0

Notes:

1. Constituents are from Pennsylvania Corrective Action Process (CAP) Regulation Amendments effective December 1, 2001; provided in Chapter VI, Section E (pgs. 29-30) of PADEP Document, *Closure Requirements for Underground Storage Tank Systems,* effective April 1, 1998 and the March 18, 2008 revised PADEP Petroleum Short List.
2. Select soil samples collected within and around the CAMU were analyzed for full TCL VOCs, TCL SVOCs, and TAL metals.

Table 1c
Constituents of Concern for Surface Water
AOI 10 Site Characterization/Remedial Investigation Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

VOLATILE ORGANIC COMPOUNDS	CAS No.
1,2-Dichloroethane	107-06-2
1,2,4-Trimethylbenzene	95-63-6
1,3,5-Trimethylbenzene	108-67-8
Benzene	71-43-2
Cumene	98-82-8
Ethylbenzene	100-41-4
Ethylene dibromide	106-93-4
Methyl tertiary butyl ether	1634-04-4
Toluene	108-88-3
Xylenes (total)	1330-20-7

SEMI-VOLATILE ORGANIC COMPOUNDS	CAS No.
Chrysene	218-01-9
Fluorene	86-73-7
Naphthalene	91-20-3
Phenanthrene	85-01-8
Pyrene	129-00-0

TOTAL AND DISSOLVED TAL METALS	CAS No.
Aluminum	7429-90-5
Antimony	7440-36-0
Arsenic	7440-38-2
Barium	7440-39-3
Beryllium	7440-41-7
Cadmium	7440-43-9
Calcium	7440-70-2
Chromium	7440-47-3
Cobalt	7440-48-4
Copper	7440-50-8
Iron	7439-89-6
Lead (total)	7439-92-1
Magnesium	7439-95-4
Manganese	7439-96-5
Mercury	7439-97-6
Nickel	7440-02-0
Potassium	9/7/7440
Selenium	7782-49-2
Silver	7440-22-4
Sodium	7440-23-5
Thallium	7440-28-0
Vanadium	7440-62-2
Zinc	7440-66-6
Additional Analysis	
Hardness	

Table 1d
Constituents of Concern for Sediment Samples
AOI 10 Site Characterization/Remedial Investigation Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

VOLATILE ORGANIC COMPOUNDS	CAS No.
1,2-Dichloroethane	107-06-2
1,2,4-Trimethylbenzene	95-63-6
1,3,5-Trimethylbenzene	108-67-8
Benzene	71-43-2
Cumene	98-82-8
Ethylbenzene	100-41-4
Ethylene dibromide	106-93-4
Methyl tertiary butyl ether	1634-04-4
Toluene	108-88-3
Xylenes (total)	1330-20-7
Additional Volatile Compounds To Be Analyzed	
1,2-Dichlorobenzene	95-50-1
1,3-Dichlorobenzene	541-73-1
1,4-Dichlorobenzene	106-46-7
1-Methylnaphthalene	90-12-0

SEMI-VOLATILE ORGANIC COMPOUNDS (via SIMS Method)	CAS No.
Anthracene	120-12-7
Benzo(a)anthracene	56-55-3
Benzo (g,h,i) perylene	191-24-2
Benzo(a)pyrene	50-32-8
Benzo(b)fluoranthene	205-99-2
Chrysene	218-01-9
Fluorene	86-73-7
Naphthalene	91-20-3
Phenanthrene	85-01-8
Pyrene	129-00-0
Additional Semi-Volatile Compounds To Be Analyzed	
Phenol	108-95-2
2,4-Dimethylphenol	105-67-9
2,4-Dinitrophenol	51-28-5
2-Methylphenol	95-48-7
6-Methyl Chrysene	1705-85-7
2-Nitrophenol	88-75-5
Benzenethiol	108-98-5
Dibenz(a,h)acridine	224-53-3
Benzo(k)fluoranthene	207-08-9
Benzyl Butyl Phthalate	85-68-7
bis(2-Ethylhexyl) phthalate	117-81-7
Dibenzo(a,h)anthracene	53-70-3
Diethyl Phthalate	84-66-2
Dimethyl Phthalate	131-11-3
Di-n-butyl phthalate	84-74-2
Di-n-octyl phthalate	117-84-0
Fluoranthene	206-44-0

Notes:

1. Additional compounds to be analyzed obtained from a modified analyte list from the 1992 RCRA RFI.

Table 1d (continued)
Constituents of Concern for Sediment Samples
AOI 10 Work Plan for Site Characterization
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

TAL METALS	CAS No.
Aluminum	7429-90-5
Antimony	7440-36-0
Arsenic	7440-38-2
Barium	7440-39-3
Beryllium	7440-41-7
Cadmium	7440-43-9
Calcium	7440-70-2
Chromium	7440-47-3
Cobalt	7440-48-4
Copper	7440-50-8
Iron	7439-89-6
Lead (total)	7439-92-1
Magnesium	7439-95-4
Manganese	7439-96-5
Mercury	7439-97-6
Nickel	7440-02-0
Potassium	9/7/7440
Selenium	7782-49-2
Silver	7440-22-4
Sodium	7440-23-5
Thallium	7440-28-0
Vanadium	7440-62-2
Zinc	7440-66-6
Additional Analysis	
Total Organic Carbon	
Particle Grain Size	

Notes:

1. Additional compounds to be analyzed obtained from a modified analyte list from the 1992 RCRA RFI.

Table 2
Existing Well Summary
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Well ID	Former Well ID[1]	Northing	Easting	Well Type	Well Classification[2]	Soil Boring Log Available (Y/N)	Construction Detail Available (Y/N)	Date of Well Completion	Well Construction Details[3]								References
									Well Completion Depth (ft. bgs)	Well Diameter (in)	Top of Inner Casing Elevation[4] (ft. msl) (NAVD88)	Ground Surface Elevation (ft.) (NAVD88)	Top of Screen Elevation (ft) (NAVD88)	Bottom of Screen Elevation (ft) (NAVD88)	Depth to Screen (ft. bgs)	Screen Length (ft.)	
W-1	W-17	223593.677	2682761.638	Monitoring Well	Shallow	Y	Y	8/9/88	17	2	9.60	7.69	5.69	-9.31	2	15	
W-1D		223583.998	2682756.483	Monitoring Well	Intermediate	Y	Y	4/6/11	76.5	4	10.73	7.87	-58.63	-68.63	66.5	10	Aquaterra, 2011
W-2	W-16	223350.051	2681822.333	Monitoring Well	Shallow	Y	N	8/7/85	21.5	--	19.45	17.27	--	--	--	--	Sun, 1993
W-3[5]	W-1	222926.249	2682400.535	Monitoring Well	Shallow	Y	N	6/21/85	14.6	--	9.47	--	--	--	2	8	Sun, 1993
W-4[5]	W-2	223120.547	2682104.698	Monitoring Well	Shallow	Y	Y	6/21/85	10	--	6.51	--	--	--	2	8	Sun, 1993
W-5	MW-12, B-12	223047.410	2681651.163	Monitoring Well	Shallow	Y	Y	2/19/92	13	4	7.73	6.00	3.00	-7.00	3	10	ENSR, 1992
W-6	W-5	222623.498	2682398.660	Monitoring Well	Shallow	Y	N	6/21/85	10	--	7.49	4.83	2.83	-5.17	2	8	Sun, 1993
W-7[5]	W-4	222671.404	2681958.304	Monitoring Well	Shallow	Y	N	6/21/55	10	--	8.55	--	--	--	2	8	Sun, 1993
W-8	MW-14, B-14	222548.523	2681883.523	Monitoring Well	Shallow	Y	Y	2/24/92	13	4	8.44	7.22	4.22	-5.78	3	10	ENSR, 1992
W-9	MW-20, B-20	222542.814	2681893.171	Monitoring Well	Intermediate	Y	Y	3/12/92	79	2	9.29	6.96	4.96	-3.04	2	8	ENSR, 1992
W-10	W-8	222348.449	2681974.151	Monitoring Well	Shallow	Y	N	6/24/85	10	--	7.72	4.74	2.74	-5.27	2	8	Sun, 1993
W-11	W-7	222285.800	2682276.399	Monitoring Well	Shallow	Y	N	6/21/85	10	--	8.06	5.80	5.80	-4.20	0	10	Sun, 1993
W-12	MW-16, B-16	221939.059	2682078.235	Monitoring Well	Shallow	Y	Y	2/25/92	13	4	7.10	5.08	2.08	-4.92	3	7	ENSR, 1992
W-13	MW-21, B-21	221929.280	2682064.602	Monitoring Well	Intermediate	Y	Y	3/12/92	74	4	6.65	5.16	-51.84	-61.84	57	10	ENSR, 1992
W-14	MW-13, B-13	222310.042	2681746.563	Monitoring Well	Shallow	Y	Y	2/19/92	10	4	7.26	5.44	2.44	-4.56	3	7	ENSR, 1992
W-15	W-6	222774.758	2681623.753	Monitoring Well	Shallow	Y	N	6/21/85	10	--	8.78	7.30	7.30	-2.70	0	10	Sun, 1993
W-16	MW-15, B-15	221794.793	2681794.482	Monitoring Well	Shallow	Y	Y	2/24/92	12	4	6.64	5.50	2.50	-4.50	3	7	ENSR, 1992
W-17	W-10	221776.820	2681731.049	Monitoring Well	Shallow	Y	N	8/9/88	10	2	7.22	5.07	3.07	-4.93	2	8	Sun, 1993
W-18	W-12	221944.014	2681223.198	Monitoring Well	Shallow	Y	N	8/10/88	15	2	8.12	5.92	4.92	-9.08	1	14	Sun, 1993
W-19	MW-27, B-27	222405.114	2680982.432	Monitoring Well	Intermediate	Y	Y	3/25/92	83	2	10.06	8.17	-61.83	-71.83	70	10	ENSR, 1992
W-20	MW-17, B-17	222415.212	2680986.732	Monitoring Well	Shallow	Y	Y	2/25/92	12	4	10.11	8.84	5.84	-1.16	3	7	ENSR, 1992
W-21[5]	W-13	222238.813	2680879.938	Monitoring Well	Shallow	Y	N	6/21/85	10	--	7.64	--	--	--	2	8	Sun, 1993
W-22	W-14	222466.056	2680429.390	Monitoring Well	Shallow	Y	N	6/21/85	8	2	6.44	6.00	6.00	-2.00	0	8	Sun, 1993
W-23	W-15	222588.626	2680081.211	Monitoring Well	Shallow	Y	N	6/21/85	10	2	7.55	5.21	-4.79	-14.79	10	10	Sun, 1993
W-24	W-18	222584.494	2679927.148	Monitoring Well	Shallow	Y	Y	8/10/88	15	2	5.47	3.73	2.73	-11.27	1	14	Sun, 1993
W-25	MW-18, B-18	222643.035	2679601.016	Monitoring Well	Shallow	Y	Y	3/2/92	17	4	10.15	8.03	3.03	-6.97	5	10	ENSR, 1992
W-26	MW-19, B-19	222651.426	2679591.709	Monitoring Well	Intermediate	Y	Y	3/4/92	37	4	9.98	8.35	-9.65	-14.65	18	5	ENSR, 1992
W-27	W-19	222625.973	2679107.331	Monitoring Well	Shallow	Y	Y	8/10/88	20	2	10.86	9.17	4.17	-10.83	5	15	Sun, 1993
W-28		222857.370	2682420.037	Monitoring Well	Shallow	Y	Y	4/18/11	14	4	8.61	5.79	1.79	-8.21	4	10	Aquaterra, 2011
W-29		223225.260	2682148.792	Monitoring Well	Shallow	Y	Y	4/18/11	14	4	11.82	9.09	5.09	-4.91	4	10	Aquaterra, 2011
W-30		222660.796	2681982.993	Monitoring Well	Shallow	Y	Y	4/15/11	13	4	8.65	6.58	3.58	-6.42	3	10	Aquaterra, 2011
W-31		222012.680	2681807.660	Monitoring Well	Shallow	Y	Y	4/15/11	15	4	8.27	5.43	2.43	-9.57	3	12	Aquaterra, 2011
W-32		222061.938	2681224.314	Monitoring Well	Shallow	Y	Y	4/18/11	13	4	14.83	11.96	8.96	-1.04	3	10	Aquaterra, 2011
W-32D		222055.387	2681222.072	Monitoring Well	Intermediate	Y	Y	4/8/11	53	4	14.70	11.50	-31.50	-84.50	43	53	Aquaterra, 2011
W-33		222385.134	2680145.426	Monitoring Well	Shallow	Y	Y	4/20/11	16	4	17.07	13.36	7.36	-2.64	6	10	Aquaterra, 2011
W-34		222425.094	2680918.947	Monitoring Well	Shallow	Y	Y	4/20/11	15	4	14.14	10.78	6.78	-3.22	4	10	Aquaterra, 2011
PH-31	--	--	--	Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	USGS, 1989

NOTES:

-- Data could not be located or determined based on available reports

Abandoned/destroyed wells.

AOI - Area of Interest

ft. - feet

bgs - below ground surface

in. - inches

msl - elevation relative to mean sea level

NA - Data not available

1. Former well IDs were derived from handwritten notes on the logs themselves or the referenced report.
2. Well classification based on the formation that the well is screened in. Wells screened within the Middle Clay or the Farrington Sand are classified as deep wells.
   Well classification for wells screened above the Lower/Middle Clay are based on the following: screened in Fill/Alluvium - Shallow, screened in Trenton Gravel - Intermediate, screened in Fill/Alluvium & Trenton Gravel - Shallow/Intermediate
3. Well construction details were taken directly from well boring logs provided by Handex, Stantec, Aquaterra or collected from available historic reports.
4. Wells were surveyed by Langan in July 2010 and May 2011.
5. Wells could not be located.
6. Well is damaged.

Table 3
Summary of Groundwater and LNAPL Elevations
May 2011
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Monitoring Point ID	Northing	Easting	Well Type	Well Classification[1]	Specific Gravity (g/cc) Used for GW Correction		Well Completion Depth (ft bgs)	Depth to Product (ft btic)	Depth to GW[4] (ft btic)	Apparent LNAPL Thickness (ft)	LNAPL Elevation (ft amsl)	GW Elevation (ft amsl)	Corrected GW Elevation (ft amsl)	TIC Elevation (ft amsl)	Notes
					S.G.[2]	Source[3]									
W-1	223593.677	2682761.638	Monitoring Well	Shallow			17.0	-	6.21	-	-	3.39	**3.39**	9.60	
W-1D	223583.998	2682756.483	Monitoring Well	Intermediate			76.5	-	9.19	-	-	1.54	**1.54**	10.73	
W-2	223350.051	2681822.333	Monitoring Well	Shallow			21.5	-	15.16	-	-	4.29	**4.29**	19.45	
W-5	223047.410	2681651.163	Monitoring Well	Shallow			13.0	-	3.11	-	-	4.62	**4.62**	7.73	
W-6	222623.498	2682398.660	Monitoring Well	Shallow			10.0	-	2.52	-	-	4.97	**4.97**	7.49	
W-8	222548.523	2681883.523	Monitoring Well	Shallow	0.9515	W-8	13.0	-[5]	-	**0.59**	NA	NA	**NA**	8.44	Product sample collected on 4/27/11
W-9	222542.814	2681893.171	Monitoring Well	Intermediate			79.0	-	9.39	-	-	-0.10	**-0.10**	9.29	
W-11	222285.800	2682276.399	Monitoring Well	Shallow			10.0	-	3.69	-	-	4.37	**4.37**	8.06	
W-12	221939.059	2682078.235	Monitoring Well	Shallow			13.0	-	2.97	-	-	4.13	**4.13**	7.10	
W-13	221929.280	2682064.602	Monitoring Well	Intermediate			74.0	-	7.57	-	-	-0.92	**-0.92**	6.65	
W-14	222310.042	2681746.563	Monitoring Well	Shallow	0.9478	W-14	10.0	2.01	2.12	**0.11**	5.25	5.14	**5.25**	7.26	Product sample collected on 4/27/11
W-15	222774.758	2681623.753	Monitoring Well	Shallow			10.0	-	2.15	-	-	6.63	**6.63**	8.78	
W-16	221794.793	2681794.482	Monitoring Well	Shallow			12.0	-	2.42	-	-	4.22	**4.22**	6.64	
W-17	221776.820	2681731.049	Monitoring Well	Shallow			10.0	-	2.89	-	-	4.33	**4.33**	7.22	
W-18	221944.014	2681223.198	Monitoring Well	Shallow	0.9478	W-14	15.0	-[5]	-	**0.01**	NA	NA	**NA**	8.12	Product sample collected on 4/27/11
W-19	222405.114	2680982.432	Monitoring Well	Intermediate			83.0	-	10.87	-	-	-0.81	**-0.81**	10.06	
W-20	222415.212	2680986.732	Monitoring Well	Shallow			12.0	-	4.75	-	-	5.36	**5.36**	10.11	
W-22	222466.056	2680429.390	Monitoring Well	Shallow			8.0	-	0.99	-	-	5.45	**5.45**	6.44	
W-23	222588.626	2680081.211	Monitoring Well	Shallow			10.0	-	2.10	-	-	5.45	**5.45**	7.55	
W-25	222643.035	2679601.016	Monitoring Well	Shallow			17.0	-	5.71	-	-	4.44	**4.44**	10.15	
W-26	222651.426	2679591.709	Monitoring Well	Intermediate			37.0	-	11.68	-	-	-1.70	**-1.70**	9.98	
W-27	222625.973	2679107.331	Monitoring Well	Shallow			20.0	-	6.18	-	-	4.68	**4.68**	10.86	
W-28	222857.370	2682420.037	Monitoring Well	Shallow			14.0	-	3.22	-	-	5.39	**5.39**	8.61	
W-29	223225.260	2682148.792	Monitoring Well	Shallow			14.0	-	7.36	-	-	4.46	**4.46**	11.82	
W-30	222660.796	2681982.993	Monitoring Well	Shallow			13.0	-	3.40	-	-	5.25	**5.25**	8.65	
W-31	222012.680	2681807.660	Monitoring Well	Shallow			15.0	-	3.13	-	-	5.14	**5.14**	8.27	
W-32	222061.938	2681224.314	Monitoring Well	Shallow			13.0	-	9.09	-	-	5.74	**5.74**	14.83	
W-32D	222055.387	2681222.072	Monitoring Well	Intermediate			53.0	-	11.43	-	-	3.27	**3.27**	14.70	
W-33	222385.134	2680145.426	Monitoring Well	Shallow			16.0	-	11.35	-	-	5.72	**5.72**	17.07	
W-34	222425.094	2680918.947	Monitoring Well	Shallow			15.0	-	8.27	-	-	5.87	**5.87**	14.14	

Notes:
1. Well type was chosen based on the formation the well screens. Wells screened within the Middle Clay or the Farrington Sand were classified as deep wells. Based on their total depth, wells screened above the Middle Clay are classified as either a shallow and/or intermediate well.
2. Specific Gravity (S.G.) values were determined from LNAPL samples collected by Aquaterra/Stantek as part of CCR and/or SCR/RIR.
3. For wells with no direct LNAPL density measurements, the density value in the nearest well with LNAPL data was used.
4. Depth to water and depth to LNAPL provided by Aquaterra. All wells gauged on 4/26 & 4/27/11 unless otherwise noted.
5. LNAPL thickness values obtained from June 2010 gauging event. Product in well was too viscous to collect accurate product thickness in April 2011.

g/cc = grams per cubic centimeter
LNAPL = Light Non-Aqueous Phase Liquid
ft amsl = Feet Above Mean Sea Level
GW = Groundwater
NA = Not Applicable
NM = Not Measured
NP = No Product
ft btic = Feet Below Top of Inner Casing

Table 4
Summary of Shallow Soil Sample Analytical Results: Outside CAMU Areas
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (0 - 2 ft bgs)	PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500)	Location ID	BH-10-36				BH-10-37				BH-10-38				BH-10-39				BH-10-40			
						Sample ID	BH-10-36_0-2'				BH-10-37_0-2'				BH-10-38_0-2'				BH-10-39_0-2'				BH-10-40_0-2'			
						Sample Date	4/5/2011				4/5/2011				4/5/2011				4/5/2011				4/5/2011			
						Sample Matrix	Soil				Soil				Soil				Soil				Soil			
						Sample Interval	0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs			
						Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Volatile Organic Compounds																										
1,2,4-Trimethylbenzene	95-63-6	6.2	35	560	35	mg/kg	ND	U	0.001	0.91	ND	U	0.001	0.93	ND	U	0.002	1.52	0.4	J	0.16	121.6	ND	U	0.0009	0.79
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.005	0.0012	3.7	0.005	mg/kg	ND	U	0.001	0.91	ND	U	0.001	0.93	ND	U	0.002	1.52	ND	U	**0.16**	121.6	ND	U	0.0009	0.79
1,2-Dichloroethane	107-06-2	0.5	0.1	86	0.5	mg/kg	ND	U	0.001	0.91	ND	U	0.001	0.93	ND	U	0.002	1.52	ND	U	0.16	121.6	ND	U	0.0009	0.79
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	5.3	9.3	480	9.3	mg/kg	ND	U	0.001	0.91	ND	U	0.001	0.93	ND	U	0.002	1.52	ND	U	0.16	121.6	ND	U	0.0009	0.79
Benzene	71-43-2	0.5	0.13	290	0.5	mg/kg	0.008		0.0006	0.91	0.008		0.0006	0.93	ND	U	9E-04	1.52	0.12	J	0.08	121.6	0.003	J	0.0005	0.79
Dimethyl Benzene/ Xylenes, Total	1330-20-7	1000	990	8000	1000	mg/kg	ND	U	0.001	0.91	ND	U	0.001	0.93	ND	U	0.002	1.52	0.18	J	0.16	121.6	ND	U	0.0009	0.79
Ethylbenzene	100-41-4	70	46	10000	70	mg/kg	ND	U	0.001	0.91	ND	U	0.001	0.93	ND	U	0.002	1.52	0.24	J	0.16	121.6	ND	U	0.0009	0.79
Isopropylbenzene (Cumene)	98-82-8	350	2500	10000	2500	mg/kg	ND	U	0.001	0.91	ND	U	0.001	0.93	ND	U	0.002	1.52	2.5		0.16	121.6	ND	U	0.0009	0.79
Tert-Butyl Methyl Ether	1634-04-4	2	0.28	3200	2	mg/kg	ND	U	0.0006	0.91	ND	U	0.0006	0.93	ND	U	9E-04	1.52	ND	U	0.08	121.6	ND	U	0.0005	0.79
Toluene	108-88-3	100	44	10000	100	mg/kg	0.009		0.001	0.91	0.005	J	0.001	0.93	ND	U	0.002	1.52	ND	U	0.16	121.6	0.001	J	0.0009	0.79
Semi-Volatile Organic Compounds																										
Anthracene	120-12-7	6.6	350	190000	350	mg/kg	0.46	J	0.2	5	1.9		0.21	5	ND	U	0.2	5	12		2.2	5	4.7		0.19	5
Benzo(A)Anthracene	56-55-3	0.36	320	110	110	mg/kg	1.8		0.2	5	6.5		0.21	5	ND	U	0.2	5	22		2.2	5	11		0.19	5
Benzo(A)Pyrene	50-32-8	0.02	46	11	11	mg/kg	1.8		0.2	5	6.5		0.21	5	ND	U	0.2	5	**16**		2.2	5	9.2		0.19	5
Benzo(B)Fluoranthene	205-99-2	0.12	170	110	110	mg/kg	2.4		0.2	5	9.3		0.21	5	ND	U	0.2	5	25		2.2	5	12		0.19	5
Benzo(G,H,I)Perylene	191-24-2	0.026	180	170000	180	mg/kg	1.3		0.2	5	3.9		0.21	5	ND	U	0.2	5	9.9	J	2.2	5	4.8		0.19	5
Chrysene	218-01-9	0.19	230	11000	230	mg/kg	2.2		0.2	5	6.2		0.21	5	ND	U	0.2	5	23		2.2	5	10		0.19	5
Fluorene	86-73-7	190	3800	110000	3800	mg/kg	ND	U	0.2	5	0.83	J	0.21	5	ND	U	0.2	5	7	J	2.2	5	1.3		0.19	5
Naphthalene	91-20-3	10	25	56000	25	mg/kg	0.39	J	0.2	5	1.1		0.21	5	ND	U	0.2	5	ND	U	2.2	5	0.51	J	0.19	5
Phenanthrene	85-01-8	110	10000	190000	10000	mg/kg	1.9		0.2	5	8.6		0.21	5	0.24	J	0.2	5	50		2.2	5	18		0.19	5
Pyrene	129-00-0	13	2200	84000	2200	mg/kg	3.1		0.2	5	10		0.21	5	ND	U	0.2	5	51		2.2	5	20		0.19	5
Metals																										
Lead	7439-92-1	0.5	450	1000	450	mg/kg	390		0.0627	10	540		0.132	20	11.6		0.012	2	415		0.068	10	65.1		0.0121	2
General Chemistry																										
Moisture, Percent	MOIST	NS	NS	NS	NS	%	18.7		0.5	1	21.8		0.5	1	16.9		0.5	1	23.9		0.5	1	15		0.5	1

Notes:
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard

All soil samples collected and analyzed were unsaturated.

Qualifiers:
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

Exceedance Summary:
10 - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Direct Contact Standard

Table 4
Summary of Shallow Soil Sample Analytical Results: Outside CAMU Areas
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (0 - 2 ft bgs)	PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500)	Location ID	BH-10-41				BH-10-42				BH-10-47				BH-10-49				BH-10-50			
						Sample ID	BH-10-41_0-2'				BH-10-42_0-2'				BH-10-47_0-2'				BH-10-49_0-2'				BH-10-50_0-2'			
						Sample Date	4/5/2011				4/19/2011				4/19/2011				4/19/2011				4/19/2011			
						Sample Matrix	Soil				Soil				Soil				Soil				Soil			
						Sample Interval	0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs			
						Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Volatile Organic Compounds																										
1,2,4-Trimethylbenzene	95-63-6	6.2	35	560	35	mg/kg	0.014		0.002	1.05	ND	U	0.001	1.1	ND	U	0.001	0.82	ND	U	0.001	0.93	ND	U	9E-04	0.8
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.005	0.0012	3.7	0.005	mg/kg	ND	U	0.002	1.05	ND	U	0.001	1.1	ND	U	0.001	0.82	ND	U	0.001	0.93	ND	U	9E-04	0.8
1,2-Dichloroethane	107-06-2	0.5	0.1	86	0.5	mg/kg	ND	U	0.002	1.05	ND	U	0.001	1.1	ND	U	0.001	0.82	ND	U	0.001	0.93	ND	U	9E-04	0.8
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	5.3	9.3	480	9.3	mg/kg	0.007	J	0.002	1.05	ND	U	0.001	1.1	ND	U	0.001	0.82	ND	U	0.001	0.93	ND	U	9E-04	0.8
Benzene	71-43-2	0.5	0.13	290	0.5	mg/kg	0.008	J	8E-04	1.05	0.002	J	7E-04	1.1	0.003	J	5E-04	0.82	0.007		7E-04	0.93	0.003	J	5E-04	0.8
Dimethyl Benzene/ Xylenes, Total	1330-20-7	1000	990	8000	1000	mg/kg	0.012		0.002	1.05	ND	U	0.001	1.1	ND	U	0.001	0.82	0.002	J	0.001	0.93	ND	U	9E-04	0.8
Ethylbenzene	100-41-4	70	46	10000	70	mg/kg	ND	U	0.002	1.05	ND	U	0.001	1.1	ND	U	0.001	0.82	ND	U	0.001	0.93	ND	U	9E-04	0.8
Isopropylbenzene (Cumene)	98-82-8	350	2500	10000	2500	mg/kg	ND	U	0.002	1.05	ND	U	0.001	1.1	ND	U	0.001	0.82	ND	U	0.001	0.93	ND	U	9E-04	0.8
Tert-Butyl Methyl Ether	1634-04-4	2	0.28	3200	2	mg/kg	ND	U	8E-04	1.05	ND	U	7E-04	1.1	ND	U	5E-04	0.82	ND	U	7E-04	0.93	ND	U	5E-04	0.8
Toluene	108-88-3	100	44	10000	100	mg/kg	0.01		0.002	1.05	0.001	J	0.001	1.1	0.002	J	0.001	0.82	0.003	J	0.001	0.93	0.001	J	9E-04	0.8
Semi-Volatile Organic Compounds																										
Anthracene	120-12-7	6.6	350	190000	350	mg/kg	ND	U	1.2	5	1.2		0.2	1	0.25		0.04	1	0.057	J	0.047	1	1.4		0.037	1
Benzo(A)Anthracene	56-55-3	0.36	320	110	110	mg/kg	ND	U	1.2	5	1.4		0.2	1	0.67		0.04	1	0.12	J	0.047	1	1.9		0.037	1
Benzo(A)Pyrene	50-32-8	0.02	46	11	11	mg/kg	ND	U	1.2	5	1.3		0.2	1	0.82		0.04	1	0.14	J	0.047	1	1.3		0.037	1
Benzo(B)Fluoranthene	205-99-2	0.12	170	110	110	mg/kg	ND	U	1.2	5	1.5		0.2	1	0.83		0.04	1	0.094	J	0.047	1	1.5		0.037	1
Benzo(G,H,I)Perylene	191-24-2	0.026	180	170000	180	mg/kg	ND	U	1.2	5	2.2		0.2	1	0.77		0.04	1	0.15	J	0.047	1	0.78		0.037	1
Chrysene	218-01-9	0.19	230	11000	230	mg/kg	ND	U	1.2	5	2.6		0.2	1	0.73		0.04	1	0.18	J	0.047	1	1.7		0.037	1
Fluorene	86-73-7	190	3800	110000	3800	mg/kg	ND	U	1.2	5	0.32	J	0.2	1	0.05	J	0.04	1	ND	U	0.047	1	0.64		0.037	1
Naphthalene	91-20-3	10	25	56000	25	mg/kg	ND	U	1.2	5	2.8		0.2	1	0.29		0.04	1	0.11	J	0.047	1	0.74		0.037	1
Phenanthrene	85-01-8	110	10000	190000	10000	mg/kg	ND	U	1.2	5	2.9		0.2	1	0.54		0.04	1	0.15	J	0.047	1	4.7		0.37	10
Pyrene	129-00-0	13	2200	84000	2200	mg/kg	ND	U	1.2	5	2.5		0.2	1	0.81		0.04	1	0.14	J	0.047	1	3.3		0.037	1
Metals																										
Lead	7439-92-1	0.5	450	1000	450	mg/kg	186		0.039	5	249		0.06	10	233		0.062	10	340		0.072	10	84.7		0.029	5
General Chemistry																										
Moisture, Percent	MOIST	NS	NS	NS	NS	%	34		0.5	1	15.3		0.5	1	17.1		0.5	1	29.5		0.5	1	11.8		0.5	1

Notes:
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard

All soil samples collected and analyzed were unsaturated.

Qualifiers:
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

Exceedance Summary:
10 - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Direct Contact Standard

Table 4
Summary of Shallow Soil Sample Analytical Results: Outside CAMU Areas
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (0 - 2 ft bgs)	PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500)	Location ID	BH-10-53				BH-10-54				BH-10-59				BH-10-60				BH-10-61			
						Sample ID	BH-10-53_0-2'				BH-10-54_0-2'				BH-10-59_0-2'				BH-10-60_0-2'				BH-10-61_0-2'			
						Sample Date	4/22/2011				4/22/2011				4/22/2011				4/22/2011				4/22/2011			
						Sample Matrix	Soil				Soil				Soil				Soil				Soil			
						Sample Interval	0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs			
						Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Volatile Organic Compounds																										
1,2,4-Trimethylbenzene	95-63-6	6.2	35	560	35	mg/kg	ND	U	0.002	0.98	ND	U	0.001	0.82	0.002	J	0.001	0.98	0.005	J	0.002	1.26	ND	U	0.001	0.8
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.005	0.0012	3.7	0.005	mg/kg	ND	U	0.002	0.98	ND	U	0.001	0.82	ND	U	0.001	0.98	ND	U	0.002	1.26	ND	U	0.001	0.8
1,2-Dichloroethane	107-06-2	0.5	0.1	86	0.5	mg/kg	ND	U	0.002	0.98	ND	U	0.001	0.82	ND	U	0.001	0.98	ND	U	0.002	1.26	ND	U	0.001	0.8
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	5.3	9.3	480	9.3	mg/kg	ND	U	0.002	0.98	ND	U	0.001	0.82	ND	U	0.001	0.98	0.004	J	0.002	1.26	ND	U	0.001	0.8
Benzene	71-43-2	0.5	0.13	290	0.5	mg/kg	0.018		9E-04	0.98	0.005	J	5E-04	0.82	0.012		6E-04	0.98	0.02		8E-04	1.26	0.002	J	5E-04	0.8
Dimethyl Benzene/ Xylenes, Total	1330-20-7	1000	990	8000	1000	mg/kg	0.002	J	0.002	0.98	ND	U	0.001	0.82	0.003	J	0.001	0.98	0.005	J	0.002	1.26	ND	U	0.001	0.8
Ethylbenzene	100-41-4	70	46	10000	70	mg/kg	ND	U	0.002	0.98	ND	U	0.001	0.82	ND	U	0.001	0.98	ND	U	0.002	1.26	ND	U	0.001	0.8
Isopropylbenzene (Cumene)	98-82-8	350	2500	10000	2500	mg/kg	ND	U	0.002	0.98	ND	U	0.001	0.82	ND	U	0.001	0.98	ND	U	0.002	1.26	ND	U	0.001	0.8
Tert-Butyl Methyl Ether	1634-04-4	2	0.28	3200	2	mg/kg	ND	U	9E-04	0.98	ND	U	5E-04	0.82	ND	U	6E-04	0.98	ND	U	8E-04	1.26	ND	U	5E-04	0.8
Toluene	108-88-3	100	44	10000	100	mg/kg	0.01		0.002	0.98	0.007		0.001	0.82	0.006		0.001	0.98	0.011		0.002	1.26	0.001	J	0.001	0.8
Semi-Volatile Organic Compounds																										
Anthracene	120-12-7	6.6	350	190000	350	mg/kg	0.28	J	0.063	1	0.83		0.041	1	1.3	J	0.41	10	ND	U	4	10	0.29		0.04	1
Benzo(A)Anthracene	56-55-3	0.36	320	110	110	mg/kg	0.53		0.063	1	2.4		0.041	1	2.1		0.41	10	ND	U	4	10	0.65		0.04	1
Benzo(A)Pyrene	50-32-8	0.02	46	11	11	mg/kg	0.39		0.063	1	2.5		0.041	1	1.6	J	0.41	10	10	J	4	10	0.58		0.04	1
Benzo(B)Fluoranthene	205-99-2	0.12	170	110	110	mg/kg	0.48		0.063	1	3.2		0.041	1	2.1		0.41	10	4.9	J	4	10	0.7		0.04	1
Benzo(G,H,I)Perylene	191-24-2	0.026	180	170000	180	mg/kg	0.2	J	0.063	1	1.7		0.041	1	1.2	J	0.41	10	11	J	4	10	0.34		0.04	1
Chrysene	218-01-9	0.19	230	11000	230	mg/kg	0.47		0.063	1	2.6		0.041	1	2.3		0.41	10	9.7	J	4	10	0.57		0.04	1
Fluorene	86-73-7	190	3800	110000	3800	mg/kg	0.12	J	0.063	1	0.21		0.041	1	0.73	J	0.41	10	ND	U	4	10	0.047	J	0.04	1
Naphthalene	91-20-3	10	25	56000	25	mg/kg	0.088	J	0.063	1	0.87		0.041	1	ND	U	0.41	10	ND	U	4	10	0.067	J	0.04	1
Phenanthrene	85-01-8	110	10000	190000	10000	mg/kg	0.9		0.063	1	2.8		0.041	1	4.1		0.41	10	ND	U	4	10	1.1		0.04	1
Pyrene	129-00-0	13	2200	84000	2200	mg/kg	0.86		0.063	1	4.4		0.041	1	3.9		0.41	10	7.1	J	4	10	1		0.04	1
Metals																										
Lead	7439-92-1	0.5	450	1000	450	mg/kg	**3310**		0.491	50	186		0.033	5	401		0.061	10	777		0.122	20	118		0.03	5
General Chemistry																										
Moisture, Percent	MOIST	NS	NS	NS	NS	%	48.1		0.5	1	20		0.5	1	18.3		0.5	1	17.3		0.5	1	17.3		0.5	1

Notes:
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard

All soil samples collected and analyzed were unsaturated.

Qualifiers:
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

Exceedance Summary:
10 - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Direct Contact Standard

Table 4
Summary of Shallow Soil Sample Analytical Results: Outside CAMU Areas
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (0 - 2 ft bgs)	PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500)	Location ID	BH-10-62				BH-10-66				BH-10-67				BH-10-71				BH-10-72			
						Sample ID	BH-10-62_0-2'				BH-10-66_0-2'				BH-10-67_0-2'				BH-10-71_0-2'				BH-10-72_0-2'			
						Sample Date	4/22/2011				4/21/2011				4/21/2011				4/5/2011				4/5/2011			
						Sample Matrix	Soil				Soil				Soil				Soil				Soil			
						Sample Interval	0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs			
						Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Volatile Organic Compounds																										
1,2,4-Trimethylbenzene	95-63-6	6.2	35	560	35	mg/kg	0.004	J	0.002	1.07	ND	U	0.001	0.79	0.16		0.002	1.08	0.011		0.001	0.95	ND	U	0.12	79.72
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.005	0.0012	3.7	0.005	mg/kg	ND	U	0.002	1.07	ND	U	0.001	0.79	ND	U	0.002	1.08	ND	U	0.001	0.95	ND	U	**0.12**	79.72
1,2-Dichloroethane	107-06-2	0.5	0.1	86	0.5	mg/kg	ND	U	0.002	1.07	ND	U	0.001	0.79	0.003	J	0.002	1.08	ND	U	0.001	0.95	ND	U	0.12	79.72
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	5.3	9.3	480	9.3	mg/kg	0.002	J	0.002	1.07	ND	U	0.001	0.79	0.029		0.002	1.08	0.005	J	0.001	0.95	ND	U	0.12	79.72
Benzene	71-43-2	0.5	0.13	290	0.5	mg/kg	0.051		0.001	1.07	0.004	J	5E-04	0.79	0.11		0.001	1.08	0.019		6E-04	0.95	ND	U	0.062	79.72
Dimethyl Benzene/ Xylenes, Total	1330-20-7	1000	990	8000	1000	mg/kg	0.006	J	0.002	1.07	ND	U	0.001	0.79	0.3		0.002	1.08	0.016		0.001	0.95	ND	U	0.12	79.72
Ethylbenzene	100-41-4	70	46	10000	70	mg/kg	ND	U	0.002	1.07	ND	U	0.001	0.79	0.023		0.002	1.08	0.002	J	0.001	0.95	ND	U	0.12	79.72
Isopropylbenzene (Cumene)	98-82-8	350	2500	10000	2500	mg/kg	ND	U	0.002	1.07	ND	U	0.001	0.79	0.005	J	0.002	1.08	ND	U	0.001	0.95	ND	U	0.12	79.72
Tert-Butyl Methyl Ether	1634-04-4	2	0.28	3200	2	mg/kg	ND	U	0.001	1.07	ND	U	5E-04	0.79	ND	U	0.001	1.08	ND	U	6E-04	0.95	ND	U	0.062	79.72
Toluene	108-88-3	100	44	10000	100	mg/kg	0.024		0.002	1.07	0.002	J	0.001	0.79	0.22		0.002	1.08	0.014		0.001	0.95	ND	U	0.12	79.72
Semi-Volatile Organic Compounds																										
Anthracene	120-12-7	6.6	350	190000	350	mg/kg	0.73	J	0.62	10	ND	U	0.04	1	0.33		0.062	1	ND	U	0.21	5	5.8	J	2.6	5
Benzo(A)Anthracene	56-55-3	0.36	320	110	110	mg/kg	1.6	J	0.62	10	0.07	J	0.04	1	0.62		0.062	1	0.32	J	0.21	5	15		2.6	5
Benzo(A)Pyrene	50-32-8	0.02	46	11	11	mg/kg	2.4	J	0.62	10	0.065	J	0.04	1	0.57		0.062	1	0.51	J	0.21	5	**49**		2.6	5
Benzo(B)Fluoranthene	205-99-2	0.12	170	110	110	mg/kg	2.8	J	0.62	10	0.069	J	0.04	1	0.7		0.062	1	0.35	J	0.21	5	31		2.6	5
Benzo(G,H,I)Perylene	191-24-2	0.026	180	170000	180	mg/kg	3.4		0.62	10	0.085	J	0.04	1	0.39		0.062	1	1.1		0.21	5	47		2.6	5
Chrysene	218-01-9	0.19	230	11000	230	mg/kg	1.8	J	0.62	10	0.077	J	0.04	1	0.75		0.062	1	0.46	J	0.21	5	27		2.6	5
Fluorene	86-73-7	190	3800	110000	3800	mg/kg	ND	U	0.62	10	ND	U	0.04	1	0.12	J	0.062	1	ND	U	0.21	5	ND	U	2.6	5
Naphthalene	91-20-3	10	25	56000	25	mg/kg	4.2		0.62	10	ND	U	0.04	1	0.28	J	0.062	1	0.25	J	0.21	5	3.1	J	2.6	5
Phenanthrene	85-01-8	110	10000	190000	10000	mg/kg	1.9	J	0.62	10	0.06	J	0.04	1	1.1		0.062	1	0.47	J	0.21	5	12	J	2.6	5
Pyrene	129-00-0	13	2200	84000	2200	mg/kg	2.6	J	0.62	10	0.079	J	0.04	1	1.2		0.062	1	0.68	J	0.21	5	49		2.6	5
Metals																										
Lead	7439-92-1	0.5	450	1000	450	mg/kg	**2580**		0.475	50	250		0.031	5	985		0.192	20	244		0.065	10	946		0.159	20
General Chemistry																										
Moisture, Percent	MOIST	NS	NS	NS	NS	%	46.3		0.5	1	18		0.5	1	46.8		0.5	1	20.2		0.5	1	35.7		0.5	1

Notes:
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard

All soil samples collected and analyzed were unsaturated.

Qualifiers:
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

Exceedance Summary:
10 - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Direct Contact Standard

Table 4
Summary of Shallow Soil Sample Analytical Results: Outside CAMU Areas
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (0 - 2 ft bgs)	PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500)	Location ID	BH-10-73				BH-10-76				BH-10-78				BH-10-79				BH-10-80			
						Sample ID	BH-10-73_0-2'				BH-10-76_0-2'				BH-10-78_0-2'				BH-10-79_0-2'				BH-10-80_0-2'			
						Sample Date	4/5/2011				4/20/2011				4/21/2011				4/21/2011				4/21/2011			
						Sample Matrix	Soil				Soil				Soil				Soil				Soil			
						Sample Interval	0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs			
						Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Volatile Organic Compounds																										
1,2,4-Trimethylbenzene	95-63-6	6.2	35	560	35	mg/kg	0.005	J	0.002	1.07	ND	U	0.001	0.89	ND	U	0.001	0.82	ND	U	9E-04	0.8	ND	U	0.001	0.81
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.005	0.0012	3.7	0.005	mg/kg	ND	U	0.002	1.07	ND	U	0.001	0.89	ND	U	0.001	0.82	ND	U	9E-04	0.8	ND	U	0.001	0.81
1,2-Dichloroethane	107-06-2	0.5	0.1	86	0.5	mg/kg	ND	U	0.002	1.07	ND	U	0.001	0.89	ND	U	0.001	0.82	ND	U	9E-04	0.8	ND	U	0.001	0.81
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	5.3	9.3	480	9.3	mg/kg	0.003	J	0.002	1.07	ND	U	0.001	0.89	ND	U	0.001	0.82	ND	U	9E-04	0.8	ND	U	0.001	0.81
Benzene	71-43-2	0.5	0.13	290	0.5	mg/kg	0.016		9E-04	1.07	0.005	J	5E-04	0.89	0.001	J	5E-04	0.82	0.004	J	5E-04	0.8	0.009		5E-04	0.81
Dimethyl Benzene/ Xylenes, Total	1330-20-7	1000	990	8000	1000	mg/kg	0.012		0.002	1.07	ND	U	0.001	0.89	ND	U	0.001	0.82	ND	U	9E-04	0.8	ND	U	0.001	0.81
Ethylbenzene	100-41-4	70	46	10000	70	mg/kg	0.003	J	0.002	1.07	ND	U	0.001	0.89	ND	U	0.001	0.82	ND	U	9E-04	0.8	ND	U	0.001	0.81
Isopropylbenzene (Cumene)	98-82-8	350	2500	10000	2500	mg/kg	ND	U	0.002	1.07	ND	U	0.001	0.89	ND	U	0.001	0.82	ND	U	9E-04	0.8	ND	U	0.001	0.81
Tert-Butyl Methyl Ether	1634-04-4	2	0.28	3200	2	mg/kg	ND	U	9E-04	1.07	ND	U	5E-04	0.89	ND	U	5E-04	0.82	ND	U	5E-04	0.8	ND	U	5E-04	0.81
Toluene	108-88-3	100	44	10000	100	mg/kg	0.018		0.002	1.07	0.002	J	0.001	0.89	ND	U	0.001	0.82	0.001	J	9E-04	0.8	0.001	J	0.001	0.81
Semi-Volatile Organic Compounds																										
Anthracene	120-12-7	6.6	350	190000	350	mg/kg	ND	U	2.9	5	0.26		0.04	1	0.43		0.039	1	ND	U	0.038	1	0.57		0.04	1
Benzo(A)Anthracene	56-55-3	0.36	320	110	110	mg/kg	ND	U	2.9	5	1.4		0.04	1	0.91		0.039	1	0.041	J	0.038	1	1.7		0.04	1
Benzo(A)Pyrene	50-32-8	0.02	46	11	11	mg/kg	ND	U	2.9	5	1.8		0.04	1	0.66		0.039	1	0.046	J	0.038	1	1.4		0.04	1
Benzo(B)Fluoranthene	205-99-2	0.12	170	110	110	mg/kg	ND	U	2.9	5	1.5		0.04	1	0.81		0.039	1	0.046	J	0.038	1	1.9		0.04	1
Benzo(G,H,I)Perylene	191-24-2	0.026	180	170000	180	mg/kg	3.9	J	2.9	5	2		0.04	1	0.33		0.039	1	ND	U	0.038	1	0.79		0.04	1
Chrysene	218-01-9	0.19	230	11000	230	mg/kg	ND	U	2.9	5	1.6		0.04	1	0.82		0.039	1	ND	U	0.038	1	1.6		0.04	1
Fluorene	86-73-7	190	3800	110000	3800	mg/kg	ND	U	2.9	5	0.083	J	0.04	1	0.14	J	0.039	1	ND	U	0.038	1	0.15	J	0.04	1
Naphthalene	91-20-3	10	25	56000	25	mg/kg	17		2.9	5	0.34		0.04	1	0.085	J	0.039	1	ND	U	0.038	1	0.18	J	0.04	1
Phenanthrene	85-01-8	110	10000	190000	10000	mg/kg	4.4	J	2.9	5	0.74		0.04	1	1.3		0.039	1	ND	U	0.038	1	1.9		0.04	1
Pyrene	129-00-0	13	2200	84000	2200	mg/kg	ND	U	2.9	5	0.99		0.04	1	1.3		0.039	1	0.042	J	0.038	1	2.9		0.04	1
Metals																										
Lead	7439-92-1	0.5	450	1000	450	mg/kg	**4550**		0.887	100	**1990**		0.621	100	79.3		0.012	2	145		0.029	5	234		0.06	10
General Chemistry																										
Moisture, Percent	MOIST	NS	NS	NS	NS	%	42.5		0.5	1	17.1		0.5	1	15.3		0.5	1	12.6		0.5	1	16.5		0.5	1

Notes:
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard

All soil samples collected and analyzed were unsaturated.

Qualifiers:
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

Exceedance Summary:
10 - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Direct Contact Standard

Table 4
Summary of Shallow Soil Sample Analytical Results: Outside CAMU Areas
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (0 - 2 ft bgs)	PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500)	Location ID	W-1D				W-28				W-29				W-30				W-31			
						Sample ID	W-1D_0-2'				W-28_0-2'				W-29_0-2'				W-30@0'-2'				W-31@0'-2'			
						Sample Date	4/5/2011				4/19/2011				4/19/2011				4/15/2011				4/15/2011			
						Sample Matrix	Soil				Soil				Soil				Soil				Soil			
						Sample Interval	0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs			
						Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Volatile Organic Compounds																										
1,2,4-Trimethylbenzene	95-63-6	6.2	35	560	35	mg/kg	ND	U	9E-04	0.8	1.6		0.06	50.09	ND	U	0.001	0.95	0.004	J	0.003	1.45	0.092	J	0.075	63.87
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.005	0.0012	3.7	0.005	mg/kg	ND	U	9E-04	0.8	ND	U	**0.06**	50.09	ND	U	0.001	0.95	ND	U	0.003	1.45	ND	U	**0.075**	63.87
1,2-Dichloroethane	107-06-2	0.5	0.1	86	0.5	mg/kg	ND	U	9E-04	0.8	ND	U	0.06	50.09	ND	U	0.001	0.95	ND	U	0.003	1.45	ND	U	0.075	63.87
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	5.3	9.3	480	9.3	mg/kg	ND	U	9E-04	0.8	0.43		0.06	50.09	ND	U	0.001	0.95	0.003	J	0.003	1.45	0.086	J	0.075	63.87
Benzene	71-43-2	0.5	0.13	290	0.5	mg/kg	0.001	J	5E-04	0.8	0.17	J	0.03	50.09	0.004	J	5E-04	0.95	0.012	J	0.001	1.45	0.089	J	0.037	63.87
Dimethyl Benzene/ Xylenes, Total	1330-20-7	1000	990	8000	1000	mg/kg	ND	U	9E-04	0.8	0.54		0.06	50.09	0.001	J	0.001	0.95	ND	U	0.003	1.45	0.14	J	0.075	63.87
Ethylbenzene	100-41-4	70	46	10000	70	mg/kg	ND	U	9E-04	0.8	0.065	J	0.06	50.09	ND	U	0.001	0.95	ND	U	0.003	1.45	0.076	J	0.075	63.87
Isopropylbenzene (Cumene)	98-82-8	350	2500	10000	2500	mg/kg	ND	U	9E-04	0.8	ND	U	0.06	50.09	ND	U	0.001	0.95	ND	U	0.003	1.45	0.4		0.075	63.87
Tert-Butyl Methyl Ether	1634-04-4	2	0.28	3200	2	mg/kg	ND	U	5E-04	0.8	ND	U	0.03	50.09	ND	U	5E-04	0.95	ND	U	0.001	1.45	ND	U	0.037	63.87
Toluene	108-88-3	100	44	10000	100	mg/kg	ND	U	9E-04	0.8	0.11	J	0.06	50.09	0.006		0.001	0.95	0.004	J	0.003	1.45	0.094	J	0.075	63.87
Semi-Volatile Organic Compounds																										
Anthracene	120-12-7	6.6	350	190000	350	mg/kg	2.3		0.19	5	0.57		0.04	1	0.83		0.038	1	ND	U	0.057	1	0.49	J	0.39	10
Benzo(A)Anthracene	56-55-3	0.36	320	110	110	mg/kg	3.7		0.19	5	0.63		0.04	1	0.9		0.038	1	0.07	J	0.057	1	0.78	J	0.39	10
Benzo(A)Pyrene	50-32-8	0.02	46	11	11	mg/kg	2.7		0.19	5	0.39		0.04	1	0.84		0.038	1	ND	U	0.057	1	0.59	J	0.39	10
Benzo(B)Fluoranthene	205-99-2	0.12	170	110	110	mg/kg	3.7		0.19	5	0.27		0.04	1	0.97		0.038	1	ND	U	0.057	1	0.54	J	0.39	10
Benzo(G,H,I)Perylene	191-24-2	0.026	180	170000	180	mg/kg	1.4		0.19	5	0.22		0.04	1	0.76		0.038	1	ND	U	0.057	1	ND	U	0.39	10
Chrysene	218-01-9	0.19	230	11000	230	mg/kg	3.2		0.19	5	1.4		0.04	1	1.1		0.038	1	0.4		0.057	1	2.6		0.39	10
Fluorene	86-73-7	190	3800	110000	3800	mg/kg	1		0.19	5	0.97		0.04	1	0.14	J	0.038	1	ND	U	0.057	1	ND	U	0.39	10
Naphthalene	91-20-3	10	25	56000	25	mg/kg	0.42	J	0.19	5	0.67		0.04	1	1.3		0.038	1	0.11	J	0.057	1	ND	U	0.39	10
Phenanthrene	85-01-8	110	10000	190000	10000	mg/kg	7.9		0.19	5	1.9		0.04	1	1.4		0.038	1	0.35		0.057	1	0.51	J	0.39	10
Pyrene	129-00-0	13	2200	84000	2200	mg/kg	6.9		0.19	5	1.4		0.04	1	1.5		0.038	1	0.28	J	0.057	1	2.2		0.39	10
Metals																										
Lead	7439-92-1	0.5	450	1000	450	mg/kg	76.5		0.012	2	181		0.03	5	259		0.058	10	**1990**		0.431	50	955		0.152	25
General Chemistry																										
Moisture, Percent	MOIST	NS	NS	NS	NS	%	13.6		0.5	1	17		0.5	1	13.9		0.5	1	42		0.5	1	14.6		0.5	1

Notes:
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard

All soil samples collected and analyzed were unsaturated.

Qualifiers:
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

Exceedance Summary:
10 - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Direct Contact Standard

Table 4
Summary of Shallow Soil Sample Analytical Results: Outside CAMU Areas
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (0 - 2 ft bgs)	PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500)	Location ID	W-32D				W-33				W-34			
						Sample ID	W-32D_0-2'				W-33_0-2'				W-34_0-2'			
						Sample Date	4/7/2011				4/20/2011				4/20/2011			
						Sample Matrix	Soil				Soil				Soil			
						Sample Interval	0-2 ft bgs				0-2 ft bgs				0-2 ft bgs			
						Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Volatile Organic Compounds																		
1,2,4-Trimethylbenzene	95-63-6	6.2	35	560	35	mg/kg	ND	U	0.001	1.01	ND	U	0.001	0.87	ND	U	0.001	0.89
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.005	0.0012	3.7	0.005	mg/kg	ND	U	0.001	1.01	ND	U	0.001	0.87	ND	U	0.001	0.89
1,2-Dichloroethane	107-06-2	0.5	0.1	86	0.5	mg/kg	ND	U	0.001	1.01	ND	U	0.001	0.87	ND	U	0.001	0.89
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	5.3	9.3	480	9.3	mg/kg	ND	U	0.001	1.01	ND	U	0.001	0.87	ND	U	0.001	0.89
Benzene	71-43-2	0.5	0.13	290	0.5	mg/kg	0.003	J	7E-04	1.01	0.011		5E-04	0.87	0.003	J	5E-04	0.89
Dimethyl Benzene/ Xylenes, Total	1330-20-7	1000	990	8000	1000	mg/kg	ND	U	0.001	1.01	0.006		0.001	0.87	ND	U	0.001	0.89
Ethylbenzene	100-41-4	70	46	10000	70	mg/kg	ND	U	0.001	1.01	ND	U	0.001	0.87	ND	U	0.001	0.89
Isopropylbenzene (Cumene)	98-82-8	350	2500	10000	2500	mg/kg	ND	U	0.001	1.01	ND	U	0.001	0.87	ND	U	0.001	0.89
Tert-Butyl Methyl Ether	1634-04-4	2	0.28	3200	2	mg/kg	ND	U	7E-04	1.01	ND	U	5E-04	0.87	ND	U	5E-04	0.89
Toluene	108-88-3	100	44	10000	100	mg/kg	0.002	J	0.001	1.01	0.011		0.001	0.87	0.002	J	0.001	0.89
Semi-Volatile Organic Compounds																		
Anthracene	120-12-7	6.6	350	190000	350	mg/kg	ND	U	0.24	5	0.17	J	0.039	1	0.18	J	0.039	1
Benzo(A)Anthracene	56-55-3	0.36	320	110	110	mg/kg	0.35	J	0.24	5	0.15	J	0.039	1	0.55		0.039	1
Benzo(A)Pyrene	50-32-8	0.02	46	11	11	mg/kg	0.43	J	0.24	5	0.2		0.039	1	0.54		0.039	1
Benzo(B)Fluoranthene	205-99-2	0.12	170	110	110	mg/kg	0.44	J	0.24	5	0.16	J	0.039	1	0.62		0.039	1
Benzo(G,H,I)Perylene	191-24-2	0.026	180	170000	180	mg/kg	0.68	J	0.24	5	0.36		0.039	1	0.47		0.039	1
Chrysene	218-01-9	0.19	230	11000	230	mg/kg	0.44	J	0.24	5	0.19	J	0.039	1	0.6		0.039	1
Fluorene	86-73-7	190	3800	110000	3800	mg/kg	ND	U	0.24	5	0.041	J	0.039	1	0.053	J	0.039	1
Naphthalene	91-20-3	10	25	56000	25	mg/kg	ND	U	0.24	5	0.14	J	0.039	1	0.18	J	0.039	1
Phenanthrene	85-01-8	110	10000	190000	10000	mg/kg	0.42	J	0.24	5	0.24		0.039	1	0.59		0.039	1
Pyrene	129-00-0	13	2200	84000	2200	mg/kg	0.52	J	0.24	5	0.26		0.039	1	0.86		0.039	1
Metals																		
Lead	7439-92-1	0.5	450	1000	450	mg/kg	**1200**		0.181	25	297		0.06	10	561		0.122	20
General Chemistry																		
Moisture, Percent	MOIST	NS	NS	NS	NS	%	29.7		0.5	1	14.4		0.5	1	14.9		0.5	1

Notes:
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard

All soil samples collected and analyzed were unsaturated.

Qualifiers:
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

Exceedance Summary:
10 - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Direct Contact Standard

Table 5
Summary of Shallow Soil Sample Analytical Results for CAMU Delineation Samples
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (0 - 2 ft bgs)	PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500)	Location ID	BH-10-43				BH-10-48				BH-10-51				BH-10-52				BH-10-57				BH-10-58			
						Sample ID	BH-10-43_0-2'				BH-10-48_0-2'				BH-10-51_0-2'				BH-10-52_0-2'				BH-10-57_0-2'				BH-10-58_0-2'			
						Sample Date	4/14/2011				4/14/2011				4/14/2011				4/14/2011				4/21/2011				4/14/2011			
						Sample Matrix	Soil				Soil				Soil				Soil				Soil				Soil			
						Sample Interval	0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs			
						Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Volatile Organic Compounds																														
1,1,1-Trichloroethane	71-55-6	20	7.2	10000	20	mg/kg	ND	U	0.0009	0.74	ND	U	0.001	0.76	ND	U	0.001	0.99	ND	U	0.0009	0.78	ND	U	0.76	607.74	ND	U	0.2	91.09
1,1,2,2-Tetrachloroethane	79-34-5	0.03	0.0093	38	0.03	mg/kg	ND	U	0.0009	0.74	ND	U	0.001	0.76	ND	U	0.001	0.99	ND	U	0.0009	0.78	ND	U	**0.76**	607.74	ND	U	**0.2**	91.09
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	10000	10000	10000	10000	mg/kg	ND	U	0.002	0.74	ND	U	0.002	0.76	ND	U	0.003	0.99	ND	U	0.002	0.78	ND	U	1.5	607.74	ND	U	0.4	91.09
1,1,2-Trichloroethane	79-00-5	0.5	0.15	140	0.5	mg/kg	ND	U	0.0009	0.74	ND	U	0.001	0.76	ND	U	0.001	0.99	ND	U	0.0009	0.78	ND	U	**0.76**	607.74	ND	U	0.2	91.09
1,1-Dichloroethane	75-34-3	16	3.9	1400	16	mg/kg	ND	U	0.0009	0.74	ND	U	0.001	0.76	ND	U	0.001	0.99	ND	U	0.0009	0.78	ND	U	0.76	607.74	ND	U	0.2	91.09
1,1-Dichloroethene	75-35-4	0.7	0.19	10000	0.7	mg/kg	ND	U	0.0009	0.74	ND	U	0.001	0.76	ND	U	0.001	0.99	ND	U	0.0009	0.78	ND	U	**0.76**	607.74	ND	U	0.2	91.09
1,2,4-Trichlorobenzene	120-82-1	7	27	10000	27	mg/kg	ND	U	0.0009	0.74	ND	U	0.001	0.76	ND	U	0.001	0.99	ND	U	0.0009	0.78	ND	U	0.76	607.74	ND	U	0.2	91.09
1,2-Dibromo-3-Chloropropane	96-12-8	0.02	0.0092	0.37	0.02	mg/kg	ND	U	0.002	0.74	ND	U	0.002	0.76	ND	U	0.003	0.99	ND	U	0.002	0.78	ND	U	**1.5**	607.74	ND	U	**0.4**	91.09
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.005	0.0012	3.7	0.005	mg/kg	ND	U	0.0009	0.74	ND	U	0.001	0.76	ND	U	0.001	0.99	ND	U	0.0009	0.78	ND	U	**0.76**	607.74	ND	U	**0.2**	91.09
1,2-Dichlorobenzene	95-50-1	60	59	10000	60	mg/kg	ND	U	0.0009	0.74	ND	U	0.001	0.76	ND	U	0.001	0.99	ND	U	0.0009	0.78	ND	U	0.76	607.74	ND	U	0.2	91.09
1,2-Dichloroethane	107-06-2	0.5	0.1	86	0.5	mg/kg	ND	U	0.0009	0.74	ND	U	0.001	0.76	ND	U	0.001	0.99	ND	U	0.0009	0.78	ND	U	**0.76**	607.74	ND	U	0.2	91.09
1,2-Dichloropropane	78-87-5	0.5	0.11	220	0.5	mg/kg	ND	U	0.0009	0.74	ND	U	0.001	0.76	ND	U	0.001	0.99	ND	U	0.0009	0.78	ND	U	**0.76**	607.74	ND	U	0.2	91.09
1,3-Dichlorobenzene	541-73-1	60	61	8400	61	mg/kg	ND	U	0.0009	0.74	ND	U	0.001	0.76	ND	U	0.001	0.99	ND	U	0.0009	0.78	ND	U	0.76	607.74	ND	U	0.2	91.09
1,4-Dichlorobenzene	106-46-7	7.5	10	200	10	mg/kg	ND	U	0.0009	0.74	ND	U	0.001	0.76	ND	U	0.001	0.99	ND	U	0.0009	0.78	ND	U	0.76	607.74	ND	U	0.2	91.09
2-Hexanone	591-78-6	4.4	1.1	400	4.4	mg/kg	ND	U	0.003	0.74	ND	U	0.003	0.76	ND	U	0.004	0.99	ND	U	0.003	0.78	ND	U	2.3	607.74	ND	U	0.59	91.09
Acetone	67-64-1	9200	1000	10000	9200	mg/kg	0.091		0.006	0.74	0.11		0.007	0.76	0.21		0.009	0.99	0.084		0.006	0.78	ND	U	5.3	607.74	ND	U	1.4	91.09
Benzene	71-43-2	0.5	0.13	290	0.5	mg/kg	0.012		0.0004	0.74	0.007		0.0005	0.76	0.006	J	0.0007	0.99	0.008		0.0005	0.78	1.2	J	0.38	607.74	ND	U	0.099	91.09
Bromodichloromethane	75-27-4	8	2.7	60	8	mg/kg	ND	U	0.0009	0.74	ND	U	0.001	0.76	ND	U	0.001	0.99	ND	U	0.0009	0.78	ND	U	0.76	607.74	ND	U	0.2	91.09
Bromoform	75-25-2	8	3.5	2000	8	mg/kg	ND	U	0.0009	0.74	ND	U	0.001	0.76	ND	U	0.001	0.99	ND	U	0.0009	0.78	ND	U	0.76	607.74	ND	U	0.2	91.09
Bromomethane	74-83-9	1	0.54	400	1	mg/kg	ND	U	0.002	0.74	ND	U	0.002	0.76	ND	U	0.003	0.99	ND	U	0.002	0.78	ND	U	**1.5**	607.74	ND	U	0.4	91.09
Carbon Disulfide	75-15-0	620	530	10000	620	mg/kg	0.004	J	0.0009	0.74	0.002	J	0.001	0.76	0.005	J	0.001	0.99	0.002	J	0.0009	0.78	ND	U	0.76	607.74	ND	U	0.2	91.09
Carbon Tetrachloride	56-23-5	0.5	0.26	150	0.5	mg/kg	ND	U	0.0009	0.74	ND	U	0.001	0.76	ND	U	0.001	0.99	ND	U	0.0009	0.78	ND	U	**0.76**	607.74	ND	U	0.2	91.09
Chlorobenzene	108-90-7	10	6.1	4000	10	mg/kg	ND	U	0.0009	0.74	ND	U	0.001	0.76	ND	U	0.001	0.99	ND	U	0.0009	0.78	ND	U	0.76	607.74	ND	U	0.2	91.09
Chloroethane	75-00-3	90	19	10000	90	mg/kg	ND	U	0.002	0.74	ND	U	0.002	0.76	ND	U	0.003	0.99	ND	U	0.002	0.78	ND	U	1.5	607.74	ND	U	0.4	91.09
Chloroform	67-66-3	8	2	97	8	mg/kg	ND	U	0.0009	0.74	ND	U	0.001	0.76	ND	U	0.001	0.99	ND	U	0.0009	0.78	ND	U	0.76	607.74	ND	U	0.2	91.09
Chloromethane	74-87-3	3	0.38	1200	3	mg/kg	ND	U	0.002	0.74	ND	U	0.002	0.76	ND	U	0.003	0.99	ND	U	0.002	0.78	ND	U	1.5	607.74	ND	U	0.4	91.09
Cis-1,2-Dichloroethylene	156-59-2	7	1.6	10000	7	mg/kg	ND	U	0.0009	0.74	ND	U	0.001	0.76	ND	U	0.001	0.99	ND	U	0.0009	0.78	ND	U	0.76	607.74	ND	U	0.2	91.09
Cis-1,3-Dichloropropene	10061-01-5	NS	NS	NS	NS	mg/kg	ND	U	0.0009	0.74	ND	U	0.001	0.76	ND	U	0.001	0.99	ND	U	0.0009	0.78	ND	U	0.76	607.74	ND	U	0.2	91.09
Cyclohexane	110-82-7	5300	6900	10000	6900	mg/kg	ND	U	0.0009	0.74	0.016		0.001	0.76	0.007		0.001	0.99	ND	U	0.0009	0.78	ND	U	0.76	607.74	ND	U	0.2	91.09
Dibromochloromethane	124-48-1	8	2.5	82	8	mg/kg	ND	U	0.0009	0.74	ND	U	0.001	0.76	ND	U	0.001	0.99	ND	U	0.0009	0.78	ND	U	0.76	607.74	ND	U	0.2	91.09
Dichlorodifluoromethane	75-71-8	100	100	10000	100	mg/kg	ND	U	0.002	0.74	ND	U	0.002	0.76	ND	U	0.003	0.99	ND	U	0.002	0.78	ND	U	1.5	607.74	ND	U	0.4	91.09
Dimethyl Benzene/ Xylenes, Total	1330-20-7	1000	990	8000	1000	mg/kg	ND	U	0.0009	0.74	0.014		0.001	0.76	0.027		0.001	0.99	0.001	J	0.0009	0.78	25		0.76	607.74	ND	U	0.2	91.09
Ethylbenzene	100-41-4	70	46	10000	70	mg/kg	0.001	J	0.0009	0.74	0.001	J	0.001	0.76	0.003	J	0.001	0.99	ND	U	0.0009	0.78	5.7		0.76	607.74	ND	U	0.2	91.09
Isopropylbenzene (Cumene)	98-82-8	350	2500	10000	2500	mg/kg	ND	U	0.0009	0.74	0.013		0.001	0.76	0.004	J	0.001	0.99	ND	U	0.0009	0.78	22		0.76	607.74	ND	U	0.2	91.09
Methyl Acetate	79-20-9	10000	1900	10000	10000	mg/kg	ND	U	0.002	0.74	ND	U	0.002	0.76	ND	U	0.003	0.99	ND	U	0.002	0.78	ND	U	1.5	607.74	1.7		0.4	91.09
Methyl Ethyl Ketone (2-Butanone)	78-93-3	400	76	10000	400	mg/kg	0.011		0.004	0.74	0.017		0.004	0.76	0.034		0.005	0.99	0.008	J	0.004	0.78	ND	U	3	607.74	ND	U	0.79	91.09
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	820	130	10000	820	mg/kg	ND	U	0.003	0.74	ND	U	0.003	0.76	ND	U	0.004	0.99	ND	U	0.003	0.78	ND	U	2.3	607.74	ND	U	0.59	91.09
Methylcyclohexane	108-87-2	NS	NS	NS	NS	mg/kg	0.001	J	0.0009	0.74	0.081		0.001	0.76	0.081		0.001	0.99	ND	U	0.0009	0.78	7		0.76	607.74	ND	U	0.2	91.09
Methylene Chloride	75-09-2	0.5	0.076	4700	0.5	mg/kg	ND	U	0.002	0.74	ND	U	0.002	0.76	ND	U	0.003	0.99	ND	U	0.002	0.78	ND	U	**1.5**	607.74	ND	U	0.4	91.09
Styrene	100-42-5	10	24	10000	24	mg/kg	ND	U	0.0009	0.74	ND	U	0.001	0.76	ND	U	0.001	0.99	ND	U	0.0009	0.78	ND	U	0.76	607.74	ND	U	0.2	91.09
Tert-Butyl Methyl Ether	1634-04-4	2	0.28	3200	2	mg/kg	ND	U	0.0004	0.74	ND	U	0.0005	0.76	ND	U	0.0007	0.99	ND	U	0.0005	0.78	ND	U	0.38	607.74	ND	U	0.099	91.09
Tetrachloroethylene(PCE)	127-18-4	0.5	0.43	1500	0.5	mg/kg	ND	U	0.0009	0.74	ND	U	0.001	0.76	0.003	J	0.001	0.99	ND	U	0.0009	0.78	1.6	J	**0.76**	607.74	ND	U	0.2	91.09
Toluene	108-88-3	100	44	10000	100	mg/kg	0.002	J	0.0009	0.74	0.002	J	0.001	0.76	0.005	J	0.001	0.99	0.003	J	0.0009	0.78	13		0.76	607.74	ND	U	0.2	91.09
Trans-1,2-Dichloroethene	156-60-5	10	2.3	4800	10	mg/kg	ND	U	0.0009	0.74	ND	U	0.001	0.76	ND	U	0.001	0.99	ND	U	0.0009	0.78	ND	U	0.76	607.74	ND	U	0.2	91.09
Trans-1,3-Dichloropropene	10061-02-6	NS	NS	NS	NS	mg/kg	ND	U	0.0009	0.74	ND	U	0.001	0.76	ND	U	0.001	0.99	ND	U	0.0009	0.78	ND	U	0.76	607.74	ND	U	0.2	91.09
Trichloroethylene (TCE)	79-01-6	0.5	0.17	1300	0.5	mg/kg	ND	U	0.0009	0.74	ND	U	0.001	0.76	ND	U	0.001	0.99	ND	U	0.0009	0.78	ND	U	**0.76**	607.74	ND	U	0.2	91.09
Trichlorofluoromethane	75-69-4	200	87	10000	200	mg/kg	ND	U	0.002	0.74	ND	U	0.002	0.76	ND	U	0.003	0.99	ND	U	0.002	0.78	ND	U	1.5	607.74	ND	U	0.4	91.09
Vinyl Chloride	75-01-4	0.2	0.027	110	0.2	mg/kg	ND	U	0.0009	0.74	ND	U	0.001	0.76	ND	U	0.001	0.99	ND	U	0.0009	0.78	ND	U	**0.76**	607.74	ND	U	**0.2**	91.09

Table 5
Summary of Shallow Soil Sample Analytical Results for CAMU Delineation Samples
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (0 - 2 ft bgs)	PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500)	Location ID	BH-10-43				BH-10-48				BH-10-51				BH-10-52				BH-10-57				BH-10-58			
						Sample ID	BH-10-43_0-2'				BH-10-48_0-2'				BH-10-51_0-2'				BH-10-52_0-2'				BH-10-57_0-2'				BH-10-58_0-2'			
						Sample Date	4/14/2011				4/14/2011				4/14/2011				4/14/2011				4/21/2011				4/14/2011			
						Sample Matrix	Soil				Soil				Soil				Soil				Soil				Soil			
						Sample Interval	0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs			
						Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Semi-Volatile Organic Compounds																														
2,4,5-Trichlorophenol	95-95-4	1000	6100	190000	6100	mg/kg	ND	U	0.39	5	ND	U	0.42	5	ND	U	0.45	5	ND	U	0.39	5	ND	U	4.1	10	ND	U	0.72	5
2,4,6-Trichlorophenol	88-06-2	10	29	2800	29	mg/kg	ND	U	0.2	5	ND	U	0.21	5	ND	U	0.22	5	ND	U	0.19	5	ND	U	2.1	10	ND	U	0.36	5
2,4-Dichlorophenol	120-83-2	2	1	8400	2	mg/kg	ND	U	0.2	5	ND	U	0.21	5	ND	U	0.22	5	ND	U	0.19	5	ND	U	**2.1**	10	ND	U	0.36	5
2,4-Dimethylphenol	105-67-9	200	87	10000	200	mg/kg	ND	U	0.39	5	ND	U	0.42	5	ND	U	0.45	5	ND	U	0.39	5	ND	U	4.1	10	ND	U	0.72	5
2,4-Dinitrophenol	51-28-5	20	2.3	5600	20	mg/kg	ND	U	2	5	ND	U	2.1	5	ND	U	2.2	5	ND	U	1.9	5	ND	U	**21**	10	ND	U	3.6	5
2,4-Dinitrotoluene	121-14-2	0.84	0.2	260	0.84	mg/kg	ND	U	0.39	5	ND	U	0.42	5	ND	U	0.45	5	ND	U	0.39	5	ND	U	**4.1**	10	ND	U	0.72	5
2,6-Dinitrotoluene	606-20-2	10	3	2800	10	mg/kg	ND	U	0.2	5	ND	U	0.21	5	ND	U	0.22	5	ND	U	0.19	5	ND	U	2.1	10	ND	U	0.36	5
2-Chloronaphthalene	91-58-7	820	18000	190000	18000	mg/kg	ND	U	0.2	5	ND	U	0.21	5	ND	U	0.22	5	ND	U	0.19	5	ND	U	2.1	10	ND	U	0.36	5
2-Chlorophenol	95-57-8	4	4.4	10000	4.4	mg/kg	ND	U	0.2	5	ND	U	0.21	5	ND	U	0.22	5	ND	U	0.19	5	ND	U	2.1	10	ND	U	0.36	5
2-Methylnaphthalene	91-57-6	41	1600	11000	1600	mg/kg	ND	U	0.2	5	0.58	J	0.21	5	0.96	J	0.22	5	ND	U	0.19	5	2.7	J	2.1	10	0.82	J	0.36	5
2-Methylphenol (O-Cresol)	95-48-7	510	85	140000	510	mg/kg	ND	U	0.39	5	ND	U	0.42	5	ND	U	0.45	5	ND	U	0.39	5	ND	U	4.1	10	ND	U	0.72	5
2-Nitroaniline	88-74-4	31	5.5	8400	31	mg/kg	ND	U	0.2	5	ND	U	0.21	5	ND	U	0.22	5	ND	U	0.19	5	ND	U	2.1	10	ND	U	0.36	5
2-Nitrophenol	88-75-5	82	17	22000	82	mg/kg	ND	U	0.2	5	ND	U	0.21	5	ND	U	0.22	5	ND	U	0.19	5	ND	U	2.1	10	ND	U	0.36	5
3,3'-Dichlorobenzidine	91-94-1	0.58	32	180	32	mg/kg	ND	U	0.59	5	ND	U	0.62	5	ND	U	0.67	5	ND	U	0.58	5	ND	U	6.2	10	ND	U	1.1	5
3-Nitroaniline	99-09-2	3.1	0.48	840	3.1	mg/kg	ND	U	0.39	5	ND	U	0.42	5	ND	U	0.45	5	ND	U	0.39	5	ND	U	**4.1**	10	ND	U	0.72	5
4,6-Dinitro-2-Methylphenol	534-52-1	1	0.75	280	1	mg/kg	ND	U	0.98	5	ND	U	**1**	5	ND	U	**1.1**	5	ND	U	0.97	5	ND	U	**10**	10	ND	U	**1.8**	5
4-Bromophenyl Phenyl Ether	101-55-3	0.5	NS	100	0.5	mg/kg	ND	U	0.2	5	ND	U	0.21	5	ND	U	0.22	5	ND	U	0.19	5	ND	U	**2.1**	10	ND	U	0.36	5
4-Chloro-3-Methylphenol	59-50-7	51	110	14000	110	mg/kg	ND	U	0.39	5	ND	U	0.42	5	ND	U	0.45	5	ND	U	0.39	5	ND	U	4.1	10	ND	U	0.72	5
4-Chloroaniline	106-47-8	1.3	1.6	400	1.6	mg/kg	ND	U	0.39	5	ND	U	0.42	5	ND	U	0.45	5	ND	U	0.39	5	ND	U	**4.1**	10	ND	U	0.72	5
4-Chlorophenyl Phenyl Ether	7005-72-3	0.5	NS	100	0.5	mg/kg	ND	U	0.2	5	ND	U	0.21	5	ND	U	0.22	5	ND	U	0.19	5	ND	U	**2.1**	10	ND	U	0.36	5
4-Methylphenol (P-Cresol)	106-44-5	51	12	14000	51	mg/kg	ND	U	0.39	5	ND	U	0.42	5	ND	U	0.45	5	ND	U	0.39	5	ND	U	4.1	10	ND	U	0.72	5
4-Nitroaniline	100-01-6	13	1.9	4000	13	mg/kg	ND	U	0.39	5	ND	U	0.42	5	ND	U	0.45	5	ND	U	0.39	5	ND	U	4.1	10	ND	U	0.72	5
4-Nitrophenol	100-02-7	6	4.1	22000	6	mg/kg	ND	U	0.98	5	ND	U	1	5	ND	U	1.1	5	ND	U	0.97	5	ND	U	**10**	10	ND	U	1.8	5
Acenaphthene	83-32-9	380	4700	170000	4700	mg/kg	ND	U	0.2	5	ND	U	0.21	5	ND	U	0.22	5	ND	U	0.19	5	ND	U	2.1	10	ND	U	0.36	5
Acenaphthylene	208-96-8	610	6900	170000	6900	mg/kg	ND	U	0.2	5	ND	U	0.21	5	ND	U	0.22	5	ND	U	0.19	5	ND	U	2.1	10	ND	U	0.36	5
Acetophenone	98-86-2	1000	540	10000	1000	mg/kg	ND	U	0.39	5	ND	U	0.42	5	ND	U	0.45	5	ND	U	0.39	5	ND	U	4.1	10	ND	U	0.72	5
Anthracene	120-12-7	6.6	350	190000	350	mg/kg	ND	U	0.2	5	ND	U	0.21	5	ND	U	0.22	5	0.31	J	0.19	5	ND	U	2.1	10	ND	U	0.36	5
Atrazine	1912-24-9	0.3	0.13	340	0.3	mg/kg	ND	U	0.2	5	ND	U	0.21	5	ND	U	0.22	5	ND	U	0.19	5	ND	U	**2.1**	10	ND	U	**0.36**	5
Benzaldehyde	100-52-7	NS	NS	NS	NS	mg/kg	ND	U	0.39	5	ND	U	0.42	5	ND	U	0.45	5	ND	U	0.39	5	ND	U	4.1	10	ND	U	0.72	5
Benzo(A)Anthracene	56-55-3	0.36	320	110	110	mg/kg	ND	U	0.2	5	0.39	J	0.21	5	ND	U	0.22	5	0.61	J	0.19	5	ND	U	2.1	10	ND	U	0.36	5
Benzo(A)Pyrene	50-32-8	0.02	46	11	11	mg/kg	ND	U	0.2	5	0.42	J	0.21	5	0.45	J	0.22	5	0.59	J	0.19	5	ND	U	2.1	10	ND	U	0.36	5
Benzo(B)Fluoranthene	205-99-2	0.12	170	110	110	mg/kg	ND	U	0.2	5	0.61	J	0.21	5	0.33	J	0.22	5	0.68	J	0.19	5	ND	U	2.1	10	ND	U	0.36	5
Benzo(G,H,I)Perylene	191-24-2	0.026	180	170000	180	mg/kg	ND	U	0.2	5	0.42	J	0.21	5	0.58	J	0.22	5	0.44	J	0.19	5	2.6	J	2.1	10	ND	U	0.36	5
Benzo(K)Fluoranthene	207-08-9	0.055	610	1100	610	mg/kg	ND	U	0.2	5	ND	U	0.21	5	ND	U	0.22	5	0.35	J	0.19	5	ND	U	2.1	10	ND	U	0.36	5
Benzyl Butyl Phthalate	85-68-7	140	10000	10000	10000	mg/kg	ND	U	0.39	5	ND	U	0.42	5	ND	U	0.45	5	ND	U	0.39	5	ND	U	4.1	10	ND	U	0.72	5
Biphenyl (Diphenyl)	92-52-4	510	2200	140000	2200	mg/kg	ND	U	0.2	5	ND	U	0.21	5	ND	U	0.22	5	ND	U	0.19	5	ND	U	2.1	10	ND	U	0.36	5
Bis(2-Chloroethoxy) Methane	111-91-1	31	8.2	8400	31	mg/kg	ND	U	0.2	5	ND	U	0.21	5	ND	U	0.22	5	ND	U	0.19	5	ND	U	2.1	10	ND	U	0.36	5
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	0.076	0.023	6.7	0.076	mg/kg	ND	U	**0.2**	5	ND	U	**0.21**	5	ND	U	**0.22**	5	ND	U	**0.19**	5	ND	U	**2.1**	10	ND	U	**0.36**	5
Bis(2-Chloroisopropyl) Ether	108-60-1	30	8	220	30	mg/kg	ND	U	0.2	5	ND	U	0.21	5	ND	U	0.22	5	ND	U	0.19	5	ND	U	2.1	10	ND	U	0.36	5
Bis(2-Ethylhexyl) Phthalate	117-81-7	0.6	130	5700	130	mg/kg	ND	U	0.39	5	ND	U	0.42	5	ND	U	0.45	5	ND	U	0.39	5	ND	U	4.1	10	ND	U	0.72	5
Caprolactam	105-60-2	NS	NS	NS	NS	mg/kg	ND	U	0.2	5	ND	U	0.21	5	ND	U	0.22	5	ND	U	0.19	5	ND	U	2.1	10	ND	U	0.36	5
Carbazole	86-74-8	13	83	4000	83	mg/kg	ND	U	0.2	5	ND	U	0.21	5	ND	U	0.22	5	ND	U	0.19	5	ND	U	2.1	10	ND	U	0.36	5
Chrysene	218-01-9	0.19	230	11000	230	mg/kg	ND	U	0.2	5	0.43	J	0.21	5	0.79	J	0.22	5	0.65	J	0.19	5	ND	U	2.1	10	ND	U	0.36	5
Dibenz(A,H)Anthracene	53-70-3	0.036	160	11	11	mg/kg	ND	U	0.2	5	ND	U	0.21	5	ND	U	0.22	5	ND	U	0.19	5	ND	U	2.1	10	ND	U	0.36	5
Dibenzofuran	132-64-9	10	260	2800	260	mg/kg	ND	U	0.2	5	ND	U	0.21	5	ND	U	0.22	5	ND	U	0.19	5	ND	U	2.1	10	ND	U	0.36	5
Diethyl Phthalate	84-66-2	8200	2600	10000	8200	mg/kg	ND	U	0.39	5	ND	U	0.42	5	ND	U	0.45	5	ND	U	0.39	5	ND	U	4.1	10	ND	U	0.72	5
Dimethyl Phthalate	131-11-3	0.5	NS	100	0.5	mg/kg	ND	U	0.39	5	ND	U	0.42	5	ND	U	0.45	5	ND	U	0.39	5	ND	U	**4.1**	10	ND	U	**0.72**	5
Di-N-Butyl Phthalate	84-74-2	1000	4100	10000	4100	mg/kg	ND	U	0.39	5	ND	U	0.42	5	ND	U	0.45	5	ND	U	0.39	5	ND	U	4.1	10	ND	U	0.72	5
Di-N-Octylphthalate	117-84-0	300	10000	10000	10000	mg/kg	ND	U	0.39	5	ND	U	0.42	5	ND	U	0.45	5	ND	U	0.39	5	ND	U	4.1	10	ND	U	0.72	5
Fluoranthene	206-44-0	26	3200	110000	3200	mg/kg	ND	U	0.2	5	0.51	J	0.21	5	ND	U	0.22	5	1.1		0.19	5	ND	U	2.1	10	ND	U	0.36	5

Table 5
Summary of Shallow Soil Sample Analytical Results for CAMU Delineation Samples
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (0 - 2 ft bgs)	PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500)	Location ID	BH-10-43				BH-10-48				BH-10-51				BH-10-52				BH-10-57				BH-10-58			
						Sample ID	BH-10-43_0-2'				BH-10-48_0-2'				BH-10-51_0-2'				BH-10-52_0-2'				BH-10-57_0-2'				BH-10-58_0-2'			
						Sample Date	4/14/2011				4/14/2011				4/14/2011				4/14/2011				4/21/2011				4/14/2011			
						Sample Matrix	Soil				Soil				Soil				Soil				Soil				Soil			
						Sample Interval	0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs			
						Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Fluorene	86-73-7	190	3800	110000	3800	mg/kg	ND	U	0.2	5	ND	U	0.21	5	ND	U	0.22	5	ND	U	0.19	5	ND	U	2.1	10	ND	U	0.36	5
Hexachlorobenzene	118-74-1	0.1	0.96	50	0.96	mg/kg	ND	U	0.2	5	ND	U	0.21	5	ND	U	0.22	5	ND	U	0.19	5	ND	U	**2.1**	10	ND	U	0.36	5
Hexachlorobutadiene	87-68-3	3.3	39	1000	39	mg/kg	ND	U	0.39	5	ND	U	0.42	5	ND	U	0.45	5	ND	U	0.39	5	ND	U	4.1	10	ND	U	0.72	5
Hexachlorocyclopentadiene	77-47-4	5	91	10000	91	mg/kg	ND	U	0.98	5	ND	U	1	5	ND	U	1.1	5	ND	U	0.97	5	ND	U	10	10	ND	U	1.8	5
Hexachloroethane	67-72-1	0.1	0.56	550	0.56	mg/kg	ND	U	0.2	5	ND	U	0.21	5	ND	U	0.22	5	ND	U	0.19	5	ND	U	**2.1**	10	ND	U	0.36	5
Indeno[1,2,3-cd]pyrene	193-39-5	0.36	28000	110	110	mg/kg	ND	U	0.2	5	0.31	J	0.21	5	ND	U	0.22	5	0.35	J	0.19	5	ND	U	2.1	10	ND	U	0.36	5
Isophorone	78-59-1	10	1.9	10000	10	mg/kg	ND	U	0.2	5	ND	U	0.21	5	ND	U	0.22	5	ND	U	0.19	5	ND	U	2.1	10	ND	U	0.36	5
Naphthalene	91-20-3	10	25	56000	25	mg/kg	ND	U	0.2	5	0.23	J	0.21	5	0.24	J	0.22	5	ND	U	0.19	5	5.7	J	2.1	10	0.4	J	0.36	5
Nitrobenzene	98-95-3	20	8.7	5600	20	mg/kg	ND	U	0.2	5	ND	U	0.21	5	ND	U	0.22	5	ND	U	0.19	5	ND	U	2.1	10	ND	U	0.36	5
N-Nitrosodi-N-Propylamine	621-64-7	0.037	0.0051	11	0.037	mg/kg	ND	U	**0.2**	5	ND	U	**0.21**	5	ND	U	**0.22**	5	ND	U	**0.19**	5	ND	U	**2.1**	10	ND	U	**0.36**	5
N-Nitrosodiphenylamine	86-30-6	53	83	16000	83	mg/kg	ND	U	0.2	5	ND	U	0.21	5	ND	U	0.22	5	ND	U	0.19	5	ND	U	2.1	10	ND	U	0.36	5
Pentachlorophenol	87-86-5	0.1	5	660	5	mg/kg	ND	U	0.98	5	ND	U	1	5	ND	U	1.1	5	ND	U	0.97	5	ND	U	**10**	10	ND	U	1.8	5
Phenanthrene	85-01-8	110	10000	190000	10000	mg/kg	ND	U	0.2	5	0.42	J	0.21	5	0.68	J	0.22	5	1.1		0.19	5	ND	U	2.1	10	ND	U	0.36	5
Phenol	108-95-2	200	33	190000	200	mg/kg	ND	U	0.2	5	ND	U	0.21	5	ND	U	0.22	5	ND	U	0.19	5	ND	U	2.1	10	ND	U	0.36	5
Pyrene	129-00-0	13	2200	84000	2200	mg/kg	ND	U	0.2	5	0.47	J	0.21	5	0.59	J	0.22	5	0.98		0.19	5	4	J	2.1	10	ND	U	0.36	5
Metals																														
Aluminum	7429-90-5	NS	NS	190000	190000	mg/kg	18800		5.79	1	22200		6.06	1	20100		6.76	1	12600		5.79	1	15100		6.14	1	24900		10.9	1
Antimony	7440-36-0	0.6	27	1100	27	mg/kg	ND	U	1.15	1	ND	U	1.21	1	13.5		1.34	1	ND	U	1.15	1	1.92	J	1.22	1	ND	U	2.17	1
Arsenic	7440-38-2	1	29	53	29	mg/kg	14.7		1.09	1	20		1.15	1	21.3		1.28	1	12.2		1.09	1	21.1		1.16	1	18.6		2.07	1
Barium	7440-39-3	200	8200	190000	8200	mg/kg	212		0.046	1	317		0.0482	1	271		0.0537	1	174		0.0461	1	188		0.0488	1	735		0.087	1
Beryllium	7440-41-7	0.4	320	5600	320	mg/kg	0.692		0.0782	1	0.857		0.082	1	0.767		0.0913	1	0.649		0.0783	1	0.742		0.083	1	0.724	J	0.148	1
Cadmium	7440-43-9	0.5	38	1400	38	mg/kg	ND	U	0.161	1	2.22		0.169	1	0.945		0.188	1	0.238	J	0.161	1	0.792		0.171	1	1.26		0.304	1
Calcium	7440-70-2	NS	NS	NS	NS	mg/kg	18100		7.05	1	93700		36.9	5	112000		41.2	5	9200		7.06	1	16200		7.48	1	48000		13.3	1
Chromium, Total	7440-47-3	NS	NS	NS	NS	mg/kg	56		0.679	1	250		0.711	1	1880		0.792	1	52		0.68	1	88.5		0.72	1	57.3		1.28	1
Cobalt	7440-48-4	3	140	840	140	mg/kg	8.32		0.219	1	8.12		0.229	1	10.2		0.255	1	7.07		0.219	1	8.42		0.232	1	11.3		0.413	1
Copper	7440-50-8	100	43000	100000	43000	mg/kg	98.2		0.253	1	187		0.265	1	246		0.295	1	79.3		0.253	1	131		0.269	1	363		0.478	1
Iron	7439-89-6	NS	NS	190000	190000	mg/kg	23000		5.42	1	42300		28.4	5	23400		6.33	1	19800		5.43	1	20100		5.75	1	28900		10.2	1
Lead	7439-92-1	0.5	450	1000	450	mg/kg	167		0.69	1	278		0.723	1	**1720**		4.03	5	**1480**		3.46	5	743		0.733	1	941		1.3	1
Magnesium	7439-95-4	NS	NS	NS	NS	mg/kg	6630		2.92	1	36900		3.06	1	43400		3.41	1	4510		2.93	1	6350		3.1	1	33200		5.52	1
Manganese	7439-96-5	30	2000	130000	2000	mg/kg	451		0.0897	1	2810		0.47	5	602		0.105	1	276		0.0899	1	596		0.0952	1	730		0.17	1
Mercury	7439-97-6	0.2	10	450	10	mg/kg	0.111	J	0.0033	1	0.0867	J	0.0035	1	1.52		0.0189	5	0.715		0.0034	1	0.607		0.0034	1	4.82		0.0295	5
Nickel	7440-02-0	10	650	56000	650	mg/kg	37.6		0.219	1	52		0.229	1	100		0.255	1	24.9		0.219	1	40.1		0.232	1	61.6		0.413	1
Potassium	7440-09-7	NS	NS	NS	NS	mg/kg	1430		20.7	1	1260		21.7	1	874		24.2	1	1520		20.7	1	1020		22	1	990		39.1	1
Selenium	7782-49-2	5	26	14000	26	mg/kg	ND	U	1.13	1	2.58		1.18	1	ND	U	1.32	1	ND	U	1.13	1	2.26	J	1.2	1	ND	U	2.13	1
Silver	7440-22-4	10	84	14000	84	mg/kg	ND	U	0.207	1	ND	U	0.217	1	ND	U	0.242	1	ND	U	0.207	1	0.226	J	0.22	1	0.58	J	0.391	1
Sodium	7440-23-5	NS	NS	NS	NS	mg/kg	130		42.9	1	748		45	1	323		50.1	1	107	J	43	1	177		45.5	1	212	J	81.1	1
Thallium	7440-28-0	0.2	14	200	14	mg/kg	ND	U	1.67	1	ND	U	1.75	1	ND	U	1.95	1	ND	U	1.67	1	ND	U	1.77	1	ND	U	3.15	1
Vanadium	7440-62-2	72	72000	20000	20000	mg/kg	84.8		0.219	1	233		0.229	1	259		0.255	1	51.6		0.219	1	91.7		0.232	1	100		0.413	1
Zinc	7440-66-6	200	12000	190000	12000	mg/kg	113		0.759	1	750		0.796	1	893		0.886	1	177		0.76	1	260		0.806	1	431		1.43	1
General Chemistry																														
Moisture, Percent	MOIST	NS	NS	NS	NS	%	15.6		0.5	1	21		0.5	1	27		0.5	1	14.9		0.5	1	19.7		0.5	1	54		0.5	1

Notes:
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard
All soil samples in this table are considered saturated soils.

Qualifiers:
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

Exceedance Summary:
10 - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Direct Contact Standard

Table 5
Summary of Shallow Soil Sample Analytical Results for CAMU Delineation Samples
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (0 - 2 ft bgs)	PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500)	Location ID	BH-10-65				BH-10-68				BH-10-75				BH-10-81				BH-10-82				BH-10-83			
						Sample ID	BH-10-65_0-2'				BH-10-68_0-2'				BH-10-75_0-2'				BH-10-81_0-2'				BH-10-82_0-2'				BH-10-83_0-2'			
						Sample Date	4/14/2011				4/14/2011				4/19/2011				4/21/2011				4/20/2011				4/21/2011			
						Sample Matrix	Soil				Soil				Soil				Soil				Soil				Soil			
						Sample Interval	0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs			
						Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Volatile Organic Compounds																														
1,1,1-Trichloroethane	71-55-6	20	7.2	10000	20	mg/kg	ND	U	0.001	1	ND	U	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98
1,1,2,2-Tetrachloroethane	79-34-5	0.03	0.0093	38	0.03	mg/kg	ND	U	0.001	1	ND	U	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	10000	10000	10000	10000	mg/kg	ND	U	0.003	1	ND	U	0.002	0.74	ND	U	0.002	0.82	ND	U	0.002	0.77	ND	U	0.002	0.77	ND	U	0.003	0.98
1,1,2-Trichloroethane	79-00-5	0.5	0.15	140	0.5	mg/kg	ND	U	0.001	1	ND	U	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98
1,1-Dichloroethane	75-34-3	16	3.9	1400	16	mg/kg	ND	U	0.001	1	ND	U	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98
1,1-Dichloroethene	75-35-4	0.7	0.19	10000	0.7	mg/kg	ND	U	0.001	1	ND	U	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98
1,2,4-Trichlorobenzene	120-82-1	7	27	10000	27	mg/kg	ND	U	0.001	1	ND	U	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98
1,2-Dibromo-3-Chloropropane	96-12-8	0.02	0.0092	0.37	0.02	mg/kg	ND	U	0.003	1	ND	U	0.002	0.74	ND	U	0.002	0.82	ND	U	0.002	0.77	ND	U	0.002	0.77	ND	U	0.003	0.98
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.005	0.0012	3.7	0.005	mg/kg	ND	U	0.001	1	ND	U	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98
1,2-Dichlorobenzene	95-50-1	60	59	10000	60	mg/kg	ND	U	0.001	1	ND	U	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98
1,2-Dichloroethane	107-06-2	0.5	0.1	86	0.5	mg/kg	ND	U	0.001	1	ND	U	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98
1,2-Dichloropropane	78-87-5	0.5	0.11	220	0.5	mg/kg	ND	U	0.001	1	ND	U	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98
1,3-Dichlorobenzene	541-73-1	60	61	8400	61	mg/kg	ND	U	0.001	1	ND	U	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98
1,4-Dichlorobenzene	106-46-7	7.5	10	200	10	mg/kg	ND	U	0.001	1	ND	U	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98
2-Hexanone	591-78-6	4.4	1.1	400	4.4	mg/kg	ND	U	0.004	1	ND	U	0.003	0.74	ND	U	0.003	0.82	ND	U	0.003	0.77	ND	U	0.004	0.77	ND	U	0.004	0.98
Acetone	67-64-1	9200	1000	10000	9200	mg/kg	0.36		0.01	1	0.087		0.006	0.74	0.099		0.007	0.82	0.033		0.006	0.77	0.32		0.008	0.77	0.26		0.009	0.98
Benzene	71-43-2	0.5	0.13	290	0.5	mg/kg	0.033		0.0007	1	0.003	J	0.0004	0.74	0.005		5E-04	0.82	0.0008	J	5E-04	0.77	0.001	J	6E-04	0.77	0.012		6E-04	0.98
Bromodichloromethane	75-27-4	8	2.7	60	8	mg/kg	ND	U	0.001	1	ND	U	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98
Bromoform	75-25-2	8	3.5	2000	8	mg/kg	ND	U	0.001	1	ND	U	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98
Bromomethane	74-83-9	1	0.54	400	1	mg/kg	ND	U	0.003	1	ND	U	0.002	0.74	ND	U	0.002	0.82	ND	U	0.002	0.77	ND	U	0.002	0.77	ND	U	0.003	0.98
Carbon Disulfide	75-15-0	620	530	10000	620	mg/kg	0.005	J	0.001	1	0.004	J	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	0.004	J	0.001	0.98
Carbon Tetrachloride	56-23-5	0.5	0.26	150	0.5	mg/kg	ND	U	0.001	1	ND	U	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98
Chlorobenzene	108-90-7	10	6.1	4000	10	mg/kg	ND	U	0.001	1	ND	U	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98
Chloroethane	75-00-3	90	19	10000	90	mg/kg	ND	U	0.003	1	ND	U	0.002	0.74	ND	U	0.002	0.82	ND	U	0.002	0.77	ND	U	0.002	0.77	ND	U	0.003	0.98
Chloroform	67-66-3	8	2	97	8	mg/kg	ND	U	0.001	1	ND	U	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98
Chloromethane	74-87-3	3	0.38	1200	3	mg/kg	ND	U	0.003	1	ND	U	0.002	0.74	ND	U	0.002	0.82	ND	U	0.002	0.77	ND	U	0.002	0.77	ND	U	0.003	0.98
Cis-1,2-Dichloroethylene	156-59-2	7	1.6	10000	7	mg/kg	ND	U	0.001	1	ND	U	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98
Cis-1,3-Dichloropropene	10061-01-5	NS	NS	NS	NS	mg/kg	ND	U	0.001	1	ND	U	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98
Cyclohexane	110-82-7	5300	6900	10000	6900	mg/kg	0.009		0.001	1	ND	U	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98
Dibromochloromethane	124-48-1	8	2.5	82	8	mg/kg	ND	U	0.001	1	ND	U	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98
Dichlorodifluoromethane	75-71-8	100	100	10000	100	mg/kg	ND	U	0.003	1	ND	U	0.002	0.74	ND	U	0.002	0.82	ND	U	0.002	0.77	ND	U	0.002	0.77	ND	U	0.003	0.98
Dimethyl Benzene/ Xylenes, Total	1330-20-7	1000	990	8000	1000	mg/kg	0.012		0.001	1	ND	U	0.0009	0.74	0.002	J	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	0.002	J	0.001	0.98
Ethylbenzene	100-41-4	70	46	10000	70	mg/kg	0.002	J	0.001	1	ND	U	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98
Isopropylbenzene (Cumene)	98-82-8	350	2500	10000	2500	mg/kg	0.002	J	0.001	1	ND	U	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98
Methyl Acetate	79-20-9	10000	1900	10000	10000	mg/kg	ND	U	0.003	1	ND	U	0.002	0.74	ND	U	0.002	0.82	ND	U	0.002	0.77	ND	U	0.002	0.77	ND	U	0.003	0.98
Methyl Ethyl Ketone (2-Butanone)	78-93-3	400	76	10000	400	mg/kg	0.048		0.006	1	0.009		0.004	0.74	0.015		0.004	0.82	ND	U	0.004	0.77	0.013		0.005	0.77	0.027		0.005	0.98
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	820	130	10000	820	mg/kg	ND	U	0.004	1	ND	U	0.003	0.74	ND	U	0.003	0.82	ND	U	0.003	0.77	ND	U	0.004	0.77	ND	U	0.004	0.98
Methylcyclohexane	108-87-2	NS	NS	NS	NS	mg/kg	0.028		0.001	1	0.002	J	0.0009	0.74	0.004	J	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98
Methylene Chloride	75-09-2	0.5	0.076	4700	0.5	mg/kg	ND	U	0.003	1	ND	U	0.002	0.74	ND	U	0.002	0.82	ND	U	0.002	0.77	ND	U	0.002	0.77	ND	U	0.003	0.98
Styrene	100-42-5	10	24	10000	24	mg/kg	ND	U	0.001	1	ND	U	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98
Tert-Butyl Methyl Ether	1634-04-4	2	0.28	3200	2	mg/kg	ND	U	0.0007	1	ND	U	0.0004	0.74	ND	U	5E-04	0.82	ND	U	5E-04	0.77	ND	U	6E-04	0.77	ND	U	6E-04	0.98
Tetrachloroethylene(PCE)	127-18-4	0.5	0.43	1500	0.5	mg/kg	ND	U	0.001	1	ND	U	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98
Toluene	108-88-3	100	44	10000	100	mg/kg	0.008		0.001	1	ND	U	0.0009	0.74	0.003	J	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	0.009		0.001	0.98
Trans-1,2-Dichloroethene	156-60-5	10	2.3	4800	10	mg/kg	ND	U	0.001	1	ND	U	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98
Trans-1,3-Dichloropropene	10061-02-6	NS	NS	NS	NS	mg/kg	ND	U	0.001	1	ND	U	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98
Trichloroethylene (TCE)	79-01-6	0.5	0.17	1300	0.5	mg/kg	ND	U	0.001	1	ND	U	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98
Trichlorofluoromethane	75-69-4	200	87	10000	200	mg/kg	ND	U	0.003	1	ND	U	0.002	0.74	ND	U	0.002	0.82	ND	U	0.002	0.77	ND	U	0.002	0.77	ND	U	0.003	0.98
Vinyl Chloride	75-01-4	0.2	0.027	110	0.2	mg/kg	ND	U	0.001	1	ND	U	0.0009	0.74	ND	U	9E-04	0.82	ND	U	9E-04	0.77	ND	U	0.001	0.77	ND	U	0.001	0.98

Table 5
Summary of Shallow Soil Sample Analytical Results for CAMU Delineation Samples
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (0 - 2 ft bgs)	PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500)	Location ID	BH-10-65				BH-10-68				BH-10-75				BH-10-81				BH-10-82				BH-10-83			
						Sample ID	BH-10-65_0-2'				BH-10-68_0-2'				BH-10-75_0-2'				BH-10-81_0-2'				BH-10-82_0-2'				BH-10-83_0-2'			
						Sample Date	4/14/2011				4/14/2011				4/19/2011				4/21/2011				4/20/2011				4/21/2011			
						Sample Matrix	Soil				Soil				Soil				Soil				Soil				Soil			
						Sample Interval	0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs			
						Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Semi-Volatile Organic Compounds																														
2,4,5-Trichlorophenol	95-95-4	1000	6100	190000	6100	mg/kg	ND	U	0.45	5	ND	U	0.39	5	ND	U	0.077	1	ND	U	0.08	1	ND	U	0.1	1	ND	U	0.086	1
2,4,6-Trichlorophenol	88-06-2	10	29	2800	29	mg/kg	ND	U	0.23	5	ND	U	0.2	5	ND	U	0.038	1	ND	U	0.04	1	ND	U	0.05	1	ND	U	0.043	1
2,4-Dichlorophenol	120-83-2	2	1	8400	2	mg/kg	ND	U	0.23	5	ND	U	0.2	5	ND	U	0.038	1	ND	U	0.04	1	ND	U	0.05	1	ND	U	0.043	1
2,4-Dimethylphenol	105-67-9	200	87	10000	200	mg/kg	ND	U	0.45	5	ND	U	0.39	5	ND	U	0.077	1	ND	U	0.08	1	ND	U	0.1	1	ND	U	0.086	1
2,4-Dinitrophenol	51-28-5	20	2.3	5600	20	mg/kg	ND	U	2.3	5	ND	U	2	5	ND	U	0.38	1	ND	U	0.4	1	ND	U	0.5	1	ND	U	0.43	1
2,4-Dinitrotoluene	121-14-2	0.84	0.2	260	0.84	mg/kg	ND	U	0.45	5	ND	U	0.39	5	ND	U	0.077	1	ND	U	0.08	1	ND	U	0.1	1	ND	U	0.086	1
2,6-Dinitrotoluene	606-20-2	10	3	2800	10	mg/kg	ND	U	0.23	5	ND	U	0.2	5	ND	U	0.038	1	ND	U	0.04	1	ND	U	0.05	1	ND	U	0.043	1
2-Chloronaphthalene	91-58-7	820	18000	190000	18000	mg/kg	ND	U	0.23	5	ND	U	0.2	5	ND	U	0.038	1	ND	U	0.04	1	ND	U	0.05	1	ND	U	0.043	1
2-Chlorophenol	95-57-8	4	4.4	10000	4.4	mg/kg	ND	U	0.23	5	ND	U	0.2	5	ND	U	0.038	1	ND	U	0.04	1	ND	U	0.05	1	ND	U	0.043	1
2-Methylnaphthalene	91-57-6	41	1600	11000	1600	mg/kg	0.41	J	0.23	5	ND	U	0.2	5	0.26		0.038	1	0.51		0.04	1	0.15	J	0.05	1	0.2	J	0.043	1
2-Methylphenol (O-Cresol)	95-48-7	510	85	140000	510	mg/kg	ND	U	0.45	5	ND	U	0.39	5	ND	U	0.077	1	ND	U	0.08	1	ND	U	0.1	1	ND	U	0.086	1
2-Nitroaniline	88-74-4	31	5.5	8400	31	mg/kg	ND	U	0.23	5	ND	U	0.2	5	ND	U	0.038	1	ND	U	0.04	1	ND	U	0.05	1	ND	U	0.043	1
2-Nitrophenol	88-75-5	82	17	22000	82	mg/kg	ND	U	0.23	5	ND	U	0.2	5	ND	U	0.038	1	ND	U	0.04	1	ND	U	0.05	1	ND	U	0.043	1
3,3'-Dichlorobenzidine	91-94-1	0.58	32	180	32	mg/kg	ND	U	0.68	5	ND	U	0.59	5	ND	U	0.11	1	ND	U	0.12	1	ND	U	0.15	1	ND	U	0.13	1
3-Nitroaniline	99-09-2	3.1	0.48	840	3.1	mg/kg	ND	U	0.45	5	ND	U	0.39	5	ND	U	0.077	1	ND	U	0.08	1	ND	U	0.1	1	ND	U	0.086	1
4,6-Dinitro-2-Methylphenol	534-52-1	1	0.75	280	1	mg/kg	ND	U	**1.1**	5	ND	U	0.98	5	ND	U	0.19	1	ND	U	0.2	1	ND	U	0.25	1	ND	U	0.22	1
4-Bromophenyl Phenyl Ether	101-55-3	0.5	NS	100	0.5	mg/kg	ND	U	0.23	5	ND	U	0.2	5	ND	U	0.038	1	ND	U	0.04	1	ND	U	0.05	1	ND	U	0.043	1
4-Chloro-3-Methylphenol	59-50-7	51	110	14000	110	mg/kg	ND	U	0.45	5	ND	U	0.39	5	ND	U	0.077	1	ND	U	0.08	1	ND	U	0.1	1	ND	U	0.086	1
4-Chloroaniline	106-47-8	1.3	1.6	400	1.6	mg/kg	ND	U	0.45	5	ND	U	0.39	5	ND	U	0.077	1	ND	U	0.08	1	ND	U	0.1	1	ND	U	0.086	1
4-Chlorophenyl Phenyl Ether	7005-72-3	0.5	NS	100	0.5	mg/kg	ND	U	0.23	5	ND	U	0.2	5	ND	U	0.038	1	ND	U	0.04	1	ND	U	0.05	1	ND	U	0.043	1
4-Methylphenol (P-Cresol)	106-44-5	51	12	14000	51	mg/kg	ND	U	0.45	5	ND	U	0.39	5	ND	U	0.077	1	ND	U	0.08	1	ND	U	0.1	1	ND	U	0.086	1
4-Nitroaniline	100-01-6	13	1.9	4000	13	mg/kg	ND	U	0.45	5	ND	U	0.39	5	ND	U	0.077	1	ND	U	0.08	1	ND	U	0.1	1	ND	U	0.086	1
4-Nitrophenol	100-02-7	6	4.1	22000	6	mg/kg	ND	U	1.1	5	ND	U	0.98	5	ND	U	0.19	1	ND	U	0.2	1	ND	U	0.25	1	ND	U	0.22	1
Acenaphthene	83-32-9	380	4700	170000	4700	mg/kg	ND	U	0.23	5	ND	U	0.2	5	0.36		0.038	1	0.083	J	0.04	1	0.25		0.05	1	0.093	J	0.043	1
Acenaphthylene	208-96-8	610	6900	170000	6900	mg/kg	ND	U	0.23	5	ND	U	0.2	5	0.31		0.038	1	0.064	J	0.04	1	0.096	J	0.05	1	0.077	J	0.043	1
Acetophenone	98-86-2	1000	540	10000	1000	mg/kg	ND	U	0.45	5	ND	U	0.39	5	ND	U	0.077	1	ND	U	0.08	1	ND	U	0.1	1	ND	U	0.086	1
Anthracene	120-12-7	6.6	350	190000	350	mg/kg	ND	U	0.23	5	ND	U	0.2	5	1.2		0.038	1	0.39		0.04	1	0.74		0.05	1	0.27		0.043	1
Atrazine	1912-24-9	0.3	0.13	340	0.3	mg/kg	ND	U	0.23	5	ND	U	0.2	5	ND	U	0.038	1	ND	U	0.04	1	ND	U	0.05	1	ND	U	0.043	1
Benzaldehyde	100-52-7	NS	NS	NS	NS	mg/kg	ND	U	0.45	5	ND	U	0.39	5	ND	U	0.077	1	ND	U	0.08	1	ND	U	0.1	1	ND	U	0.086	1
Benzo(A)Anthracene	56-55-3	0.36	320	110	110	mg/kg	ND	U	0.23	5	ND	U	0.2	5	3.8		0.038	1	1.9		0.04	1	1.3		0.05	1	0.73		0.043	1
Benzo(A)Pyrene	50-32-8	0.02	46	11	11	mg/kg	ND	U	0.23	5	ND	U	0.2	5	2.8		0.038	1	2.7		0.04	1	0.96		0.05	1	0.68		0.043	1
Benzo(B)Fluoranthene	205-99-2	0.12	170	110	110	mg/kg	ND	U	0.23	5	ND	U	0.2	5	3.6		0.038	1	2.5		0.04	1	1.1		0.05	1	0.89		0.043	1
Benzo(G,H,I)Perylene	191-24-2	0.026	180	170000	180	mg/kg	ND	U	0.23	5	ND	U	0.2	5	1.9		0.038	1	3.1		0.04	1	0.54		0.05	1	0.59		0.043	1
Benzo(K)Fluoranthene	207-08-9	0.055	610	1100	610	mg/kg	ND	U	0.23	5	ND	U	0.2	5	2.1		0.038	1	0.84		0.04	1	0.63		0.05	1	0.37		0.043	1
Benzyl Butyl Phthalate	85-68-7	140	10000	10000	10000	mg/kg	ND	U	0.45	5	ND	U	0.39	5	ND	U	0.077	1	ND	U	0.08	1	ND	U	0.1	1	0.74		0.086	1
Biphenyl (Diphenyl)	92-52-4	510	2200	140000	2200	mg/kg	ND	U	0.23	5	ND	U	0.2	5	0.056	J	0.038	1	0.075	J	0.04	1	ND	U	0.05	1	ND	U	0.043	1
Bis(2-Chloroethoxy) Methane	111-91-1	31	8.2	8400	31	mg/kg	ND	U	0.23	5	ND	U	0.2	5	ND	U	0.038	1	ND	U	0.04	1	ND	U	0.05	1	ND	U	0.043	1
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	0.076	0.023	6.7	0.076	mg/kg	ND	U	**0.23**	5	ND	U	**0.2**	5	ND	U	0.038	1	ND	U	0.04	1	ND	U	0.05	1	ND	U	0.043	1
Bis(2-Chloroisopropyl) Ether	108-60-1	30	8	220	30	mg/kg	ND	U	0.23	5	ND	U	0.2	5	ND	U	0.038	1	ND	U	0.04	1	ND	U	0.05	1	ND	U	0.043	1
Bis(2-Ethylhexyl) Phthalate	117-81-7	0.6	130	5700	130	mg/kg	ND	U	0.45	5	ND	U	0.39	5	0.11	J	0.077	1	0.4		0.08	1	0.1	J	0.1	1	1		0.086	1
Caprolactam	105-60-2	NS	NS	NS	NS	mg/kg	ND	U	0.23	5	ND	U	0.2	5	ND	U	0.038	1	ND	U	0.04	1	ND	U	0.05	1	ND	U	0.043	1
Carbazole	86-74-8	13	83	4000	83	mg/kg	ND	U	0.23	5	ND	U	0.2	5	0.6		0.038	1	0.12	J	0.04	1	0.27		0.05	1	0.12	J	0.043	1
Chrysene	218-01-9	0.19	230	11000	230	mg/kg	ND	U	0.23	5	ND	U	0.2	5	3.5		0.038	1	2.4		0.04	1	1.2		0.05	1	0.84		0.043	1
Dibenz(A,H)Anthracene	53-70-3	0.036	160	11	11	mg/kg	ND	U	0.23	5	ND	U	0.2	5	0.64		0.038	1	2.2		0.04	1	0.19	J	0.05	1	0.19	J	0.043	1
Dibenzofuran	132-64-9	10	260	2800	260	mg/kg	ND	U	0.23	5	ND	U	0.2	5	0.34		0.038	1	0.11	J	0.04	1	0.21	J	0.05	1	0.085	J	0.043	1
Diethyl Phthalate	84-66-2	8200	2600	10000	8200	mg/kg	ND	U	0.45	5	ND	U	0.39	5	ND	U	0.077	1	ND	U	0.08	1	ND	U	0.1	1	ND	U	0.086	1
Dimethyl Phthalate	131-11-3	0.5	NS	100	0.5	mg/kg	ND	U	0.45	5	ND	U	0.39	5	ND	U	0.077	1	ND	U	0.08	1	ND	U	0.1	1	ND	U	0.086	1
Di-N-Butyl Phthalate	84-74-2	1000	4100	10000	4100	mg/kg	ND	U	0.45	5	ND	U	0.39	5	ND	U	0.077	1	ND	U	0.08	1	ND	U	0.1	1	0.3		0.086	1
Di-N-Octylphthalate	117-84-0	300	10000	10000	10000	mg/kg	ND	U	0.45	5	ND	U	0.39	5	ND	U	0.077	1	ND	U	0.08	1	ND	U	0.1	1	ND	U	0.086	1
Fluoranthene	206-44-0	26	3200	110000	3200	mg/kg	ND	U	0.23	5	ND	U	0.2	5	6.6		0.077	2	1.7		0.04	1	1.9		0.05	1	1.2		0.043	1

Table 5
Summary of Shallow Soil Sample Analytical Results for CAMU Delineation Samples
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (0 - 2 ft bgs)	PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500)	Location ID	BH-10-65				BH-10-68				BH-10-75				BH-10-81				BH-10-82				BH-10-83			
						Sample ID	BH-10-65_0-2'				BH-10-68_0-2'				BH-10-75_0-2'				BH-10-81_0-2'				BH-10-82_0-2'				BH-10-83_0-2'			
						Sample Date	4/14/2011				4/14/2011				4/19/2011				4/21/2011				4/20/2011				4/21/2011			
						Sample Matrix	Soil				Soil				Soil				Soil				Soil				Soil			
						Sample Interval	0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs			
						Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Fluorene	86-73-7	190	3800	110000	3800	mg/kg	ND	U	0.23	5	ND	U	0.2	5	0.34		0.038	1	0.1	J	0.04	1	0.28		0.05	1	0.094	J	0.043	1
Hexachlorobenzene	118-74-1	0.1	0.96	50	0.96	mg/kg	ND	U	0.23	5	ND	U	0.2	5	ND	U	0.038	1	ND	U	0.04	1	ND	U	0.05	1	ND	U	0.043	1
Hexachlorobutadiene	87-68-3	3.3	39	1000	39	mg/kg	ND	U	0.45	5	ND	U	0.39	5	ND	U	0.077	1	ND	U	0.08	1	ND	U	0.1	1	ND	U	0.086	1
Hexachlorocyclopentadiene	77-47-4	5	91	10000	91	mg/kg	ND	U	1.1	5	ND	U	0.98	5	ND	U	0.19	1	ND	U	0.2	1	ND	U	0.25	1	ND	U	0.22	1
Hexachloroethane	67-72-1	0.1	0.56	550	0.56	mg/kg	ND	U	0.23	5	ND	U	0.2	5	ND	U	0.038	1	ND	U	0.04	1	ND	U	0.05	1	ND	U	0.043	1
Indeno[1,2,3-cd]pyrene	193-39-5	0.36	28000	110	110	mg/kg	ND	U	0.23	5	ND	U	0.2	5	1.8		0.038	1	1.9		0.04	1	0.55		0.05	1	0.44		0.043	1
Isophorone	78-59-1	10	1.9	10000	10	mg/kg	ND	U	0.23	5	ND	U	0.2	5	ND	U	0.038	1	ND	U	0.04	1	ND	U	0.05	1	ND	U	0.043	1
Naphthalene	91-20-3	10	25	56000	25	mg/kg	ND	U	0.23	5	ND	U	0.2	5	0.29		0.038	1	0.36		0.04	1	0.16	J	0.05	1	0.16	J	0.043	1
Nitrobenzene	98-95-3	20	8.7	5600	20	mg/kg	ND	U	0.23	5	ND	U	0.2	5	ND	U	0.038	1	ND	U	0.04	1	ND	U	0.05	1	ND	U	0.043	1
N-Nitrosodi-N-Propylamine	621-64-7	0.037	0.0051	11	0.037	mg/kg	ND	U	**0.23**	5	ND	U	**0.2**	5	ND	U	**0.038**	1	ND	U	**0.04**	1	ND	U	**0.05**	1	ND	U	**0.043**	1
N-Nitrosodiphenylamine	86-30-6	53	83	16000	83	mg/kg	ND	U	0.23	5	ND	U	0.2	5	ND	U	0.038	1	ND	U	0.04	1	ND	U	0.05	1	ND	U	0.043	1
Pentachlorophenol	87-86-5	0.1	5	660	5	mg/kg	ND	U	1.1	5	ND	U	0.98	5	ND	U	0.19	1	ND	U	0.2	1	ND	U	0.25	1	ND	U	0.22	1
Phenanthrene	85-01-8	110	10000	190000	10000	mg/kg	ND	U	0.23	5	ND	U	0.2	5	4.8		0.077	2	1.6		0.04	1	2.5		0.05	1	1		0.043	1
Phenol	108-95-2	200	33	190000	200	mg/kg	ND	U	0.23	5	1.3		0.2	5	ND	U	0.038	1	ND	U	0.04	1	ND	U	0.05	1	ND	U	0.043	1
Pyrene	129-00-0	13	2200	84000	2200	mg/kg	ND	U	0.23	5	ND	U	0.2	5	5.4		0.077	2	2		0.04	1	2.5		0.05	1	1.1		0.043	1
Metals																														
Aluminum	7429-90-5	NS	NS	190000	190000	mg/kg	13100		6.92	1	22600		5.7	1	15700		5.68	1	10100		29.6	5	26300		7.56	1	17200		6.41	1
Antimony	7440-36-0	0.6	27	1100	27	mg/kg	ND	U	1.38	1	ND	U	1.13	1	1.47	J	1.13	1	ND	U	5.88	5	ND	U	1.5	1	ND	U	1.27	1
Arsenic	7440-38-2	1	29	53	29	mg/kg	8.71		1.31	1	7.99		1.08	1	**61.3**		1.07	1	38.9		5.58	5	17		1.43	1	13.7		1.21	1
Barium	7440-39-3	200	8200	190000	8200	mg/kg	170		0.055	1	135		0.0454	1	147		0.045	1	122		0.047	1	261		0.06	1	272		0.051	1
Beryllium	7440-41-7	0.4	320	5600	320	mg/kg	0.503	J	0.0935	1	1.11		0.0771	1	0.856		0.077	1	0.698		0.08	1	1.1		0.102	1	0.797		0.087	1
Cadmium	7440-43-9	0.5	38	1400	38	mg/kg	0.403	J	0.193	1	ND	U	0.159	1	0.418	J	0.158	1	ND	U	0.823	5	ND	U	0.21	1	3.98		0.178	1
Calcium	7440-70-2	NS	NS	NS	NS	mg/kg	20200		8.43	1	25900		6.95	1	9930		6.92	1	6520		7.21	1	21500		9.21	1	15800		7.82	1
Chromium, Total	7440-47-3	NS	NS	NS	NS	mg/kg	27		0.812	1	142		0.669	1	45.5		0.666	1	54.8		3.47	5	117		0.886	1	86.9		0.752	1
Cobalt	7440-48-4	3	140	840	140	mg/kg	5.34		0.261	1	9		0.215	1	8.16		0.215	1	13.1		1.12	5	11		0.285	1	9.93		0.242	1
Copper	7440-50-8	100	43000	100000	43000	mg/kg	86.7		0.303	1	41.2		0.249	1	61.8		0.248	1	94.2		1.29	5	122		0.331	1	212		0.28	1
Iron	7439-89-6	NS	NS	190000	190000	mg/kg	14900		6.48	1	30000		5.34	1	26000		5.32	1	68100		27.7	5	47200		35.4	5	28400		6	1
Lead	7439-92-1	0.5	450	1000	450	mg/kg	307		0.825	1	94.2		0.68	1	192		0.678	1	242		3.53	5	584		0.901	1	402		0.765	1
Magnesium	7439-95-4	NS	NS	NS	NS	mg/kg	11200		3.49	1	13800		2.88	1	3960		2.87	1	3040		2.99	1	7070		3.82	1	7310		3.24	1
Manganese	7439-96-5	30	2000	130000	2000	mg/kg	382		0.107	1	777		0.0884	1	464		0.088	1	539		0.092	1	576		0.117	1	384		0.099	1
Mercury	7439-97-6	0.2	10	450	10	mg/kg	0.648		0.0038	1	0.335		0.0032	1	0.182		0.003	1	0.373		0.003	1	0.215		0.004	1	0.387		0.004	1
Nickel	7440-02-0	10	650	56000	650	mg/kg	24.1		0.261	1	30.2		0.215	1	25.3		0.215	1	37.2		1.12	5	41.6		0.285	1	44.8		0.242	1
Potassium	7440-09-7	NS	NS	NS	NS	mg/kg	836		24.8	1	1050		20.4	1	1630		20.3	1	1690		106	5	2020		27	1	1820		22.9	1
Selenium	7782-49-2	5	26	14000	26	mg/kg	ND	U	1.35	1	ND	U	1.11	1	ND	U	1.11	1	ND	U	5.76	5	ND	U	7.36	5	1.68	J	1.25	1
Silver	7440-22-4	10	84	14000	84	mg/kg	ND	U	0.248	1	ND	U	0.204	1	ND	U	0.203	1	ND	U	1.06	5	ND	U	0.27	1	ND	U	0.229	1
Sodium	7440-23-5	NS	NS	NS	NS	mg/kg	99.3	J	51.3	1	88.4	J	42.3	1	292		42.1	1	138		43.8	1	105	J	56	1	160		47.6	1
Thallium	7440-28-0	0.2	14	200	14	mg/kg	ND	U	1.99	1	ND	U	1.64	1	2.02	J	1.64	1	ND	U	8.52	5	ND	U	10.9	5	ND	U	1.85	1
Vanadium	7440-62-2	72	72000	20000	20000	mg/kg	48.8		0.261	1	60.8		0.215	1	62.9		0.215	1	63.1		1.12	5	106		0.285	1	65.3		0.242	1
Zinc	7440-66-6	200	12000	190000	12000	mg/kg	181		0.908	1	115		0.748	1	189		0.745	1	141		3.88	5	271		0.992	1	369		0.841	1
General Chemistry																														
Moisture, Percent	MOIST	NS	NS	NS	NS	%	27.3		0.5	1	16		0.5	1	13.2		0.5	1	16.6		0.5	1	34.1		0.5	1	23.1		0.5	1

Notes:
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard
All soil samples in this table are considered saturated soils.

Qualifiers:
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

Exceedance Summary:
10 - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Direct Contact Standard

Table 6
Summary of Shallow Soil Sample Analytical Results:
CAMU Area Soil Samples
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (0 - 2 ft bgs)	PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500)	Location ID	BH-10-44				BH-10-45				BH-10-46				BH-10-55				BH-10-56				BH-10-63			
						Sample ID	BH-10-44-WC_0-2'				BH-10-45-WC_0-2'				BH-10-46-WC_0-2'				BH-10-55-WC_0-2'				BH-10-56-WC_0-2'				BH-10-63-WC_0-2'			
						Sample Date	4/12/2011				4/12/2011				4/12/2011				4/12/2011				4/12/2011				4/13/2011			
						Sample Matrix	Soil				Soil				Soil				Soil				Soil				Soil			
						Sample Interval	0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs			
						Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Volatile Organic Compounds																														
1,1,1-Trichloroethane	71-55-6	20	7.2	10000	20	mg/kg	ND	U	0.054	44.95	ND	U	0.001	0.86	ND	U	8E-04	0.68	ND	U	0.001	0.98	ND	U	0.001	1.02	ND	U	9E-04	0.75
1,1,2,2-Tetrachloroethane	79-34-5	0.03	0.0093	38	0.03	mg/kg	ND	U	**0.054**	44.95	ND	U	0.001	0.86	ND	U	8E-04	0.68	ND	U	0.001	0.98	ND	U	0.001	1.02	ND	U	9E-04	0.75
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	10000	10000	10000	10000	mg/kg	ND	U	0.11	44.95	ND	U	0.002	0.86	ND	U	0.002	0.68	ND	U	0.003	0.98	ND	U	0.002	1.02	ND	U	0.002	0.75
1,1,2-Trichloroethane	79-00-5	0.5	0.15	140	0.5	mg/kg	ND	U	0.054	44.95	ND	U	0.001	0.86	ND	U	8E-04	0.68	ND	U	0.001	0.98	ND	U	0.001	1.02	ND	U	9E-04	0.75
1,1-Dichloroethane	75-34-3	16	3.9	1400	16	mg/kg	ND	U	0.054	44.95	ND	U	0.001	0.86	ND	U	8E-04	0.68	ND	U	0.001	0.98	ND	U	0.001	1.02	ND	U	9E-04	0.75
1,1-Dichloroethene	75-35-4	0.7	0.19	10000	0.7	mg/kg	ND	U	0.054	44.95	ND	U	0.001	0.86	ND	U	8E-04	0.68	ND	U	0.001	0.98	ND	U	0.001	1.02	ND	U	9E-04	0.75
1,2,4-Trichlorobenzene	120-82-1	7	27	10000	27	mg/kg	ND	U	0.054	44.95	ND	U	0.001	0.86	ND	U	8E-04	0.68	ND	U	0.001	0.98	ND	U	0.001	1.02	ND	U	9E-04	0.75
1,2-Dibromo-3-Chloropropane	96-12-8	0.02	0.0092	0.37	0.02	mg/kg	ND	U	**0.11**	44.95	ND	U	0.002	0.86	ND	U	0.002	0.68	ND	U	0.003	0.98	ND	U	0.002	1.02	ND	U	0.002	0.75
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.005	0.0012	3.7	0.005	mg/kg	ND	U	**0.054**	44.95	ND	U	0.001	0.86	ND	U	8E-04	0.68	ND	U	0.001	0.98	ND	U	0.001	1.02	ND	U	9E-04	0.75
1,2-Dichlorobenzene	95-50-1	60	59	10000	60	mg/kg	ND	U	0.054	44.95	ND	U	0.001	0.86	ND	U	8E-04	0.68	ND	U	0.001	0.98	ND	U	0.001	1.02	ND	U	9E-04	0.75
1,2-Dichloroethane	107-06-2	0.5	0.1	86	0.5	mg/kg	ND	U	0.054	44.95	ND	U	0.001	0.86	ND	U	8E-04	0.68	ND	U	0.001	0.98	ND	U	0.001	1.02	ND	U	9E-04	0.75
1,2-Dichloropropane	78-87-5	0.5	0.11	220	0.5	mg/kg	ND	U	0.054	44.95	ND	U	0.001	0.86	ND	U	8E-04	0.68	ND	U	0.001	0.98	ND	U	0.001	1.02	ND	U	9E-04	0.75
1,3-Dichlorobenzene	541-73-1	60	61	8400	61	mg/kg	ND	U	0.054	44.95	ND	U	0.001	0.86	ND	U	8E-04	0.68	ND	U	0.001	0.98	ND	U	0.001	1.02	ND	U	9E-04	0.75
1,4-Dichlorobenzene	106-46-7	7.5	10	200	10	mg/kg	ND	U	0.054	44.95	ND	U	0.001	0.86	ND	U	8E-04	0.68	ND	U	0.001	0.98	ND	U	0.001	1.02	ND	U	9E-04	0.75
2-Hexanone	591-78-6	4.4	1.1	400	4.4	mg/kg	ND	U	0.16	44.95	ND	U	0.003	0.86	ND	U	0.002	0.68	ND	U	0.004	0.98	ND	U	0.004	1.02	ND	U	0.003	0.75
Acetone	67-64-1	9200	1000	10000	9200	mg/kg	ND	U	0.38	44.95	0.29		0.007	0.86	0.21		0.006	0.68	0.093		0.009	0.98	0.03		0.008	1.02	0.15		0.006	0.75
Benzene	71-43-2	0.5	0.13	290	0.5	mg/kg	0.033	J	0.027	44.95	0.019		5E-04	0.86	0.012		4E-04	0.68	0.035		6E-04	0.98	0.016		6E-04	1.02	0.006		4E-04	0.75
Bromodichloromethane	75-27-4	8	2.7	60	8	mg/kg	ND	U	0.054	44.95	ND	U	0.001	0.86	ND	U	8E-04	0.68	ND	U	0.001	0.98	ND	U	0.001	1.02	ND	U	9E-04	0.75
Bromoform	75-25-2	8	3.5	2000	8	mg/kg	ND	U	0.054	44.95	ND	U	0.001	0.86	ND	U	8E-04	0.68	ND	U	0.001	0.98	ND	U	0.001	1.02	ND	U	9E-04	0.75
Bromomethane	74-83-9	1	0.54	400	1	mg/kg	ND	U	0.11	44.95	ND	U	0.002	0.86	ND	U	0.002	0.68	ND	U	0.003	0.98	ND	U	0.002	1.02	ND	U	0.002	0.75
Carbon Disulfide	75-15-0	620	530	10000	620	mg/kg	ND	U	0.054	44.95	0.004	J	0.001	0.86	0.002	J	8E-04	0.68	0.004	J	0.001	0.98	0.002	J	0.001	1.02	ND	U	9E-04	0.75
Carbon Tetrachloride	56-23-5	0.5	0.26	150	0.5	mg/kg	ND	U	0.054	44.95	ND	U	0.001	0.86	ND	U	8E-04	0.68	ND	U	0.001	0.98	ND	U	0.001	1.02	ND	U	9E-04	0.75
Chlorobenzene	108-90-7	10	6.1	4000	10	mg/kg	ND	U	0.054	44.95	ND	U	0.001	0.86	ND	U	8E-04	0.68	ND	U	0.001	0.98	ND	U	0.001	1.02	ND	U	9E-04	0.75
Chloroethane	75-00-3	90	19	10000	90	mg/kg	ND	U	0.11	44.95	ND	U	0.002	0.86	ND	U	0.002	0.68	ND	U	0.003	0.98	ND	U	0.002	1.02	ND	U	0.002	0.75
Chloroform	67-66-3	8	2	97	8	mg/kg	ND	U	0.054	44.95	ND	U	0.001	0.86	ND	U	8E-04	0.68	ND	U	0.001	0.98	ND	U	0.001	1.02	ND	U	9E-04	0.75
Chloromethane	74-87-3	3	0.38	1200	3	mg/kg	ND	U	0.11	44.95	ND	U	0.002	0.86	ND	U	0.002	0.68	ND	U	0.003	0.98	ND	U	0.002	1.02	ND	U	0.002	0.75
Cis-1,2-Dichloroethylene	156-59-2	7	1.6	10000	7	mg/kg	ND	U	0.054	44.95	ND	U	0.001	0.86	ND	U	8E-04	0.68	ND	U	0.001	0.98	ND	U	0.001	1.02	ND	U	9E-04	0.75
Cis-1,3-Dichloropropene	10061-01-5	NS	NS	NS	NS	mg/kg	ND	U	0.054	44.95	ND	U	0.001	0.86	ND	U	8E-04	0.68	ND	U	0.001	0.98	ND	U	0.001	1.02	ND	U	9E-04	0.75
Cyclohexane	110-82-7	5300	6900	10000	6900	mg/kg	ND	U	0.054	44.95	0.002	J	0.001	0.86	0.014		8E-04	0.68	0.003	J	0.001	0.98	0.001	J	0.001	1.02	0.001	J	9E-04	0.75
Dibromochloromethane	124-48-1	8	2.5	82	8	mg/kg	ND	U	0.054	44.95	ND	U	0.001	0.86	ND	U	8E-04	0.68	ND	U	0.001	0.98	ND	U	0.001	1.02	ND	U	9E-04	0.75
Dichlorodifluoromethane	75-71-8	100	100	10000	100	mg/kg	ND	U	0.11	44.95	ND	U	0.002	0.86	ND	U	0.002	0.68	ND	U	0.003	0.98	ND	U	0.002	1.02	ND	U	0.002	0.75
Dimethyl Benzene/ Xylenes, Total	1330-20-7	1000	990	8000	1000	mg/kg	0.91		0.054	44.95	0.074		0.001	0.86	0.12		8E-04	0.68	0.034		0.001	0.98	0.017		0.001	1.02	ND	U	9E-04	0.75
Ethylbenzene	100-41-4	70	46	10000	70	mg/kg	0.14	J	0.054	44.95	0.017		0.001	0.86	0.024		8E-04	0.68	0.007		0.001	0.98	0.003	J	0.001	1.02	ND	U	9E-04	0.75
Isopropylbenzene (Cumene)	98-82-8	350	2500	10000	2500	mg/kg	ND	U	0.054	44.95	0.005	J	0.001	0.86	0.005		8E-04	0.68	0.003	J	0.001	0.98	0.001	J	0.001	1.02	ND	U	9E-04	0.75
Methyl Acetate	79-20-9	10000	1900	10000	10000	mg/kg	0.46		0.11	44.95	ND	U	0.002	0.86	ND	U	0.002	0.68	ND	U	0.003	0.98	ND	U	0.002	1.02	ND	U	0.002	0.75
Methyl Ethyl Ketone (2-Butanone)	78-93-3	400	76	10000	400	mg/kg	ND	U	0.22	44.95	0.04		0.004	0.86	0.029		0.003	0.68	0.011	J	0.005	0.98	ND	U	0.005	1.02	0.007	J	0.003	0.75
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	820	130	10000	820	mg/kg	ND	U	0.16	44.95	ND	U	0.003	0.86	ND	U	0.002	0.68	ND	U	0.004	0.98	ND	U	0.004	1.02	ND	U	0.003	0.75
Methylcyclohexane	108-87-2	NS	NS	NS	NS	mg/kg	0.085	J	0.054	44.95	0.005	J	0.001	0.86	0.044		8E-04	0.68	0.008		0.001	0.98	0.004	J	0.001	1.02	0.003	J	9E-04	0.75
Methylene Chloride	75-09-2	0.5	0.076	4700	0.5	mg/kg	ND	U	0.11	44.95	ND	U	0.002	0.86	ND	U	0.002	0.68	ND	U	0.003	0.98	ND	U	0.002	1.02	ND	U	0.002	0.75
Styrene	100-42-5	10	24	10000	24	mg/kg	ND	U	0.054	44.95	ND	U	0.001	0.86	ND	U	8E-04	0.68	ND	U	0.001	0.98	ND	U	0.001	1.02	ND	U	9E-04	0.75
Tert-Butyl Methyl Ether	1634-04-4	2	0.28	3200	2	mg/kg	ND	U	0.027	44.95	ND	U	5E-04	0.86	ND	U	4E-04	0.68	ND	U	6E-04	0.98	ND	U	6E-04	1.02	ND	U	4E-04	0.75
Tetrachloroethylene(PCE)	127-18-4	0.5	0.43	1500	0.5	mg/kg	ND	U	0.054	44.95	ND	U	0.001	0.86	ND	U	8E-04	0.68	ND	U	0.001	0.98	0.002	J	0.001	1.02	ND	U	9E-04	0.75
Toluene	108-88-3	100	44	10000	100	mg/kg	0.3		0.054	44.95	0.041		0.001	0.86	0.073		8E-04	0.68	0.026		0.001	0.98	0.009		0.001	1.02	ND	U	9E-04	0.75
Trans-1,2-Dichloroethene	156-60-5	10	2.3	4800	10	mg/kg	ND	U	0.054	44.95	ND	U	0.001	0.86	ND	U	8E-04	0.68	ND	U	0.001	0.98	ND	U	0.001	1.02	ND	U	9E-04	0.75
Trans-1,3-Dichloropropene	10061-02-6	NS	NS	NS	NS	mg/kg	ND	U	0.054	44.95	ND	U	0.001	0.86	ND	U	8E-04	0.68	ND	U	0.001	0.98	ND	U	0.001	1.02	ND	U	9E-04	0.75
Trichloroethylene (TCE)	79-01-6	0.5	0.17	1300	0.5	mg/kg	ND	U	0.054	44.95	ND	U	0.001	0.86	ND	U	8E-04	0.68	ND	U	0.001	0.98	ND	U	0.001	1.02	ND	U	9E-04	0.75
Trichlorofluoromethane	75-69-4	200	87	10000	200	mg/kg	ND	U	0.11	44.95	ND	U	0.002	0.86	ND	U	0.002	0.68	ND	U	0.003	0.98	ND	U	0.002	1.02	ND	U	0.002	0.75
Vinyl Chloride	75-01-4	0.2	0.027	110	0.2	mg/kg	ND	U	0.054	44.95	ND	U	0.001	0.86	ND	U	8E-04	0.68	ND	U	0.001	0.98	ND	U	0.001	1.02	ND	U	9E-04	0.75

Table 6
Summary of Shallow Soil Sample Analytical Results:
CAMU Area Soil Samples
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (0 - 2 ft bgs)	PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500)	Location ID	BH-10-44				BH-10-45				BH-10-46				BH-10-55				BH-10-56				BH-10-63			
						Sample ID	BH-10-44-WC_0-2'				BH-10-45-WC_0-2'				BH-10-46-WC_0-2'				BH-10-55-WC_0-2'				BH-10-56-WC_0-2'				BH-10-63-WC_0-2'			
						Sample Date	4/12/2011				4/12/2011				4/12/2011				4/12/2011				4/12/2011				4/13/2011			
						Sample Matrix	Soil				Soil				Soil				Soil				Soil				Soil			
						Sample Interval	0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs			
						Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Semi-Volatile Organic Compounds																														
2,4,5-Trichlorophenol	95-95-4	1000	6100	190000	6100	mg/kg	ND	U	0.079	1	ND	U	0.81	10	ND	U	0.76	10	ND	U	0.42	5	ND	U	0.39	5	ND	U	0.38	5
2,4,6-Trichlorophenol	88-06-2	10	29	2800	29	mg/kg	ND	U	0.04	1	ND	U	0.4	10	ND	U	0.38	10	ND	U	0.21	5	ND	U	0.19	5	ND	U	0.19	5
2,4-Dichlorophenol	120-83-2	2	1	8400	2	mg/kg	ND	U	0.04	1	ND	U	0.4	10	ND	U	0.38	10	ND	U	0.21	5	ND	U	0.19	5	ND	U	0.19	5
2,4-Dimethylphenol	105-67-9	200	87	10000	200	mg/kg	ND	U	0.079	1	ND	U	0.81	10	ND	U	0.76	10	ND	U	0.42	5	ND	U	0.39	5	ND	U	0.38	5
2,4-Dinitrophenol	51-28-5	20	2.3	5600	20	mg/kg	ND	U	0.4	1	ND	U	4	10	ND	U	3.8	10	ND	U	2.1	5	ND	U	1.9	5	ND	U	1.9	5
2,4-Dinitrotoluene	121-14-2	0.84	0.2	260	0.84	mg/kg	ND	U	0.079	1	ND	U	0.81	10	ND	U	0.76	10	ND	U	0.42	5	ND	U	0.39	5	ND	U	0.38	5
2,6-Dinitrotoluene	606-20-2	10	3	2800	10	mg/kg	ND	U	0.04	1	ND	U	0.4	10	ND	U	0.38	10	ND	U	0.21	5	ND	U	0.19	5	ND	U	0.19	5
2-Chloronaphthalene	91-58-7	820	18000	190000	18000	mg/kg	ND	U	0.04	1	ND	U	0.4	10	ND	U	0.38	10	ND	U	0.21	5	ND	U	0.19	5	ND	U	0.19	5
2-Chlorophenol	95-57-8	4	4.4	10000	4.4	mg/kg	ND	U	0.04	1	ND	U	0.4	10	ND	U	0.38	10	ND	U	0.21	5	ND	U	0.19	5	ND	U	0.19	5
2-Methylnaphthalene	91-57-6	41	1600	11000	1600	mg/kg	2.1		0.04	1	ND	U	0.4	10	ND	U	0.38	10	0.92	J	0.21	5	0.52	J	0.19	5	ND	U	0.19	5
2-Methylphenol (O-Cresol)	95-48-7	510	85	140000	510	mg/kg	ND	U	0.079	1	ND	U	0.81	10	ND	U	0.76	10	ND	U	0.42	5	ND	U	0.39	5	ND	U	0.38	5
2-Nitroaniline	88-74-4	31	5.5	8400	31	mg/kg	ND	U	0.04	1	ND	U	0.4	10	ND	U	0.38	10	ND	U	0.21	5	ND	U	0.19	5	ND	U	0.19	5
2-Nitrophenol	88-75-5	82	17	22000	82	mg/kg	ND	U	0.04	1	ND	U	0.4	10	ND	U	0.38	10	ND	U	0.21	5	ND	U	0.19	5	ND	U	0.19	5
3,3'-Dichlorobenzidine	91-94-1	0.58	32	180	32	mg/kg	ND	U	0.12	1	ND	U	1.2	10	ND	U	1.1	10	ND	U	0.63	5	ND	U	0.58	5	ND	U	0.57	5
3-Nitroaniline	99-09-2	3.1	0.48	840	3.1	mg/kg	ND	U	0.079	1	ND	U	0.81	10	ND	U	0.76	10	ND	U	0.42	5	ND	U	0.39	5	ND	U	0.38	5
4,6-Dinitro-2-Methylphenol	534-52-1	1	0.75	280	1	mg/kg	ND	U	0.2	1	ND	U	**2**	10	ND	U	**1.9**	10	ND	U	**1.1**	5	ND	U	0.97	5	ND	U	0.95	5
4-Bromophenyl Phenyl Ether	101-55-3	0.5	NS	100	0.5	mg/kg	ND	U	0.04	1	ND	U	0.4	10	ND	U	0.38	10	ND	U	0.21	5	ND	U	0.19	5	ND	U	0.19	5
4-Chloro-3-Methylphenol	59-50-7	51	110	14000	110	mg/kg	ND	U	0.079	1	ND	U	0.81	10	ND	U	0.76	10	ND	U	0.42	5	ND	U	0.39	5	ND	U	0.38	5
4-Chloroaniline	106-47-8	1.3	1.6	400	1.6	mg/kg	ND	U	0.079	1	ND	U	0.81	10	ND	U	0.76	10	ND	U	0.42	5	ND	U	0.39	5	ND	U	0.38	5
4-Chlorophenyl Phenyl Ether	7005-72-3	0.5	NS	100	0.5	mg/kg	ND	U	0.04	1	ND	U	0.4	10	ND	U	0.38	10	ND	U	0.21	5	ND	U	0.19	5	ND	U	0.19	5
4-Methylphenol (P-Cresol)	106-44-5	51	12	14000	51	mg/kg	ND	U	0.079	1	ND	U	0.81	10	ND	U	0.76	10	ND	U	0.42	5	ND	U	0.39	5	ND	U	0.38	5
4-Nitroaniline	100-01-6	13	1.9	4000	13	mg/kg	ND	U	0.079	1	ND	U	0.81	10	ND	U	0.76	10	ND	U	0.42	5	ND	U	0.39	5	ND	U	0.38	5
4-Nitrophenol	100-02-7	6	4.1	22000	6	mg/kg	ND	U	0.2	1	ND	U	2	10	ND	U	1.9	10	ND	U	1.1	5	ND	U	0.97	5	ND	U	0.95	5
Acenaphthene	83-32-9	380	4700	170000	4700	mg/kg	ND	U	0.04	1	ND	U	0.4	10	ND	U	0.38	10	ND	U	0.21	5	ND	U	0.19	5	ND	U	0.19	5
Acenaphthylene	208-96-8	610	6900	170000	6900	mg/kg	ND	U	0.04	1	ND	U	0.4	10	ND	U	0.38	10	ND	U	0.21	5	ND	U	0.19	5	ND	U	0.19	5
Acetophenone	98-86-2	1000	540	10000	1000	mg/kg	ND	U	0.079	1	ND	U	0.81	10	ND	U	0.76	10	ND	U	0.42	5	ND	U	0.39	5	ND	U	0.38	5
Anthracene	120-12-7	6.6	350	190000	350	mg/kg	ND	U	0.04	1	ND	U	0.4	10	ND	U	0.38	10	0.25	J	0.21	5	0.25	J	0.19	5	ND	U	0.19	5
Atrazine	1912-24-9	0.3	0.13	340	0.3	mg/kg	ND	U	0.04	1	ND	U	**0.4**	10	ND	U	**0.38**	10	ND	U	0.21	5	ND	U	0.19	5	ND	U	0.19	5
Benzaldehyde	100-52-7	NS	NS	NS	NS	mg/kg	ND	U	0.079	1	ND	U	0.81	10	ND	U	0.76	10	ND	U	0.42	5	ND	U	0.39	5	ND	U	0.38	5
Benzo(A)Anthracene	56-55-3	0.36	320	110	110	mg/kg	0.069	J	0.04	1	ND	U	0.4	10	ND	U	0.38	10	0.68	J	0.21	5	1.2		0.19	5	ND	U	0.19	5
Benzo(A)Pyrene	50-32-8	0.02	46	11	11	mg/kg	0.18	J	0.04	1	ND	U	0.4	10	ND	U	0.38	10	0.82	J	0.21	5	1.6		0.19	5	ND	U	0.19	5
Benzo(B)Fluoranthene	205-99-2	0.12	170	110	110	mg/kg	0.085	J	0.04	1	ND	U	0.4	10	ND	U	0.38	10	1.2		0.21	5	2.1		0.19	5	ND	U	0.19	5
Benzo(G,H,I)Perylene	191-24-2	0.026	180	170000	180	mg/kg	0.042	J	0.04	1	ND	U	0.4	10	ND	U	0.38	10	0.99	J	0.21	5	1.5		0.19	5	ND	U	0.19	5
Benzo(K)Fluoranthene	207-08-9	0.055	610	1100	610	mg/kg	ND	U	0.04	1	ND	U	0.4	10	ND	U	0.38	10	0.4	J	0.21	5	0.76	J	0.19	5	ND	U	0.19	5
Benzyl Butyl Phthalate	85-68-7	140	10000	10000	10000	mg/kg	ND	U	0.079	1	ND	U	0.81	10	ND	U	0.76	10	ND	U	0.42	5	ND	U	0.39	5	ND	U	0.38	5
Biphenyl (Diphenyl)	92-52-4	510	2200	140000	2200	mg/kg	ND	U	0.04	1	ND	U	0.4	10	ND	U	0.38	10	ND	U	0.21	5	ND	U	0.19	5	ND	U	0.19	5
Bis(2-Chloroethoxy) Methane	111-91-1	31	8.2	8400	31	mg/kg	ND	U	0.04	1	ND	U	0.4	10	ND	U	0.38	10	ND	U	0.21	5	ND	U	0.19	5	ND	U	0.19	5
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	0.076	0.023	6.7	0.076	mg/kg	ND	U	0.04	1	ND	U	**0.4**	10	ND	U	**0.38**	10	ND	U	**0.21**	5	ND	U	**0.19**	5	ND	U	**0.19**	5
Bis(2-Chloroisopropyl) Ether	108-60-1	30	8	220	30	mg/kg	ND	U	0.04	1	ND	U	0.4	10	ND	U	0.38	10	ND	U	0.21	5	ND	U	0.19	5	ND	U	0.19	5
Bis(2-Ethylhexyl) Phthalate	117-81-7	0.6	130	5700	130	mg/kg	0.2	J	0.079	1	ND	U	0.81	10	ND	U	0.76	10	0.46	J	0.42	5	ND	U	0.39	5	ND	U	0.38	5
Caprolactam	105-60-2	NS	NS	NS	NS	mg/kg	ND	U	0.04	1	ND	U	0.4	10	ND	U	0.38	10	ND	U	0.21	5	ND	U	0.19	5	ND	U	0.19	5
Carbazole	86-74-8	13	83	4000	83	mg/kg	ND	U	0.04	1	ND	U	0.4	10	ND	U	0.38	10	ND	U	0.21	5	ND	U	0.19	5	ND	U	0.19	5
Chrysene	218-01-9	0.19	230	11000	230	mg/kg	0.35		0.04	1	ND	U	0.4	10	ND	U	0.38	10	0.85	J	0.21	5	1.3		0.19	5	ND	U	0.19	5
Dibenz(A,H)Anthracene	53-70-3	0.036	160	11	11	mg/kg	ND	U	0.04	1	ND	U	0.4	10	ND	U	0.38	10	0.29	J	0.21	5	0.52	J	0.19	5	ND	U	0.19	5
Dibenzofuran	132-64-9	10	260	2800	260	mg/kg	ND	U	0.04	1	ND	U	0.4	10	ND	U	0.38	10	ND	U	0.21	5	ND	U	0.19	5	ND	U	0.19	5
Diethyl Phthalate	84-66-2	8200	2600	10000	8200	mg/kg	ND	U	0.079	1	ND	U	0.81	10	ND	U	0.76	10	ND	U	0.42	5	ND	U	0.39	5	ND	U	0.38	5
Dimethyl Phthalate	131-11-3	0.5	NS	100	0.5	mg/kg	ND	U	0.079	1	ND	U	**0.81**	10	ND	U	**0.76**	10	ND	U	0.42	5	ND	U	0.39	5	ND	U	0.38	5
Di-N-Butyl Phthalate	84-74-2	1000	4100	10000	4100	mg/kg	ND	U	0.079	1	ND	U	0.81	10	ND	U	0.76	10	ND	U	0.42	5	ND	U	0.39	5	ND	U	0.38	5
Di-N-Octylphthalate	117-84-0	300	10000	10000	10000	mg/kg	ND	U	0.079	1	ND	U	0.81	10	ND	U	0.76	10	ND	U	0.42	5	ND	U	0.39	5	ND	U	0.38	5
Fluoranthene	206-44-0	26	3200	110000	3200	mg/kg	0.058	J	0.04	1	ND	U	0.4	10	ND	U	0.38	10	0.94	J	0.21	5	1.5		0.19	5	ND	U	0.19	5

Table 6
Summary of Shallow Soil Sample Analytical Results:
CAMU Area Soil Samples
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (0 - 2 ft bgs)	PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500)	Location ID	BH-10-44				BH-10-45				BH-10-46				BH-10-55				BH-10-56				BH-10-63			
						Sample ID	BH-10-44-WC_0-2'				BH-10-45-WC_0-2'				BH-10-46-WC_0-2'				BH-10-55-WC_0-2'				BH-10-56-WC_0-2'				BH-10-63-WC_0-2'			
						Sample Date	4/12/2011				4/12/2011				4/12/2011				4/12/2011				4/12/2011				4/13/2011			
						Sample Matrix	Soil				Soil				Soil				Soil				Soil				Soil			
						Sample Interval	0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs			
						Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Fluorene	86-73-7	190	3800	110000	3800	mg/kg	ND	U	0.04	1	ND	U	0.4	10	ND	U	0.38	10	ND	U	0.21	5	ND	U	0.19	5	ND	U	0.19	5
Hexachlorobenzene	118-74-1	0.1	0.96	50	0.96	mg/kg	ND	U	0.04	1	ND	U	0.4	10	ND	U	0.38	10	ND	U	0.21	5	ND	U	0.19	5	ND	U	0.19	5
Hexachlorobutadiene	87-68-3	3.3	39	1000	39	mg/kg	ND	U	0.079	1	ND	U	0.81	10	ND	U	0.76	10	ND	U	0.42	5	ND	U	0.39	5	ND	U	0.38	5
Hexachlorocyclopentadiene	77-47-4	5	91	10000	91	mg/kg	ND	U	0.2	1	ND	U	2	10	ND	U	1.9	10	ND	U	1.1	5	ND	U	0.97	5	ND	U	0.95	5
Hexachloroethane	67-72-1	0.1	0.56	550	0.56	mg/kg	ND	U	0.04	1	ND	U	0.4	10	ND	U	0.38	10	ND	U	0.21	5	ND	U	0.19	5	ND	U	0.19	5
Indeno[1,2,3-cd]pyrene	193-39-5	0.36	28000	110	110	mg/kg	ND	U	0.04	1	ND	U	0.4	10	ND	U	0.38	10	0.66	J	0.21	5	1.1		0.19	5	ND	U	0.19	5
Isophorone	78-59-1	10	1.9	10000	10	mg/kg	ND	U	0.04	1	ND	U	0.4	10	ND	U	0.38	10	ND	U	0.21	5	ND	U	0.19	5	ND	U	0.19	5
Naphthalene	91-20-3	10	25	56000	25	mg/kg	0.88		0.04	1	ND	U	0.4	10	ND	U	0.38	10	0.56	J	0.21	5	0.45	J	0.19	5	ND	U	0.19	5
Nitrobenzene	98-95-3	20	8.7	5600	20	mg/kg	ND	U	0.04	1	ND	U	0.4	10	ND	U	0.38	10	ND	U	0.21	5	ND	U	0.19	5	ND	U	0.19	5
N-Nitrosodi-N-Propylamine	621-64-7	0.037	0.0051	11	0.037	mg/kg	ND	U	**0.04**	1	ND	U	**0.4**	10	ND	U	**0.38**	10	ND	U	**0.21**	5	ND	U	**0.19**	5	ND	U	**0.19**	5
N-Nitrosodiphenylamine	86-30-6	53	83	16000	83	mg/kg	ND	U	0.04	1	ND	U	0.4	10	ND	U	0.38	10	ND	U	0.21	5	ND	U	0.19	5	ND	U	0.19	5
Pentachlorophenol	87-86-5	0.1	5	660	5	mg/kg	ND	U	0.2	1	ND	U	2	10	ND	U	1.9	10	ND	U	1.1	5	ND	U	0.97	5	ND	U	0.95	5
Phenanthrene	85-01-8	110	10000	190000	10000	mg/kg	0.26		0.04	1	ND	U	0.4	10	ND	U	0.38	10	0.87	J	0.21	5	0.93	J	0.19	5	ND	U	0.19	5
Phenol	108-95-2	200	33	190000	200	mg/kg	ND	U	0.04	1	ND	U	0.4	10	ND	U	0.38	10	ND	U	0.21	5	ND	U	0.19	5	ND	U	0.19	5
Pyrene	129-00-0	13	2200	84000	2200	mg/kg	0.13	J	0.04	1	ND	U	0.4	10	ND	U	0.38	10	0.9	J	0.21	5	1.4		0.19	5	ND	U	0.19	5
Metals																														
Aluminum	7429-90-5	NS	NS	190000	190000	mg/kg	19400		5.86	1	11200		5.83	1	24600		5.54	1	12500		6.25	1	14900		5.95	1	13000		5.76	1
Antimony	7440-36-0	0.6	27	1100	27	mg/kg	ND	U	1.16	1	ND	U	1.16	1	ND	U	1.1	1	ND	U	1.24	1	ND	U	1.18	1	ND	U	1.15	1
Arsenic	7440-38-2	1	29	53	29	mg/kg	6.77		1.11	1	6.94		1.1	1	8.36		1.05	1	17.1		1.18	1	9.44		1.12	1	6.21		1.09	1
Barium	7440-39-3	200	8200	190000	8200	mg/kg	122		0.047	1	75.7		0.046	1	103		0.044	1	108		0.05	1	100		0.047	1	49.5		0.046	1
Beryllium	7440-41-7	0.4	320	5600	320	mg/kg	2.4		0.079	1	0.523	J	0.079	1	1.4		0.075	1	0.645		0.085	1	0.796		0.08	1	0.55	J	0.078	1
Cadmium	7440-43-9	0.5	38	1400	38	mg/kg	ND	U	0.163	1	ND	U	0.162	1	ND	U	0.154	1	0.557	J	0.174	1	ND	U	0.165	1	ND	U	0.16	1
Calcium	7440-70-2	NS	NS	NS	NS	mg/kg	34500		7.14	1	37300		7.1	1	13100		6.75	1	71000		38.1	5	18400		7.25	1	962		7.02	1
Chromium, Total	7440-47-3	NS	NS	NS	NS	mg/kg	19.3		0.687	1	32.3		0.684	1	45.3		0.65	1	254		0.733	1	93.1		0.697	1	21		0.676	1
Cobalt	7440-48-4	3	140	840	140	mg/kg	11.7		0.221	1	8.02		0.22	1	11.8		0.209	1	7.77		0.236	1	6.74		0.225	1	7.43		0.218	1
Copper	7440-50-8	100	43000	100000	43000	mg/kg	33.2		0.256	1	48.8		0.255	1	37.1		0.242	1	545		0.273	1	58.8		0.26	1	20.4		0.252	1
Iron	7439-89-6	NS	NS	190000	190000	mg/kg	41000		27.4	5	14700		5.46	1	34100		25.9	5	21300		5.86	1	19900		5.57	1	18700		5.4	1
Lead	7439-92-1	0.5	450	1000	450	mg/kg	22.3		0.698	1	96.7		0.695	1	48.5		0.661	1	953		0.746	1	86.4		0.709	1	25.2		0.687	1
Magnesium	7439-95-4	NS	NS	NS	NS	mg/kg	17200		2.96	1	22200		2.94	1	8710		2.8	1	32500		3.16	1	7330		3	1	2500		2.91	1
Manganese	7439-96-5	30	2000	130000	2000	mg/kg	2040		0.454	5	396		0.09	1	861		0.086	1	479		0.097	1	242		0.092	1	302		0.089	1
Mercury	7439-97-6	0.2	10	450	10	mg/kg	0.0693	J	0.003	1	0.267		0.003	1	0.054	J	0.003	1	2.32		0.018	5	0.153		0.003	1	0.072	J	0.003	1
Nickel	7440-02-0	10	650	56000	650	mg/kg	25.8		0.221	1	16.1		0.22	1	27.3		0.209	1	39.1		0.236	1	23.5		0.225	1	14.4		0.218	1
Potassium	7440-09-7	NS	NS	NS	NS	mg/kg	1230		21	1	904		20.9	1	1350		19.8	1	1040		22.4	1	1540		21.3	1	1240		20.6	1
Selenium	7782-49-2	5	26	14000	26	mg/kg	ND	U	1.14	1	ND	U	1.14	1	ND	U	1.08	1	1.57	J	1.22	1	ND	U	1.16	1	ND	U	1.12	1
Silver	7440-22-4	10	84	14000	84	mg/kg	ND	U	0.21	1	ND	U	0.209	1	ND	U	0.198	1	0.286	J	0.224	1	ND	U	0.213	1	ND	U	0.206	1
Sodium	7440-23-5	NS	NS	NS	NS	mg/kg	80	J	43.4	1	61.2	J	43.2	1	72.1	J	41.1	1	142		46.4	1	142		44.1	1	51.2	J	42.7	1
Thallium	7440-28-0	0.2	14	200	14	mg/kg	ND	U	1.69	1	ND	U	1.68	1	ND	U	1.6	1	5.11		1.8	1	3.51	J	1.71	1	ND	U	1.66	1
Vanadium	7440-62-2	72	72000	20000	20000	mg/kg	40.5		0.221	1	35.6		0.22	1	50.3		0.209	1	100		0.236	1	58.6		0.225	1	26.5		0.218	1
Zinc	7440-66-6	200	12000	190000	12000	mg/kg	88.1		0.768	1	70.8		0.765	1	67.7		0.727	1	427		0.82	1	106		0.78	1	55.4		0.756	1
General Chemistry																														
Moisture, Percent	MOIST	NS	NS	NS	NS	%	16.6		0.5	1	17.8		0.5	1	13.5		0.5	1	21.9		0.5	1	15.4		0.5	1	12.7		0.5	1

Notes:
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard
All soil samples in this table are considered saturated soils.

Qualifiers:
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

Exceedance Summary:
10 - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
10 - Concentration Exceeds the PADEP Non-Residential Direct Contact Standard

Table 6
Summary of Shallow Soil Sample Analytical Results:
CAMU Area Soil Samples
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (0 - 2 ft bgs)	PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500)	Location ID	BH-10-64				BH-10-69				BH-10-70				BH-10-77			
						Sample ID	BH-10-64-WC_0-2'				BH-10-69-WC_0-2'				BH-10-70-WC@0'-2'				BH-10-77-WC_0-2'			
						Sample Date	4/13/2011				4/12/2011				4/11/2011				4/13/2011			
						Sample Matrix	Soil				Soil				Soil				Soil			
						Sample Interval	0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs			
						Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Volatile Organic Compounds																						
1,1,1-Trichloroethane	71-55-6	20	7.2	10000	20	mg/kg	ND	U	0.001	1.01	ND	U	0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
1,1,2,2-Tetrachloroethane	79-34-5	0.03	0.0093	38	0.03	mg/kg	ND	U	0.001	1.01	ND	U	0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	10000	10000	10000	10000	mg/kg	ND	U	0.002	1.01	ND	U	0.002	1.02	ND	U	0.002	0.81	ND	U	0.002	0.74
1,1,2-Trichloroethane	79-00-5	0.5	0.15	140	0.5	mg/kg	ND	U	0.001	1.01	ND	U	0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
1,1-Dichloroethane	75-34-3	16	3.9	1400	16	mg/kg	ND	U	0.001	1.01	ND	U	0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
1,1-Dichloroethene	75-35-4	0.7	0.19	10000	0.7	mg/kg	ND	U	0.001	1.01	ND	U	0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
1,2,4-Trichlorobenzene	120-82-1	7	27	10000	27	mg/kg	0.001	J	0.001	1.01	ND	U	0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
1,2-Dibromo-3-Chloropropane	96-12-8	0.02	0.0092	0.37	0.02	mg/kg	ND	U	0.002	1.01	ND	U	0.002	1.02	ND	U	0.002	0.81	ND	U	0.002	0.74
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.005	0.0012	3.7	0.005	mg/kg	ND	U	0.001	1.01	ND	U	0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
1,2-Dichlorobenzene	95-50-1	60	59	10000	60	mg/kg	ND	U	0.001	1.01	ND	U	0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
1,2-Dichloroethane	107-06-2	0.5	0.1	86	0.5	mg/kg	ND	U	0.001	1.01	ND	U	0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
1,2-Dichloropropane	78-87-5	0.5	0.11	220	0.5	mg/kg	ND	U	0.001	1.01	ND	U	0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
1,3-Dichlorobenzene	541-73-1	60	61	8400	61	mg/kg	ND	U	0.001	1.01	ND	U	0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
1,4-Dichlorobenzene	106-46-7	7.5	10	200	10	mg/kg	ND	U	0.001	1.01	ND	U	0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
2-Hexanone	591-78-6	4.4	1.1	400	4.4	mg/kg	ND	U	0.004	1.01	ND	U	0.004	1.02	ND	U	0.003	0.81	ND	U	0.003	0.74
Acetone	67-64-1	9200	1000	10000	9200	mg/kg	0.31		0.008	1.01	0.081		0.008	1.02	0.057		0.007	0.81	0.082		0.006	0.74
Benzene	71-43-2	0.5	0.13	290	0.5	mg/kg	0.15		6E-04	1.01	0.004	J	6E-04	1.02	ND	U	5E-04	0.81	0.002	J	4E-04	0.74
Bromodichloromethane	75-27-4	8	2.7	60	8	mg/kg	ND	U	0.001	1.01	ND	U	0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
Bromoform	75-25-2	8	3.5	2000	8	mg/kg	ND	U	0.001	1.01	ND	U	0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
Bromomethane	74-83-9	1	0.54	400	1	mg/kg	ND	U	0.002	1.01	ND	U	0.002	1.02	ND	U	0.002	0.81	ND	U	0.002	0.74
Carbon Disulfide	75-15-0	620	530	10000	620	mg/kg	0.003	J	0.001	1.01	ND	U	0.001	1.02	0.001	J	9E-04	0.81	0.001	J	9E-04	0.74
Carbon Tetrachloride	56-23-5	0.5	0.26	150	0.5	mg/kg	ND	U	0.001	1.01	ND	U	0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
Chlorobenzene	108-90-7	10	6.1	4000	10	mg/kg	ND	U	0.001	1.01	ND	U	0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
Chloroethane	75-00-3	90	19	10000	90	mg/kg	ND	U	0.002	1.01	ND	U	0.002	1.02	ND	U	0.002	0.81	ND	U	0.002	0.74
Chloroform	67-66-3	8	2	97	8	mg/kg	ND	U	0.001	1.01	ND	U	0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
Chloromethane	74-87-3	3	0.38	1200	3	mg/kg	ND	U	0.002	1.01	ND	U	0.002	1.02	ND	U	0.002	0.81	ND	U	0.002	0.74
Cis-1,2-Dichloroethylene	156-59-2	7	1.6	10000	7	mg/kg	ND	U	0.001	1.01	ND	U	0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
Cis-1,3-Dichloropropene	10061-01-5	NS	NS	NS	NS	mg/kg	ND	U	0.001	1.01	ND	U	0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
Cyclohexane	110-82-7	5300	6900	10000	6900	mg/kg	0.039		0.001	1.01	ND	U	0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
Dibromochloromethane	124-48-1	8	2.5	82	8	mg/kg	ND	U	0.001	1.01	ND	U	0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
Dichlorodifluoromethane	75-71-8	100	100	10000	100	mg/kg	ND	U	0.002	1.01	ND	U	0.002	1.02	ND	U	0.002	0.81	ND	U	0.002	0.74
Dimethyl Benzene/ Xylenes, Total	1330-20-7	1000	990	8000	1000	mg/kg	0.043		0.001	1.01	0.016		0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
Ethylbenzene	100-41-4	70	46	10000	70	mg/kg	0.021		0.001	1.01	0.003	J	0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
Isopropylbenzene (Cumene)	98-82-8	350	2500	10000	2500	mg/kg	0.019		0.001	1.01	ND	U	0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
Methyl Acetate	79-20-9	10000	1900	10000	10000	mg/kg	ND	U	0.002	1.01	ND	U	0.002	1.02	ND	U	0.002	0.81	ND	U	0.002	0.74
Methyl Ethyl Ketone (2-Butanone)	78-93-3	400	76	10000	400	mg/kg	0.026		0.005	1.01	ND	U	0.005	1.02	ND	U	0.004	0.81	0.008	J	0.004	0.74
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	820	130	10000	820	mg/kg	ND	U	0.004	1.01	ND	U	0.004	1.02	ND	U	0.003	0.81	ND	U	0.003	0.74
Methylcyclohexane	108-87-2	NS	NS	NS	NS	mg/kg	0.099		0.001	1.01	0.003	J	0.001	1.02	ND	U	9E-04	0.81	0.0009	J	9E-04	0.74
Methylene Chloride	75-09-2	0.5	0.076	4700	0.5	mg/kg	ND	U	0.002	1.01	ND	U	0.002	1.02	ND	U	0.002	0.81	ND	U	0.002	0.74
Styrene	100-42-5	10	24	10000	24	mg/kg	ND	U	0.001	1.01	ND	U	0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
Tert-Butyl Methyl Ether	1634-04-4	2	0.28	3200	2	mg/kg	ND	U	6E-04	1.01	ND	U	6E-04	1.02	ND	U	5E-04	0.81	ND	U	4E-04	0.74
Tetrachloroethylene(PCE)	127-18-4	0.5	0.43	1500	0.5	mg/kg	ND	U	0.001	1.01	ND	U	0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
Toluene	108-88-3	100	44	10000	100	mg/kg	0.013		0.001	1.01	0.017		0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
Trans-1,2-Dichloroethene	156-60-5	10	2.3	4800	10	mg/kg	ND	U	0.001	1.01	ND	U	0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
Trans-1,3-Dichloropropene	10061-02-6	NS	NS	NS	NS	mg/kg	ND	U	0.001	1.01	ND	U	0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
Trichloroethylene (TCE)	79-01-6	0.5	0.17	1300	0.5	mg/kg	ND	U	0.001	1.01	ND	U	0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74
Trichlorofluoromethane	75-69-4	200	87	10000	200	mg/kg	ND	U	0.002	1.01	ND	U	0.002	1.02	ND	U	0.002	0.81	ND	U	0.002	0.74
Vinyl Chloride	75-01-4	0.2	0.027	110	0.2	mg/kg	ND	U	0.001	1.01	ND	U	0.001	1.02	ND	U	9E-04	0.81	ND	U	9E-04	0.74

Table 6
Summary of Shallow Soil Sample Analytical Results:
CAMU Area Soil Samples
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (0 - 2 ft bgs)	PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500)	Location ID	BH-10-64				BH-10-69				BH-10-70				BH-10-77			
						Sample ID	BH-10-64-WC_0-2'				BH-10-69-WC_0-2'				BH-10-70-WC@0'-2'				BH-10-77-WC_0-2'			
						Sample Date	4/13/2011				4/12/2011				4/11/2011				4/13/2011			
						Sample Matrix	Soil				Soil				Soil				Soil			
						Sample Interval	0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs			
						Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Semi-Volatile Organic Compounds																						
2,4,5-Trichlorophenol	95-95-4	1000	6100	190000	6100	mg/kg	ND	U	3.9	5	ND	U	0.079	1	ND	U	0.077	1	ND	U	0.4	5
2,4,6-Trichlorophenol	88-06-2	10	29	2800	29	mg/kg	ND	U	2	5	ND	U	0.039	1	ND	U	0.039	1	ND	U	0.2	5
2,4-Dichlorophenol	120-83-2	2	1	8400	2	mg/kg	ND	U	**2**	5	ND	U	0.039	1	ND	U	0.039	1	ND	U	0.2	5
2,4-Dimethylphenol	105-67-9	200	87	10000	200	mg/kg	ND	U	3.9	5	ND	U	0.079	1	ND	U	0.077	1	ND	U	0.4	5
2,4-Dinitrophenol	51-28-5	20	2.3	5600	20	mg/kg	ND	U	**20**	5	ND	U	0.39	1	ND	U	0.39	1	ND	U	2	5
2,4-Dinitrotoluene	121-14-2	0.84	0.2	260	0.84	mg/kg	ND	U	**3.9**	5	ND	U	0.079	1	ND	U	0.077	1	ND	U	0.4	5
2,6-Dinitrotoluene	606-20-2	10	3	2800	10	mg/kg	ND	U	2	5	ND	U	0.039	1	ND	U	0.039	1	ND	U	0.2	5
2-Chloronaphthalene	91-58-7	820	18000	190000	18000	mg/kg	ND	U	2	5	ND	U	0.039	1	ND	U	0.039	1	ND	U	0.2	5
2-Chlorophenol	95-57-8	4	4.4	10000	4.4	mg/kg	ND	U	2	5	ND	U	0.039	1	ND	U	0.039	1	ND	U	0.2	5
2-Methylnaphthalene	91-57-6	41	1600	11000	1600	mg/kg	ND	U	2	5	0.085	J	0.039	1	ND	U	0.039	1	0.23	J	0.2	5
2-Methylphenol (O-Cresol)	95-48-7	510	85	140000	510	mg/kg	ND	U	3.9	5	ND	U	0.079	1	ND	U	0.077	1	ND	U	0.4	5
2-Nitroaniline	88-74-4	31	5.5	8400	31	mg/kg	ND	U	2	5	ND	U	0.039	1	ND	U	0.039	1	ND	U	0.2	5
2-Nitrophenol	88-75-5	82	17	22000	82	mg/kg	ND	U	2	5	ND	U	0.039	1	ND	U	0.039	1	ND	U	0.2	5
3,3'-Dichlorobenzidine	91-94-1	0.58	32	180	32	mg/kg	ND	U	5.9	5	ND	U	0.12	1	ND	U	0.12	1	ND	U	0.6	5
3-Nitroaniline	99-09-2	3.1	0.48	840	3.1	mg/kg	ND	U	**3.9**	5	ND	U	0.079	1	ND	U	0.077	1	ND	U	0.4	5
4,6-Dinitro-2-Methylphenol	534-52-1	1	0.75	280	1	mg/kg	ND	U	**9.8**	5	ND	U	0.2	1	ND	U	0.19	1	ND	U	**1**	5
4-Bromophenyl Phenyl Ether	101-55-3	0.5	NS	100	0.5	mg/kg	ND	U	**2**	5	ND	U	0.039	1	ND	U	0.039	1	ND	U	0.2	5
4-Chloro-3-Methylphenol	59-50-7	51	110	14000	110	mg/kg	ND	U	3.9	5	ND	U	0.079	1	ND	U	0.077	1	ND	U	0.4	5
4-Chloroaniline	106-47-8	1.3	1.6	400	1.6	mg/kg	ND	U	**3.9**	5	ND	U	0.079	1	ND	U	0.077	1	ND	U	0.4	5
4-Chlorophenyl Phenyl Ether	7005-72-3	0.5	NS	100	0.5	mg/kg	ND	U	**2**	5	ND	U	0.039	1	ND	U	0.039	1	ND	U	0.2	5
4-Methylphenol (P-Cresol)	106-44-5	51	12	14000	51	mg/kg	ND	U	3.9	5	ND	U	0.079	1	ND	U	0.077	1	ND	U	0.4	5
4-Nitroaniline	100-01-6	13	1.9	4000	13	mg/kg	ND	U	3.9	5	ND	U	0.079	1	ND	U	0.077	1	ND	U	0.4	5
4-Nitrophenol	100-02-7	6	4.1	22000	6	mg/kg	ND	U	**9.8**	5	ND	U	0.2	1	ND	U	0.19	1	ND	U	1	5
Acenaphthene	83-32-9	380	4700	170000	4700	mg/kg	ND	U	2	5	ND	U	0.039	1	ND	U	0.039	1	0.27	J	0.2	5
Acenaphthylene	208-96-8	610	6900	170000	6900	mg/kg	ND	U	2	5	ND	U	0.039	1	ND	U	0.039	1	ND	U	0.2	5
Acetophenone	98-86-2	1000	540	10000	1000	mg/kg	ND	U	3.9	5	ND	U	0.079	1	ND	U	0.077	1	ND	U	0.4	5
Anthracene	120-12-7	6.6	350	190000	350	mg/kg	ND	U	2	5	ND	U	0.039	1	ND	U	0.039	1	0.52	J	0.2	5
Atrazine	1912-24-9	0.3	0.13	340	0.3	mg/kg	ND	U	**2**	5	ND	U	0.039	1	ND	U	0.039	1	ND	U	0.2	5
Benzaldehyde	100-52-7	NS	NS	NS	NS	mg/kg	ND	U	3.9	5	ND	U	0.079	1	ND	U	0.077	1	ND	U	0.4	5
Benzo(A)Anthracene	56-55-3	0.36	320	110	110	mg/kg	41		2	5	ND	U	0.039	1	ND	U	0.039	1	2		0.2	5
Benzo(A)Pyrene	50-32-8	0.02	46	11	11	mg/kg	**120**		2	5	ND	U	0.039	1	ND	U	0.039	1	1.9		0.2	5
Benzo(B)Fluoranthene	205-99-2	0.12	170	110	110	mg/kg	54		2	5	ND	U	0.039	1	ND	U	0.039	1	2.5		0.2	5
Benzo(G,H,I)Perylene	191-24-2	0.026	180	170000	180	mg/kg	96		2	5	ND	U	0.039	1	ND	U	0.039	1	1.5		0.2	5
Benzo(K)Fluoranthene	207-08-9	0.055	610	1100	610	mg/kg	10		2	5	ND	U	0.039	1	ND	U	0.039	1	1.1		0.2	5
Benzyl Butyl Phthalate	85-68-7	140	10000	10000	10000	mg/kg	ND	U	3.9	5	ND	U	0.079	1	ND	U	0.077	1	ND	U	0.4	5
Biphenyl (Diphenyl)	92-52-4	510	2200	140000	2200	mg/kg	ND	U	2	5	ND	U	0.039	1	ND	U	0.039	1	ND	U	0.2	5
Bis(2-Chloroethoxy) Methane	111-91-1	31	8.2	8400	31	mg/kg	ND	U	2	5	ND	U	0.039	1	ND	U	0.039	1	ND	U	0.2	5
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	0.076	0.023	6.7	0.076	mg/kg	ND	U	**2**	5	ND	U	0.039	1	ND	U	0.039	1	ND	U	**0.2**	5
Bis(2-Chloroisopropyl) Ether	108-60-1	30	8	220	30	mg/kg	ND	U	2	5	ND	U	0.039	1	ND	U	0.039	1	ND	U	0.2	5
Bis(2-Ethylhexyl) Phthalate	117-81-7	0.6	130	5700	130	mg/kg	ND	U	3.9	5	ND	U	0.079	1	0.36	J	0.077	1	ND	U	0.4	5
Caprolactam	105-60-2	NS	NS	NS	NS	mg/kg	ND	U	2	5	ND	U	0.039	1	ND	U	0.039	1	ND	U	0.2	5
Carbazole	86-74-8	13	83	4000	83	mg/kg	ND	U	2	5	ND	U	0.039	1	ND	U	0.039	1	0.38	J	0.2	5
Chrysene	218-01-9	0.19	230	11000	230	mg/kg	83		2	5	ND	U	0.039	1	ND	U	0.039	1	2		0.2	5
Dibenz(A,H)Anthracene	53-70-3	0.036	160	11	11	mg/kg	**73**		2	5	ND	U	0.039	1	ND	U	0.039	1	0.53	J	0.2	5
Dibenzofuran	132-64-9	10	260	2800	260	mg/kg	ND	U	2	5	ND	U	0.039	1	ND	U	0.039	1	ND	U	0.2	5
Diethyl Phthalate	84-66-2	8200	2600	10000	8200	mg/kg	ND	U	3.9	5	ND	U	0.079	1	ND	U	0.077	1	ND	U	0.4	5
Dimethyl Phthalate	131-11-3	0.5	NS	100	0.5	mg/kg	ND	U	**3.9**	5	ND	U	0.079	1	ND	U	0.077	1	ND	U	0.4	5
Di-N-Butyl Phthalate	84-74-2	1000	4100	10000	4100	mg/kg	ND	U	3.9	5	ND	U	0.079	1	ND	U	0.077	1	ND	U	0.4	5
Di-N-Octylphthalate	117-84-0	300	10000	10000	10000	mg/kg	ND	U	3.9	5	ND	U	0.079	1	ND	U	0.077	1	ND	U	0.4	5
Fluoranthene	206-44-0	26	3200	110000	3200	mg/kg	2.2	J	2	5	ND	U	0.039	1	ND	U	0.039	1	3.7		0.2	5

Table 6
Summary of Shallow Soil Sample Analytical Results:
CAMU Area Soil Samples
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (0 - 2 ft bgs)	PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500)	Location ID	BH-10-64				BH-10-69				BH-10-70				BH-10-77			
						Sample ID	BH-10-64-WC_0-2'				BH-10-69-WC_0-2'				BH-10-70-WC@0'-2'				BH-10-77-WC_0-2'			
						Sample Date	4/13/2011				4/12/2011				4/11/2011				4/13/2011			
						Sample Matrix	Soil				Soil				Soil				Soil			
						Sample Interval	0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs			
						Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Fluorene	86-73-7	190	3800	110000	3800	mg/kg	ND	U	2	5	ND	U	0.039	1	ND	U	0.039	1	0.22	J	0.2	5
Hexachlorobenzene	118-74-1	0.1	0.96	50	0.96	mg/kg	ND	U	**2**	5	ND	U	0.039	1	ND	U	0.039	1	ND	U	0.2	5
Hexachlorobutadiene	87-68-3	3.3	39	1000	39	mg/kg	ND	U	3.9	5	ND	U	0.079	1	ND	U	0.077	1	ND	U	0.4	5
Hexachlorocyclopentadiene	77-47-4	5	91	10000	91	mg/kg	ND	U	9.8	5	ND	U	0.2	1	ND	U	0.19	1	ND	U	1	5
Hexachloroethane	67-72-1	0.1	0.56	550	0.56	mg/kg	ND	U	**2**	5	ND	U	0.039	1	ND	U	0.039	1	ND	U	0.2	5
Indeno[1,2,3-cd]pyrene	193-39-5	0.36	28000	110	110	mg/kg	59		2	5	ND	U	0.039	1	ND	U	0.039	1	1.3		0.2	5
Isophorone	78-59-1	10	1.9	10000	10	mg/kg	ND	U	2	5	ND	U	0.039	1	ND	U	0.039	1	ND	U	0.2	5
Naphthalene	91-20-3	10	25	56000	25	mg/kg	ND	U	2	5	0.055	J	0.039	1	ND	U	0.039	1	0.24	J	0.2	5
Nitrobenzene	98-95-3	20	8.7	5600	20	mg/kg	ND	U	2	5	ND	U	0.039	1	ND	U	0.039	1	ND	U	0.2	5
N-Nitrosodi-N-Propylamine	621-64-7	0.037	0.0051	11	0.037	mg/kg	ND	U	**2**	5	ND	U	**0.039**	1	ND	U	**0.039**	1	ND	U	**0.2**	5
N-Nitrosodiphenylamine	86-30-6	53	83	16000	83	mg/kg	ND	U	2	5	ND	U	0.039	1	ND	U	0.039	1	ND	U	0.2	5
Pentachlorophenol	87-86-5	0.1	5	660	5	mg/kg	ND	U	**9.8**	5	ND	U	0.2	1	ND	U	0.19	1	ND	U	1	5
Phenanthrene	85-01-8	110	10000	190000	10000	mg/kg	2.1	J	2	5	ND	U	0.039	1	ND	U	0.039	1	2.7		0.2	5
Phenol	108-95-2	200	33	190000	200	mg/kg	ND	U	2	5	ND	U	0.039	1	ND	U	0.039	1	ND	U	0.2	5
Pyrene	129-00-0	13	2200	84000	2200	mg/kg	8.4	J	2	5	ND	U	0.039	1	ND	U	0.039	1	3.2		0.2	5
Metals																						
Aluminum	7429-90-5	NS	NS	190000	190000	mg/kg	10200		5.7	1	17000		5.7	1	102000		29.3	5	16700		5.91	1
Antimony	7440-36-0	0.6	27	1100	27	mg/kg	ND	U	1.13	1	ND	U	1.13	1	ND	U	5.83	5	ND	U	1.17	1
Arsenic	7440-38-2	1	29	53	29	mg/kg	10.1		1.08	1	7.9		1.08	1	6.26	J	5.54	5	12.2		1.12	1
Barium	7440-39-3	200	8200	190000	8200	mg/kg	114		0.045	1	80.8		0.045	1	154		0.047	1	128		0.047	1
Beryllium	7440-41-7	0.4	320	5600	320	mg/kg	0.427	J	0.077	1	1.6		0.077	1	2.06		0.079	1	0.78		0.08	1
Cadmium	7440-43-9	0.5	38	1400	38	mg/kg	0.193	J	0.159	1	ND	U	0.159	1	2.09	J	0.816	5	ND	U	0.164	1
Calcium	7440-70-2	NS	NS	NS	NS	mg/kg	7050		6.95	1	37200		6.94	1	988		7.14	1	6090		7.2	1
Chromium, Total	7440-47-3	NS	NS	NS	NS	mg/kg	69.5		0.669	1	20.9		0.668	1	298		3.44	5	37		0.693	1
Cobalt	7440-48-4	3	140	840	140	mg/kg	6.7		0.215	1	10.9		0.215	1	46.6		1.11	5	7.6		0.223	1
Copper	7440-50-8	100	43000	100000	43000	mg/kg	59.9		0.249	1	25.3		0.249	1	88.9		1.28	5	160		0.258	1
Iron	7439-89-6	NS	NS	190000	190000	mg/kg	31600		26.7	5	29300		5.33	1	69100		27.4	5	26700		5.53	1
Lead	7439-92-1	0.5	450	1000	450	mg/kg	229		0.68	1	21.2		0.68	1	20.8		3.5	5	225		0.704	1
Magnesium	7439-95-4	NS	NS	NS	NS	mg/kg	4450		2.88	1	23700		2.88	1	2100		2.96	1	3450		2.98	1
Manganese	7439-96-5	30	2000	130000	2000	mg/kg	413		0.088	1	804		0.088	1	798		0.091	1	214		0.092	1
Mercury	7439-97-6	0.2	10	450	10	mg/kg	2.24		0.016	5	0.0447	J	0.003	1	0.0188	J	0.003	1	0.414		0.003	1
Nickel	7440-02-0	10	650	56000	650	mg/kg	63.1		0.215	1	17.7		0.215	1	132		1.11	5	26.1		0.223	1
Potassium	7440-09-7	NS	NS	NS	NS	mg/kg	1260		20.4	1	1200		20.4	1	1010		105	5	1550		21.1	1
Selenium	7782-49-2	5	26	14000	26	mg/kg	ND	U	1.11	1	1.94	J	1.11	1	ND	U	5.71	5	ND	U	1.15	1
Silver	7440-22-4	10	84	14000	84	mg/kg	ND	U	0.204	1	ND	U	0.204	1	ND	U	1.05	5	ND	U	0.211	1
Sodium	7440-23-5	NS	NS	NS	NS	mg/kg	122		42.3	1	70.7	J	42.2	1	147		43.5	1	83.3	J	43.8	1
Thallium	7440-28-0	0.2	14	200	14	mg/kg	ND	U	1.64	1	ND	U	1.64	1	ND	U	8.45	5	ND	U	1.7	1
Vanadium	7440-62-2	72	72000	20000	20000	mg/kg	163		0.215	1	33.1		0.215	1	141		1.11	5	50.2		0.223	1
Zinc	7440-66-6	200	12000	190000	12000	mg/kg	234		0.748	1	72		0.747	1	66.4		3.85	5	109		0.775	1
General Chemistry																						
Moisture, Percent	MOIST	NS	NS	NS	NS	%	15.2		0.5	1	15.1		0.5	1	14.2		0.5	1	17.3		0.5	1

Notes:
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard
All soil samples in this table are considered saturated soils.

Qualifiers:
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

Exceedance Summary:
10 - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
10 - Concentration Exceeds the PADEP Non-Residential Direct Contact Standard

Table 7
Summary of Analytical Results for Waste in CAMU Areas
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (2 - 15 ft bgs)	PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500)	Location ID	BH-10-44				BH-10-45				BH-10-46				BH-10-55				BH-10-56			
							Sample ID	BH-10-44-WC_10-12'				BH-10-45-WC_5-8'				BH-10-46-WC_5-8'				BH-10-55-WC_5-8'				BH-10-56-WC_10-12'			
							Sample Date	4/12/2011				4/12/2011				4/12/2011				4/12/2011				4/12/2011			
							Sample Matrix	Waste Soil				Waste Soil				Waste Soil				Waste Soil				Waste Soil			
							Sample Interval	10.0-12.0 ft bgs				5.0-8.0 ft bgs				5.0-8.0 ft bgs				5.0-8.0 ft bgs				10.0-12.0 ft bgs			
							Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Volatile Organic Compounds																											
1,1,1-Trichloroethane	71-55-6	20	7.2	0.72	10000.00	20	mg/kg	ND	U	0.36	172.4	ND	U	0.076	61.23	ND	U	0.68	558.5	ND	U	0.11	66.54	ND	U	0.093	62.71
1,1,2,2-Tetrachloroethane	79-34-5	0.03	0.0093	0.00093	44	0.03	mg/kg	ND	U	**0.36**	172.4	ND	U	**0.076**	61.23	ND	U	**0.68**	558.5	ND	U	**0.11**	66.54	ND	U	**0.093**	62.71
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	10000	10000	1000	10000	10000	mg/kg	ND	U	0.71	172.4	ND	U	0.15	61.23	ND	U	1.4	558.5	ND	U	0.22	66.54	ND	U	0.19	62.71
1,1,2-Trichloroethane	79-00-5	0.5	0.15	0.015	160	0.5	mg/kg	ND	U	0.36	172.4	ND	U	0.076	61.23	ND	U	**0.68**	558.5	ND	U	0.11	66.54	ND	U	0.093	62.71
1,1-Dichloroethane	75-34-3	16	3.9	0.39	1600	16	mg/kg	ND	U	0.36	172.4	ND	U	0.076	61.23	ND	U	0.68	558.5	ND	U	0.11	66.54	ND	U	0.093	62.71
1,1-Dichloroethene	75-35-4	0.7	0.19	0.019	10000	0.7	mg/kg	ND	U	0.36	172.4	ND	U	0.076	61.23	ND	U	0.68	558.5	ND	U	0.11	66.54	ND	U	0.093	62.71
1,2,4-Trichlorobenzene	120-82-1	7	27	2.7	10000	7	mg/kg	ND	U	0.36	172.4	ND	U	0.076	61.23	ND	U	0.68	558.5	ND	U	0.11	66.54	ND	U	0.093	62.71
1,2-Dibromo-3-Chloropropane	96-12-8	0.02	0.0092	0.00092	0.43	0.02	mg/kg	ND	U	**0.71**	172.4	ND	U	**0.15**	61.23	ND	U	**1.4**	558.5	ND	U	**0.22**	66.54	ND	U	**0.19**	62.71
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.005	0.0012	0.00012	4.3	0.005	mg/kg	ND	U	**0.36**	172.4	ND	U	**0.076**	61.23	ND	U	**0.68**	558.5	ND	U	**0.11**	66.54	ND	U	**0.093**	62.71
1,2-Dichlorobenzene	95-50-1	60	59	5.9	10000	60	mg/kg	ND	U	0.36	172.4	ND	U	0.076	61.23	ND	U	0.68	558.5	ND	U	0.11	66.54	ND	U	0.093	62.71
1,2-Dichloroethane	107-06-2	0.5	0.1	0.01	98	0.5	mg/kg	ND	U	0.36	172.4	ND	U	0.076	61.23	ND	U	**0.68**	558.5	ND	U	0.11	66.54	ND	U	0.093	62.71
1,2-Dichloropropane	78-87-5	0.5	0.11	0.011	260	0.5	mg/kg	ND	U	0.36	172.4	ND	U	0.076	61.23	ND	U	**0.68**	558.5	ND	U	0.11	66.54	ND	U	0.093	62.71
1,3-Dichlorobenzene	541-73-1	60	61	6.1	10000	60	mg/kg	ND	U	0.36	172.4	ND	U	0.076	61.23	ND	U	0.68	558.5	ND	U	0.11	66.54	ND	U	0.093	62.71
1,4-Dichlorobenzene	106-46-7	7.5	10	1	230	7.5	mg/kg	ND	U	0.36	172.4	ND	U	0.076	61.23	ND	U	0.68	558.5	ND	U	0.11	66.54	ND	U	0.093	62.71
2-Hexanone	591-78-6	4.4	1.1	0.11	460	4.4	mg/kg	ND	U	1.1	172.4	ND	U	0.23	61.23	ND	U	2	558.5	ND	U	0.33	66.54	ND	U	0.28	62.71
Acetone	67-64-1	9200	1000	100	10000	9200	mg/kg	ND	U	2.5	172.4	ND	U	0.53	61.23	ND	U	4.7	558.5	ND	U	0.77	66.54	ND	U	0.65	62.71
Benzene	71-43-2	0.5	0.13	0.013	330	0.5	mg/kg	8.1		0.18	172.4	0.89		0.038	61.23	1.1	J	0.34	558.5	ND	U	0.055	66.54	11		0.046	62.71
Bromodichloromethane	75-27-4	8	2.7	0.27	69	8	mg/kg	ND	U	0.36	172.4	ND	U	0.076	61.23	ND	U	0.68	558.5	ND	U	0.11	66.54	ND	U	0.093	62.71
Bromoform	75-25-2	8	3.5	0.35	2300	8	mg/kg	ND	U	0.36	172.4	ND	U	0.076	61.23	ND	U	0.68	558.5	ND	U	0.11	66.54	ND	U	0.093	62.71
Bromomethane	74-83-9	1	0.54	0.054	460	1	mg/kg	ND	U	0.71	172.4	ND	U	0.15	61.23	ND	U	**1.4**	558.5	ND	U	0.22	66.54	ND	U	0.19	62.71
Carbon Disulfide	75-15-0	620	530	53	10000	620	mg/kg	ND	U	0.36	172.4	ND	U	0.076	61.23	ND	U	0.68	558.5	ND	U	0.11	66.54	ND	U	0.093	62.71
Carbon Tetrachloride	56-23-5	0.5	0.26	0.026	170	0.5	mg/kg	ND	U	0.36	172.4	ND	U	0.076	61.23	ND	U	**0.68**	558.5	ND	U	0.11	66.54	ND	U	0.093	62.71
Chlorobenzene	108-90-7	10	6.1	0.61	4600	10	mg/kg	ND	U	0.36	172.4	ND	U	0.076	61.23	ND	U	0.68	558.5	ND	U	0.11	66.54	ND	U	0.093	62.71
Chloroethane	75-00-3	90	19	1.9	10000	90	mg/kg	ND	U	0.71	172.4	ND	U	0.15	61.23	ND	U	1.4	558.5	ND	U	0.22	66.54	ND	U	0.19	62.71
Chloroform	67-66-3	8	2	0.2	110	8	mg/kg	ND	U	0.36	172.4	ND	U	0.076	61.23	ND	U	0.68	558.5	ND	U	0.11	66.54	ND	U	0.093	62.71
Chloromethane	74-87-3	3	0.38	0.038	1400	3	mg/kg	ND	U	0.71	172.4	ND	U	0.15	61.23	ND	U	1.4	558.5	ND	U	0.22	66.54	ND	U	0.19	62.71
Cis-1,2-Dichloroethylene	156-59-2	7	1.6	0.16	10000	7	mg/kg	ND	U	0.36	172.4	ND	U	0.076	61.23	ND	U	0.68	558.5	ND	U	0.11	66.54	ND	U	0.093	62.71
Cis-1,3-Dichloropropene	10061-01-5	NS	NS	NS	NS	NS	mg/kg	ND	U	0.36	172.4	ND	U	0.076	61.23	ND	U	0.68	558.5	ND	U	0.11	66.54	ND	U	0.093	62.71
Cyclohexane	110-82-7	5300	6900	690	10000	5300	mg/kg	13		0.36	172.4	2.1		0.076	61.23	0.77	J	0.68	558.5	0.21	J	0.11	66.54	0.59		0.093	62.71
Dibromochloromethane	124-48-1	8	2.5	0.25	95	8	mg/kg	ND	U	0.36	172.4	ND	U	0.076	61.23	ND	U	0.68	558.5	ND	U	0.11	66.54	ND	U	0.093	62.71
Dichlorodifluoromethane	75-71-8	100	100	10	10000	100	mg/kg	ND	U	0.71	172.4	ND	U	0.15	61.23	ND	U	1.4	558.5	ND	U	0.22	66.54	ND	U	0.19	62.71
Dimethyl Benzene/ Xylenes, Total	1330-20-7	1000	990	99	9100	1000	mg/kg	460		3.6	1724	11		0.076	61.23	7.3		0.68	558.5	2.7		0.11	66.54	13		0.093	62.71
Ethylbenzene	100-41-4	70	46	4.6	10000	70	mg/kg	76		0.36	172.4	5.9		0.076	61.23	ND	U	0.68	558.5	0.39	J	0.11	66.54	2.5		0.093	62.71
Isopropylbenzene (Cumene)	98-82-8	350	2500	250	10000	350	mg/kg	20		0.36	172.4	3.9		0.076	61.23	ND	U	0.68	558.5	0.53	J	0.11	66.54	1.2		0.093	62.71
Methyl Acetate	79-20-9	10000	1900	190	10000	10000	mg/kg	ND	U	0.71	172.4	0.26	J	0.15	61.23	6.6		1.4	558.5	ND	U	0.22	66.54	0.67		0.19	62.71
Methyl Ethyl Ketone (2-Butanone)	78-93-3	400	76	7.6	10000	400	mg/kg	ND	U	1.4	172.4	ND	U	0.31	61.23	ND	U	2.7	558.5	ND	U	0.44	66.54	ND	U	0.37	62.71
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	820	130	13	10000	820	mg/kg	ND	U	1.1	172.4	ND	U	0.23	61.23	ND	U	2	558.5	ND	U	0.33	66.54	ND	U	0.28	62.71
Methylcyclohexane	108-87-2	NS	NS	NS	NS	NS	mg/kg	63		0.36	172.4	12		0.076	61.23	1.6	J	0.68	558.5	2.3		0.11	66.54	1.5		0.093	62.71
Methylene Chloride	75-09-2	0.5	0.076	0.0076	5400	0.5	mg/kg	ND	U	**0.71**	172.4	ND	U	0.15	61.23	ND	U	**1.4**	558.5	ND	U	0.22	66.54	0.5		0.19	62.71
Styrene	100-42-5	10	24	2.4	10000	10	mg/kg	ND	U	0.36	172.4	ND	U	0.076	61.23	ND	U	0.68	558.5	ND	U	0.11	66.54	ND	U	0.093	62.71
Tert-Butyl Methyl Ether	1634-04-4	2	0.28	0.028	3700	2	mg/kg	ND	U	0.18	172.4	ND	U	0.038	61.23	ND	U	0.34	558.5	ND	U	0.055	66.54	ND	U	0.046	62.71
Tetrachloroethylene(PCE)	127-18-4	0.5	0.43	0.043	4400	0.5	mg/kg	ND	U	0.36	172.4	ND	U	0.076	61.23	ND	U	**0.68**	558.5	ND	U	0.11	66.54	0.52		0.093	62.71
Toluene	108-88-3	100	44	4.4	10000	100	mg/kg	140		3.6	1724	0.36	J	0.076	61.23	3.3	J	0.68	558.5	ND	U	0.11	66.54	11		0.093	62.71
Trans-1,2-Dichloroethene	156-60-5	10	2.3	0.23	5500	10	mg/kg	ND	U	0.36	172.4	ND	U	0.076	61.23	ND	U	0.68	558.5	ND	U	0.11	66.54	ND	U	0.093	62.71
Trans-1,3-Dichloropropene	10061-02-6	NS	NS	NS	NS	NS	mg/kg	ND	U	0.36	172.4	ND	U	0.076	61.23	ND	U	0.68	558.5	ND	U	0.11	66.54	ND	U	0.093	62.71
Trichloroethylene (TCE)	79-01-6	0.5	0.17	0.017	1500	0.5	mg/kg	ND	U	0.36	172.4	ND	U	0.076	61.23	ND	U	**0.68**	558.5	ND	U	0.11	66.54	0.11	J	0.093	62.71
Trichlorofluoromethane	75-69-4	200	87	8.7	10000	200	mg/kg	ND	U	0.71	172.4	ND	U	0.15	61.23	ND	U	1.4	558.5	ND	U	0.22	66.54	ND	U	0.19	62.71
Vinyl Chloride	75-01-4	0.2	0.027	0.0027	580	0.2	mg/kg	ND	U	**0.36**	172.4	ND	U	0.076	61.23	ND	U	**0.68**	558.5	ND	U	0.11	66.54	ND	U	0.093	62.71

Table 7
Summary of Analytical Results for Waste in CAMU Areas
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (2 - 15 ft bgs)	PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500)	Location ID	BH-10-44				BH-10-45				BH-10-46				BH-10-55				BH-10-56			
							Sample ID	BH-10-44-WC_10-12'				BH-10-45-WC_5-8'				BH-10-46-WC_5-8'				BH-10-55-WC_5-8'				BH-10-56-WC_10-12'			
							Sample Date	4/12/2011				4/12/2011				4/12/2011				4/12/2011				4/12/2011			
							Sample Matrix	Waste Soil				Waste Soil				Waste Soil				Waste Soil				Waste Soil			
							Sample Interval	10.0-12.0 ft bgs				5.0-8.0 ft bgs				5.0-8.0 ft bgs				5.0-8.0 ft bgs				10.0-12.0 ft bgs			
							Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Semi-Volatile Organic Compounds																											
2,4,5-Trichlorophenol	95-95-4	1000	6100	610	190000	1000	mg/kg	ND	U	8.3	10	ND	U	4.1	5	ND	U	4	10	ND	U	0.54	1	ND	U	2.4	5
2,4,6-Trichlorophenol	88-06-2	10	29	2.9	190000	10	mg/kg	ND	U	4.1	10	ND	U	2.1	5	ND	U	2	10	ND	U	0.27	1	ND	U	1.2	5
2,4-Dichlorophenol	120-83-2	2	1	0.1	190000	2	mg/kg	ND	U	**4.1**	10	ND	U	**2.1**	5	ND	U	**2**	10	ND	U	0.27	1	ND	U	1.2	5
2,4-Dimethylphenol	105-67-9	200	87	8.7	10000	200	mg/kg	ND	U	8.3	10	ND	U	4.1	5	ND	U	4	10	ND	U	0.54	1	ND	U	2.4	5
2,4-Dinitrophenol	51-28-5	20	2.3	0.23	190000	20	mg/kg	ND	U	**41**	10	ND	U	**21**	5	ND	U	**20**	10	ND	U	2.7	1	ND	U	12	5
2,4-Dinitrotoluene	121-14-2	0.84	0.2	0.02	190000	0.84	mg/kg	ND	U	**8.3**	10	ND	U	**4.1**	5	ND	U	**4**	10	ND	U	0.54	1	ND	U	**2.4**	5
2,6-Dinitrotoluene	606-20-2	10	3	0.3	190000	10	mg/kg	ND	U	4.1	10	ND	U	2.1	5	ND	U	2	10	ND	U	0.27	1	ND	U	1.2	5
2-Chloronaphthalene	91-58-7	820	18000	1800	190000	1800	mg/kg	ND	U	4.1	10	ND	U	2.1	5	ND	U	2	10	ND	U	0.27	1	ND	U	1.2	5
2-Chlorophenol	95-57-8	4	4.4	0.44	10000	4	mg/kg	ND	U	**4.1**	10	ND	U	2.1	5	ND	U	2	10	ND	U	0.27	1	ND	U	1.2	5
2-Methylnaphthalene	91-57-6	41	1600	160	190000	160	mg/kg	1500		21	50	110		2.1	5	39		2	10	18		0.27	1	15		1.2	5
2-Methylphenol (O-Cresol)	95-48-7	510	85	8.5	190000	510	mg/kg	ND	U	8.3	10	ND	U	4.1	5	ND	U	4	10	ND	U	0.54	1	ND	U	2.4	5
2-Nitroaniline	88-74-4	31	5.5	0.55	190000	31	mg/kg	ND	U	4.1	10	ND	U	2.1	5	ND	U	2	10	ND	U	0.27	1	ND	U	1.2	5
2-Nitrophenol	88-75-5	82	17	1.7	190000	82	mg/kg	ND	U	4.1	10	ND	U	2.1	5	ND	U	2	10	ND	U	0.27	1	ND	U	1.2	5
3,3'-Dichlorobenzidine	91-94-1	0.58	32	3.2	190000	3.2	mg/kg	ND	U	**12**	10	ND	U	**6.2**	5	ND	U	**6**	10	ND	U	0.82	1	ND	U	**3.7**	5
3-Nitroaniline	99-09-2	3.1	0.48	0.048	190000	3.1	mg/kg	ND	U	**8.3**	10	ND	U	**4.1**	5	ND	U	**4**	10	ND	U	0.54	1	ND	U	2.4	5
4,6-Dinitro-2-Methylphenol	534-52-1	1	0.75	0.075	190000	1	mg/kg	ND	U	**21**	10	ND	U	**10**	5	ND	U	**10**	10	ND	U	**1.4**	1	ND	U	**6.1**	5
4-Bromophenyl Phenyl Ether	101-55-3	NS	NS	NS	NS	NS	mg/kg	ND	U	4.1	10	ND	U	2.1	5	ND	U	2	10	ND	U	0.27	1	ND	U	1.2	5
4-Chloro-3-Methylphenol	59-50-7	51	110	11	190000	51	mg/kg	ND	U	8.3	10	ND	U	4.1	5	ND	U	4	10	ND	U	0.54	1	ND	U	2.4	5
4-Chloroaniline	106-47-8	1.3	1.6	0.16	190000	1.3	mg/kg	ND	U	**8.3**	10	ND	U	**4.1**	5	ND	U	**4**	10	ND	U	0.54	1	ND	U	**2.4**	5
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	NS	NS	NS	NS	mg/kg	ND	U	4.1	10	ND	U	2.1	5	ND	U	2	10	ND	U	0.27	1	ND	U	1.2	5
4-Methylphenol (P-Cresol)	106-44-5	51	12	1.2	190000	51	mg/kg	ND	U	8.3	10	ND	U	4.1	5	ND	U	4	10	ND	U	0.54	1	ND	U	2.4	5
4-Nitroaniline	100-01-6	13	1.9	0.19	190000	13	mg/kg	ND	U	8.3	10	ND	U	4.1	5	ND	U	4	10	ND	U	0.54	1	ND	U	2.4	5
4-Nitrophenol	100-02-7	6	4.1	0.41	190000	6	mg/kg	ND	U	**21**	10	ND	U	**10**	5	ND	U	**10**	10	ND	U	1.4	1	ND	U	**6.1**	5
Acenaphthene	83-32-9	380	4700	470	190000	470	mg/kg	66		4.1	10	5.7	J	2.1	5	ND	U	2	10	1.6		0.27	1	2.2	J	1.2	5
Acenaphthylene	208-96-8	610	6900	690	190000	690	mg/kg	ND	U	4.1	10	ND	U	2.1	5	ND	U	2	10	ND	U	0.27	1	ND	U	1.2	5
Acetophenone	98-86-2	1000	540	54	10000	1000	mg/kg	ND	U	8.3	10	ND	U	4.1	5	ND	U	4	10	ND	U	0.54	1	ND	U	2.4	5
Anthracene	120-12-7	6.6	350	35	190000	35	mg/kg	32		4.1	10	2.5	J	2.1	5	ND	U	2	10	0.45	J	0.27	1	1.5	J	1.2	5
Atrazine	1912-24-9	0.3	0.13	0.013	190000	0.3	mg/kg	ND	U	**4.1**	10	ND	U	**2.1**	5	ND	U	**2**	10	ND	U	0.27	1	ND	U	**1.2**	5
Benzaldehyde	100-52-7	NS	NS	NS	NS	NS	mg/kg	ND	U	8.3	10	ND	U	4.1	5	ND	U	4	10	ND	U	0.54	1	ND	U	2.4	5
Benzo(A)Anthracene	56-55-3	0.36	320	32	190000	32	mg/kg	8.4	J	4.1	10	3.4	J	2.1	5	ND	U	2	10	0.34	J	0.27	1	3.3	J	1.2	5
Benzo(A)Pyrene	50-32-8	0.02	46	4.6	190000	4.6	mg/kg	ND	U	4.1	10	ND	U	2.1	5	7.3	J	2	10	ND	U	0.27	1	3.1	J	1.2	5
Benzo(B)Fluoranthene	205-99-2	0.12	170	17	190000	17	mg/kg	ND	U	4.1	10	ND	U	2.1	5	2.4	J	2	10	ND	U	0.27	1	2.6	J	1.2	5
Benzo(G,H,I)Perylene	191-24-2	0.026	180	18	190000	18	mg/kg	ND	U	4.1	10	ND	U	2.1	5	ND	U	2	10	ND	U	0.27	1	3.3	J	1.2	5
Benzo(K)Fluoranthene	207-08-9	0.055	610	61	190000	61	mg/kg	ND	U	4.1	10	ND	U	2.1	5	ND	U	2	10	ND	U	0.27	1	ND	U	1.2	5
Benzyl Butyl Phthalate	85-68-7	140	10000	1000	10000	1000	mg/kg	ND	U	8.3	10	ND	U	4.1	5	ND	U	4	10	ND	U	0.54	1	ND	U	2.4	5
Biphenyl (Diphenyl)	92-52-4	510	2200	220	190000	510	mg/kg	98		4.1	10	6.4	J	2.1	5	ND	U	2	10	1.6		0.27	1	ND	U	1.2	5
Bis(2-Chloroethoxy) Methane	111-91-1	31	8.2	0.82	10000	31	mg/kg	ND	U	4.1	10	ND	U	2.1	5	ND	U	2	10	ND	U	0.27	1	ND	U	1.2	5
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	0.076	0.023	0.0023	7.7	0.076	mg/kg	ND	U	**4.1**	10	ND	U	**2.1**	5	ND	U	**2**	10	ND	U	**0.27**	1	ND	U	**1.2**	5
Bis(2-Chloroisopropyl) Ether	108-60-1	30	8	0.8	250	30	mg/kg	ND	U	4.1	10	ND	U	2.1	5	ND	U	2	10	ND	U	0.27	1	ND	U	1.2	5
Bis(2-Ethylhexyl) Phthalate	117-81-7	0.6	130	13	10000	13	mg/kg	ND	U	8.3	10	ND	U	4.1	5	ND	U	4	10	ND	U	0.54	1	ND	U	2.4	5
Caprolactam	105-60-2	NS	NS	NS	NS	NS	mg/kg	ND	U	4.1	10	ND	U	2.1	5	ND	U	2	10	ND	U	0.27	1	ND	U	1.2	5
Carbazole	86-74-8	13	83	8.3	190000	13	mg/kg	ND	U	4.1	10	ND	U	2.1	5	ND	U	2	10	ND	U	0.27	1	ND	U	1.2	5
Chrysene	218-01-9	0.19	230	23	190000	23	mg/kg	16	J	4.1	10	15		2.1	5	14		2	10	0.67	J	0.27	1	5.7	J	1.2	5
Dibenz(A,H)Anthracene	53-70-3	0.036	160	16	190000	16	mg/kg	ND	U	4.1	10	ND	U	2.1	5	ND	U	2	10	ND	U	0.27	1	ND	U	1.2	5
Dibenzofuran	132-64-9	10	260	26	190000	26	mg/kg	57		4.1	10	ND	U	2.1	5	ND	U	2	10	ND	U	0.27	1	1.8	J	1.2	5
Diethyl Phthalate	84-66-2	8200	2600	260	10000	8200	mg/kg	ND	U	8.3	10	ND	U	4.1	5	ND	U	4	10	ND	U	0.54	1	ND	U	2.4	5
Dimethyl Phthalate	131-11-3	NS	NS	NS	NS	NS	mg/kg	ND	U	8.3	10	ND	U	4.1	5	ND	U	4	10	ND	U	0.54	1	ND	U	2.4	5
Di-N-Butyl Phthalate	84-74-2	1000	4100	410	10000	1000	mg/kg	ND	U	8.3	10	ND	U	4.1	5	ND	U	4	10	ND	U	0.54	1	ND	U	2.4	5
Di-N-Octylphthalate	117-84-0	300	10000	1000	10000	1000	mg/kg	ND	U	8.3	10	ND	U	4.1	5	ND	U	4	10	ND	U	0.54	1	ND	U	2.4	5
Fluoranthene	206-44-0	26	3200	320	190000	320	mg/kg	6.3	J	4.1	10	ND	U	2.1	5	ND	U	2	10	0.33	J	0.27	1	2.3	J	1.2	5

Table 7
Summary of Analytical Results for Waste in CAMU Areas
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (2 - 15 ft bgs)	PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500)	Location ID	BH-10-44				BH-10-45				BH-10-46				BH-10-55				BH-10-56			
							Sample ID	BH-10-44-WC_10-12'				BH-10-45-WC_5-8'				BH-10-46-WC_5-8'				BH-10-55-WC_5-8'				BH-10-56-WC_10-12'			
							Sample Date	4/12/2011				4/12/2011				4/12/2011				4/12/2011				4/12/2011			
							Sample Matrix	Waste Soil				Waste Soil				Waste Soil				Waste Soil				Waste Soil			
							Sample Interval	10.0-12.0 ft bgs				5.0-8.0 ft bgs				5.0-8.0 ft bgs				5.0-8.0 ft bgs				10.0-12.0 ft bgs			
							Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Fluorene	86-73-7	190	3800	380	190000	380	mg/kg	96		4.1	10	8.6	J	2.1	5	ND	U	2	10	1.5		0.27	1	2.7	J	1.2	5
Hexachlorobenzene	118-74-1	0.1	0.96	0.096	190000	0.1	mg/kg	ND	U	**4.1**	10	ND	U	**2.1**	5	ND	U	**2**	10	ND	U	**0.27**	1	ND	U	**1.2**	5
Hexachlorobutadiene	87-68-3	3.3	39	3.9	10000	3.9	mg/kg	ND	U	**8.3**	10	ND	U	**4.1**	5	ND	U	**4**	10	ND	U	0.54	1	ND	U	2.4	5
Hexachlorocyclopentadiene	77-47-4	5	91	9.1	10000	9.1	mg/kg	ND	U	**21**	10	ND	U	**10**	5	ND	U	**10**	10	ND	U	1.4	1	ND	U	6.1	5
Hexachloroethane	67-72-1	0.1	0.56	0.056	640	0.1	mg/kg	ND	U	**4.1**	10	ND	U	**2.1**	5	ND	U	**2**	10	ND	U	**0.27**	1	ND	U	**1.2**	5
Indeno[1,2,3-cd]pyrene	193-39-5	0.36	28000	2800	190000	2800	mg/kg	ND	U	4.1	10	ND	U	2.1	5	ND	U	2	10	ND	U	0.27	1	1.4	J	1.2	5
Isophorone	78-59-1	10	1.9	0.19	10000	10	mg/kg	ND	U	4.1	10	ND	U	2.1	5	ND	U	2	10	ND	U	0.27	1	ND	U	1.2	5
Naphthalene	91-20-3	10	25	2.5	190000	10	mg/kg	410		4.1	10	27		2.1	5	16		2	10	2.5		0.27	1	7.1		1.2	5
Nitrobenzene	98-95-3	20	8.7	0.87	10000	20	mg/kg	ND	U	4.1	10	ND	U	2.1	5	ND	U	2	10	ND	U	0.27	1	ND	U	1.2	5
N-Nitrosodi-N-Propylamine	621-64-7	0.037	0.0051	0.00051	10000	0.037	mg/kg	ND	U	**4.1**	10	ND	U	**2.1**	5	ND	U	**2**	10	ND	U	**0.27**	1	ND	U	**1.2**	5
N-Nitrosodiphenylamine	86-30-6	53	83	8.3	190000	53	mg/kg	ND	U	4.1	10	15		2.1	5	ND	U	2	10	ND	U	0.27	1	ND	U	1.2	5
Pentachlorophenol	87-86-5	0.1	5	0.5	190000	0.5	mg/kg	ND	U	**21**	10	ND	U	**10**	5	ND	U	**10**	10	ND	U	**1.4**	1	ND	U	**6.1**	5
Phenanthrene	85-01-8	110	10000	1000	190000	1000	mg/kg	200		4.1	10	23		2.1	5	9.4	J	2	10	5.6		0.27	1	12		1.2	5
Phenol	108-95-2	200	33	3.3	190000	200	mg/kg	ND	U	4.1	10	ND	U	2.1	5	ND	U	2	10	ND	U	0.27	1	ND	U	1.2	5
Pyrene	129-00-0	13	2200	220	190000	220	mg/kg	21	J	4.1	10	4.7	J	2.1	5	6.1	J	2	10	0.72	J	0.27	1	4.7	J	1.2	5
Metals																											
Aluminum	7429-90-5	NS	NS	NS	190000	190000	mg/kg	20400		10.3	1	12000		6.09	1	7050		5.98	1	14000		8.22	1	15500		7.45	1
Antimony	7440-36-0	0.6	27	2.7	190000	2.7	mg/kg	4.02	J	2.05	1	ND	U	1.21	1	ND	U	1.19	1	ND	U	**8.17**	5	ND	U	1.48	1
Arsenic	7440-38-2	1	29	2.9	190000	2.9	mg/kg	21.9		1.95	1	10.7		1.15	1	6.14		1.13	1	12.7		1.55	1	13.5		1.41	1
Barium	7440-39-3	200	8200	820	190000	820	mg/kg	349		0.082	1	122		0.048	1	116		0.048	1	88.8		0.065	1	178		0.059	1
Beryllium	7440-41-7	0.4	320	32	190000	32	mg/kg	0.664	J	0.139	1	0.551	J	0.082	1	0.103	J	0.081	1	0.425	J	0.111	1	0.64	J	0.101	1
Cadmium	7440-43-9	0.5	38	3.8	190000	3.8	mg/kg	0.744	J	0.287	1	ND	U	0.169	1	ND	U	0.166	1	0.422	J	0.229	1	ND	U	0.207	1
Calcium	7440-70-2	NS	NS	NS	NS	NS	mg/kg	140000		62.8	5	20900		7.42	1	9240		7.28	1	152000		50.1	5	53700		9.08	1
Chromium, Total	7440-47-3	NS	NS	NS	NS	NS	mg/kg	908		1.21	1	160		0.714	1	20.1		0.701	1	475		0.964	1	282		0.874	1
Cobalt	7440-48-4	3	140	14	190000	14	mg/kg	10.2		0.389	1	10		0.23	1	1.01		0.226	1	6.24		0.31	1	9.6		0.281	1
Copper	7440-50-8	100	43000	4300	190000	4300	mg/kg	191		0.451	1	80.3		0.266	1	165		0.261	1	120		0.359	1	163		0.326	1
Iron	7439-89-6	NS	NS	NS	190000	190000	mg/kg	16200		9.66	1	26600		5.7	1	4770		5.6	1	11300		7.7	1	28100		6.98	1
Lead	7439-92-1	0.5	450	45	190000	45	mg/kg	640		1.23	1	307		0.726	1	79.6		0.713	1	316		0.98	1	676		0.889	1
Magnesium	7439-95-4	NS	NS	NS	NS	NS	mg/kg	47000		5.21	1	8680		3.07	1	2330		3.02	1	116000		20.7	5	24900		3.76	1
Manganese	7439-96-5	30	2000	200	190000	200	mg/kg	937		0.16	1	434		0.094	1	110		0.093	1	617		0.127	1	675		0.116	1
Mercury	7439-97-6	0.2	10	1	190000	1	mg/kg	1.07		0.006	1	0.667		0.003	1	0.0629	J	0.003	1	0.116	J	0.005	1	1.88		0.021	5
Nickel	7440-02-0	10	650	65	190000	65	mg/kg	53.4		0.389	1	34.1		0.23	1	9.31		0.226	1	38.4		0.31	1	67.7		0.281	1
Potassium	7440-09-7	NS	NS	NS	NS	NS	mg/kg	990		36.9	1	1490		21.8	1	397		21.4	1	496		29.4	1	2010		26.7	1
Selenium	7782-49-2	5	26	2.6	190000	5	mg/kg	ND	U	2.01	1	ND	U	1.19	1	ND	U	1.16	1	1.68	J	1.6	1	ND	U	1.45	1
Silver	7440-22-4	10	84	8.4	190000	10	mg/kg	ND	U	0.369	1	ND	U	0.218	1	ND	U	0.214	1	ND	U	0.294	1	0.29	J	0.267	1
Sodium	7440-23-5	NS	NS	NS	NS	NS	mg/kg	269		76.5	1	114	J	45.2	1	114	J	44.3	1	85.4	J	60.9	1	402		55.3	1
Thallium	7440-28-0	0.2	14	1.4	190000	1.4	mg/kg	ND	U	**2.97**	1	4.31		**1.76**	1	ND	U	**1.72**	1	3.3	J	**2.37**	1	6.02		**2.15**	1
Vanadium	7440-62-2	72	72000	7200	190000	7200	mg/kg	100		0.389	1	76.5		0.23	1	19.8		0.226	1	71.7		0.31	1	120		0.281	1
Zinc	7440-66-6	200	12000	1200	190000	1200	mg/kg	870		1.35	1	229		0.799	1	21.3		0.784	1	641		1.08	1	513		0.978	1
General Chemistry																											
Moisture, Percent	MOIST	NS	NS	NS	NS	NS	%	51.7		0.5	1	19.8		0.5	1	17.5		0.5	1	39.4		0.5	1	32.5		0.5	1

Notes:
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard
All soil samples in this table are considered saturated soils.

Qualifiers:
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

Exceedance Summary:
10 - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Direct Contact Standard

Table 7
Summary of Analytical Results for Waste in CAMU Areas
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (2 - 15 ft bgs)	PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500)	Location ID	BH-10-63				BH-10-64				BH-10-65				BH-10-69			
							Sample ID	BH-10-63-WC_12-14'				BH-10-64-WC_11-13'				BH-10-65_6-8'				BH-10-69-WC_5-8'			
							Sample Date	4/13/2011				4/13/2011				4/14/2011				4/12/2011			
							Sample Matrix	Waste Soil				Waste Soil				Waste Soil				Waste Soil			
							Sample Interval	12.0-14.0 ft bgs				11.0-13.0 ft bgs				6.0-8.0 ft bgs				5.0-8.0 ft bgs			
							Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Volatile Organic Compounds																							
1,1,1-Trichloroethane	71-55-6	20	7.2	0.72	10000.00	20	mg/kg	ND	U	0.064	50.69	ND	U	0.13	104.6	ND	U	0.18	126.7	ND	U	0.68	547
1,1,2,2-Tetrachloroethane	79-34-5	0.03	0.0093	0.00093	44	0.03	mg/kg	ND	U	**0.064**	50.69	ND	U	**0.13**	104.6	ND	U	**0.18**	126.7	ND	U	**0.68**	547
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	10000	10000	1000	10000	10000	mg/kg	ND	U	0.13	50.69	ND	U	0.26	104.6	ND	U	0.37	126.7	ND	U	1.4	547
1,1,2-Trichloroethane	79-00-5	0.5	0.15	0.015	160	0.5	mg/kg	ND	U	0.064	50.69	ND	U	0.13	104.6	ND	U	0.18	126.7	ND	U	**0.68**	547
1,1-Dichloroethane	75-34-3	16	3.9	0.39	1600	16	mg/kg	ND	U	0.064	50.69	ND	U	0.13	104.6	ND	U	0.18	126.7	ND	U	0.68	547
1,1-Dichloroethene	75-35-4	0.7	0.19	0.019	10000	0.7	mg/kg	ND	U	0.064	50.69	ND	U	0.13	104.6	ND	U	0.18	126.7	ND	U	0.68	547
1,2,4-Trichlorobenzene	120-82-1	7	27	2.7	10000	7	mg/kg	ND	U	0.064	50.69	ND	U	0.13	104.6	ND	U	0.18	126.7	ND	U	0.68	547
1,2-Dibromo-3-Chloropropane	96-12-8	0.02	0.0092	0.00092	0.43	0.02	mg/kg	ND	U	**0.13**	50.69	ND	U	**0.26**	104.6	ND	U	**0.37**	126.7	ND	U	**1.4**	547
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.005	0.0012	0.00012	4.3	0.005	mg/kg	ND	U	**0.064**	50.69	ND	U	**0.13**	104.6	ND	U	**0.18**	126.7	ND	U	**0.68**	547
1,2-Dichlorobenzene	95-50-1	60	59	5.9	10000	60	mg/kg	ND	U	0.064	50.69	ND	U	0.13	104.6	ND	U	0.18	126.7	ND	U	0.68	547
1,2-Dichloroethane	107-06-2	0.5	0.1	0.01	98	0.5	mg/kg	ND	U	0.064	50.69	9.3		0.13	104.6	ND	U	0.18	126.7	ND	U	**0.68**	547
1,2-Dichloropropane	78-87-5	0.5	0.11	0.011	260	0.5	mg/kg	ND	U	0.064	50.69	ND	U	0.13	104.6	ND	U	0.18	126.7	ND	U	**0.68**	547
1,3-Dichlorobenzene	541-73-1	60	61	6.1	10000	60	mg/kg	ND	U	0.064	50.69	ND	U	0.13	104.6	ND	U	0.18	126.7	ND	U	0.68	547
1,4-Dichlorobenzene	106-46-7	7.5	10	1	230	7.5	mg/kg	ND	U	0.064	50.69	ND	U	0.13	104.6	ND	U	0.18	126.7	ND	U	0.68	547
2-Hexanone	591-78-6	4.4	1.1	0.11	460	4.4	mg/kg	ND	U	0.19	50.69	ND	U	0.39	104.6	ND	U	0.55	126.7	ND	U	2	547
Acetone	67-64-1	9200	1000	100	10000	9200	mg/kg	0.47	J	0.45	50.69	ND	U	0.9	104.6	ND	U	1.3	126.7	ND	U	4.7	547
Benzene	71-43-2	0.5	0.13	0.013	330	0.5	mg/kg	1.9		0.032	50.69	19		0.065	104.6	35		0.092	126.7	0.9	J	0.34	547
Bromodichloromethane	75-27-4	8	2.7	0.27	69	8	mg/kg	ND	U	0.064	50.69	ND	U	0.13	104.6	ND	U	0.18	126.7	ND	U	0.68	547
Bromoform	75-25-2	8	3.5	0.35	2300	8	mg/kg	ND	U	0.064	50.69	ND	U	0.13	104.6	ND	U	0.18	126.7	ND	U	0.68	547
Bromomethane	74-83-9	1	0.54	0.054	460	1	mg/kg	ND	U	0.13	50.69	ND	U	0.26	104.6	ND	U	0.37	126.7	ND	U	**1.4**	547
Carbon Disulfide	75-15-0	620	530	53	10000	620	mg/kg	ND	U	0.064	50.69	ND	U	0.13	104.6	ND	U	0.18	126.7	ND	U	0.68	547
Carbon Tetrachloride	56-23-5	0.5	0.26	0.026	170	0.5	mg/kg	ND	U	0.064	50.69	ND	U	0.13	104.6	ND	U	0.18	126.7	ND	U	**0.68**	547
Chlorobenzene	108-90-7	10	6.1	0.61	4600	10	mg/kg	ND	U	0.064	50.69	ND	U	0.13	104.6	ND	U	0.18	126.7	ND	U	0.68	547
Chloroethane	75-00-3	90	19	1.9	10000	90	mg/kg	ND	U	0.13	50.69	ND	U	0.26	104.6	ND	U	0.37	126.7	ND	U	1.4	547
Chloroform	67-66-3	8	2	0.2	110	8	mg/kg	ND	U	0.064	50.69	ND	U	0.13	104.6	ND	U	0.18	126.7	ND	U	0.68	547
Chloromethane	74-87-3	3	0.38	0.038	1400	3	mg/kg	ND	U	0.13	50.69	ND	U	0.26	104.6	ND	U	0.37	126.7	ND	U	1.4	547
Cis-1,2-Dichloroethylene	156-59-2	7	1.6	0.16	10000	7	mg/kg	ND	U	0.064	50.69	ND	U	0.13	104.6	ND	U	0.18	126.7	ND	U	0.68	547
Cis-1,3-Dichloropropene	10061-01-5	NS	NS	NS	NS	NS	mg/kg	ND	U	0.064	50.69	ND	U	0.13	104.6	ND	U	0.18	126.7	ND	U	0.68	547
Cyclohexane	110-82-7	5300	6900	690	10000	5300	mg/kg	1.9		0.064	50.69	2.8		0.13	104.6	6.7		0.18	126.7	1.7	J	0.68	547
Dibromochloromethane	124-48-1	8	2.5	0.25	95	8	mg/kg	ND	U	0.064	50.69	ND	U	0.13	104.6	ND	U	0.18	126.7	ND	U	0.68	547
Dichlorodifluoromethane	75-71-8	100	100	10	10000	100	mg/kg	ND	U	0.13	50.69	ND	U	0.26	104.6	ND	U	0.37	126.7	ND	U	1.4	547
Dimethyl Benzene/ Xylenes, Total	1330-20-7	1000	990	99	9100	1000	mg/kg	0.092	J	0.064	50.69	5.7		0.13	104.6	57		0.18	126.7	4.9		0.68	547
Ethylbenzene	100-41-4	70	46	4.6	10000	70	mg/kg	0.08	J	0.064	50.69	2.4		0.13	104.6	7.5		0.18	126.7	1.3	J	0.68	547
Isopropylbenzene (Cumene)	98-82-8	350	2500	250	10000	350	mg/kg	1.4		0.064	50.69	4.5		0.13	104.6	5.1		0.18	126.7	ND	U	0.68	547
Methyl Acetate	79-20-9	10000	1900	190	10000	10000	mg/kg	0.33		0.13	50.69	0.33	J	0.26	104.6	0.91	J	0.37	126.7	ND	U	1.4	547
Methyl Ethyl Ketone (2-Butanone)	78-93-3	400	76	7.6	10000	400	mg/kg	ND	U	0.26	50.69	ND	U	0.52	104.6	ND	U	0.73	126.7	ND	U	2.7	547
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	820	130	13	10000	820	mg/kg	ND	U	0.19	50.69	ND	U	0.39	104.6	ND	U	0.55	126.7	ND	U	2	547
Methylcyclohexane	108-87-2	NS	NS	NS	NS	NS	mg/kg	11		0.064	50.69	16		0.13	104.6	26		0.18	126.7	3.1	J	0.68	547
Methylene Chloride	75-09-2	0.5	0.076	0.0076	5400	0.5	mg/kg	ND	U	0.13	50.69	ND	U	0.26	104.6	ND	U	0.37	126.7	ND	U	**1.4**	547
Styrene	100-42-5	10	24	2.4	10000	10	mg/kg	ND	U	0.064	50.69	ND	U	0.13	104.6	ND	U	0.18	126.7	ND	U	0.68	547
Tert-Butyl Methyl Ether	1634-04-4	2	0.28	0.028	3700	2	mg/kg	ND	U	0.032	50.69	ND	U	0.065	104.6	ND	U	0.092	126.7	ND	U	0.34	547
Tetrachloroethylene(PCE)	127-18-4	0.5	0.43	0.043	4400	0.5	mg/kg	ND	U	0.064	50.69	ND	U	0.13	104.6	ND	U	0.18	126.7	ND	U	**0.68**	547
Toluene	108-88-3	100	44	4.4	10000	100	mg/kg	ND	U	0.064	50.69	0.64	J	0.13	104.6	5.8		0.18	126.7	1.1	J	0.68	547
Trans-1,2-Dichloroethene	156-60-5	10	2.3	0.23	5500	10	mg/kg	ND	U	0.064	50.69	ND	U	0.13	104.6	ND	U	0.18	126.7	ND	U	0.68	547
Trans-1,3-Dichloropropene	10061-02-6	NS	NS	NS	NS	NS	mg/kg	ND	U	0.064	50.69	ND	U	0.13	104.6	ND	U	0.18	126.7	ND	U	0.68	547
Trichloroethylene (TCE)	79-01-6	0.5	0.17	0.017	1500	0.5	mg/kg	ND	U	0.064	50.69	ND	U	0.13	104.6	ND	U	0.18	126.7	ND	U	**0.68**	547
Trichlorofluoromethane	75-69-4	200	87	8.7	10000	200	mg/kg	ND	U	0.13	50.69	ND	U	0.26	104.6	ND	U	0.37	126.7	ND	U	1.4	547
Vinyl Chloride	75-01-4	0.2	0.027	0.0027	580	0.2	mg/kg	ND	U	0.064	50.69	ND	U	0.13	104.6	ND	U	0.18	126.7	ND	U	**0.68**	547

Table 7
Summary of Analytical Results for Waste in CAMU Areas
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (2 - 15 ft bgs)	PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500)	Location ID	BH-10-63				BH-10-64				BH-10-65				BH-10-69			
							Sample ID	BH-10-63-WC_12-14'				BH-10-64-WC_11-13'				BH-10-65_6-8'				BH-10-69-WC_5-8'			
							Sample Date	4/13/2011				4/13/2011				4/14/2011				4/12/2011			
							Sample Matrix	Waste Soil				Waste Soil				Waste Soil				Waste Soil			
							Sample Interval	12.0-14.0 ft bgs				11.0-13.0 ft bgs				6.0-8.0 ft bgs				5.0-8.0 ft bgs			
							Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Semi-Volatile Organic Compounds																							
2,4,5-Trichlorophenol	95-95-4	1000	6100	610	190000	1000	mg/kg	ND	U	2.1	5	ND	U	0.41	5	ND	U	4.8	5	ND	U	4.1	10
2,4,6-Trichlorophenol	88-06-2	10	29	2.9	190000	10	mg/kg	ND	U	1	5	ND	U	0.2	5	ND	U	2.4	5	ND	U	2	10
2,4-Dichlorophenol	120-83-2	2	1	0.1	190000	2	mg/kg	ND	U	1	5	ND	U	0.2	5	ND	U	**2.4**	5	ND	U	**2**	10
2,4-Dimethylphenol	105-67-9	200	87	8.7	10000	200	mg/kg	ND	U	2.1	5	2.2		0.41	5	ND	U	4.8	5	ND	U	4.1	10
2,4-Dinitrophenol	51-28-5	20	2.3	0.23	190000	20	mg/kg	ND	U	10	5	ND	U	2	5	ND	U	**24**	5	ND	U	**20**	10
2,4-Dinitrotoluene	121-14-2	0.84	0.2	0.02	190000	0.84	mg/kg	ND	U	**2.1**	5	ND	U	0.41	5	ND	U	**4.8**	5	ND	U	**4.1**	10
2,6-Dinitrotoluene	606-20-2	10	3	0.3	190000	10	mg/kg	ND	U	1	5	ND	U	0.2	5	ND	U	2.4	5	ND	U	2	10
2-Chloronaphthalene	91-58-7	820	18000	1800	190000	1800	mg/kg	ND	U	1	5	ND	U	0.2	5	ND	U	2.4	5	ND	U	2	10
2-Chlorophenol	95-57-8	4	4.4	0.44	10000	4	mg/kg	ND	U	1	5	ND	U	0.2	5	ND	U	2.4	5	ND	U	2	10
2-Methylnaphthalene	91-57-6	41	1600	160	190000	160	mg/kg	57		1	5	38		2	50	280		24	50	21		2	10
2-Methylphenol (O-Cresol)	95-48-7	510	85	8.5	190000	510	mg/kg	ND	U	2.1	5	ND	U	0.41	5	ND	U	4.8	5	ND	U	4.1	10
2-Nitroaniline	88-74-4	31	5.5	0.55	190000	31	mg/kg	ND	U	1	5	ND	U	0.2	5	ND	U	2.4	5	ND	U	2	10
2-Nitrophenol	88-75-5	82	17	1.7	190000	82	mg/kg	ND	U	1	5	ND	U	0.2	5	ND	U	2.4	5	ND	U	2	10
3,3'-Dichlorobenzidine	91-94-1	0.58	32	3.2	190000	3.2	mg/kg	ND	U	3.1	5	ND	U	0.61	5	ND	U	**7.2**	5	ND	U	**6.1**	10
3-Nitroaniline	99-09-2	3.1	0.48	0.048	190000	3.1	mg/kg	ND	U	2.1	5	ND	U	0.41	5	ND	U	**4.8**	5	ND	U	**4.1**	10
4,6-Dinitro-2-Methylphenol	534-52-1	1	0.75	0.075	190000	1	mg/kg	ND	U	**5.2**	5	ND	U	**1**	5	ND	U	**12**	5	ND	U	**10**	10
4-Bromophenyl Phenyl Ether	101-55-3	NS	NS	NS	NS	NS	mg/kg	ND	U	1	5	ND	U	0.2	5	ND	U	2.4	5	ND	U	2	10
4-Chloro-3-Methylphenol	59-50-7	51	110	11	190000	51	mg/kg	ND	U	2.1	5	ND	U	0.41	5	ND	U	4.8	5	ND	U	4.1	10
4-Chloroaniline	106-47-8	1.3	1.6	0.16	190000	1.3	mg/kg	ND	U	**2.1**	5	ND	U	0.41	5	ND	U	**4.8**	5	ND	U	**4.1**	10
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	NS	NS	NS	NS	mg/kg	ND	U	1	5	ND	U	0.2	5	ND	U	2.4	5	ND	U	2	10
4-Methylphenol (P-Cresol)	106-44-5	51	12	1.2	190000	51	mg/kg	ND	U	2.1	5	ND	U	0.41	5	ND	U	4.8	5	ND	U	4.1	10
4-Nitroaniline	100-01-6	13	1.9	0.19	190000	13	mg/kg	ND	U	2.1	5	ND	U	0.41	5	ND	U	4.8	5	ND	U	4.1	10
4-Nitrophenol	100-02-7	6	4.1	0.41	190000	6	mg/kg	ND	U	5.2	5	ND	U	1	5	ND	U	**12**	5	ND	U	**10**	10
Acenaphthene	83-32-9	380	4700	470	190000	470	mg/kg	2	J	1	5	3.4		0.2	5	15		2.4	5	ND	U	2	10
Acenaphthylene	208-96-8	610	6900	690	190000	690	mg/kg	ND	U	1	5	ND	U	0.2	5	ND	U	2.4	5	ND	U	2	10
Acetophenone	98-86-2	1000	540	54	10000	1000	mg/kg	ND	U	2.1	5	ND	U	0.41	5	ND	U	4.8	5	ND	U	4.1	10
Anthracene	120-12-7	6.6	350	35	190000	35	mg/kg	1.7	J	1	5	2.9		0.2	5	7.8	J	2.4	5	ND	U	2	10
Atrazine	1912-24-9	0.3	0.13	0.013	190000	0.3	mg/kg	ND	U	**1**	5	ND	U	0.2	5	ND	U	**2.4**	5	ND	U	**2**	10
Benzaldehyde	100-52-7	NS	NS	NS	NS	NS	mg/kg	ND	U	2.1	5	ND	U	0.41	5	ND	U	4.8	5	ND	U	4.1	10
Benzo(A)Anthracene	56-55-3	0.36	320	32	190000	32	mg/kg	3.1	J	1	5	3.4		0.2	5	7.2	J	2.4	5	ND	U	2	10
Benzo(A)Pyrene	50-32-8	0.02	46	4.6	190000	4.6	mg/kg	3.5	J	1	5	2.8		0.2	5	5.7	J	2.4	5	ND	U	2	10
Benzo(B)Fluoranthene	205-99-2	0.12	170	17	190000	17	mg/kg	3	J	1	5	3.3		0.2	5	6.1	J	2.4	5	ND	U	2	10
Benzo(G,H,I)Perylene	191-24-2	0.026	180	18	190000	18	mg/kg	3.7	J	1	5	1.8		0.2	5	5.2	J	2.4	5	ND	U	2	10
Benzo(K)Fluoranthene	207-08-9	0.055	610	61	190000	61	mg/kg	ND	U	1	5	1.1		0.2	5	2.6	J	2.4	5	ND	U	2	10
Benzyl Butyl Phthalate	85-68-7	140	10000	1000	10000	1000	mg/kg	ND	U	2.1	5	ND	U	0.41	5	ND	U	4.8	5	ND	U	4.1	10
Biphenyl (Diphenyl)	92-52-4	510	2200	220	190000	510	mg/kg	1.9	J	1	5	2.1		0.2	5	26		2.4	5	ND	U	2	10
Bis(2-Chloroethoxy) Methane	111-91-1	31	8.2	0.82	10000	31	mg/kg	ND	U	1	5	ND	U	0.2	5	ND	U	2.4	5	ND	U	2	10
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	0.076	0.023	0.0023	7.7	0.076	mg/kg	ND	U	**1**	5	ND	U	**0.2**	5	ND	U	**2.4**	5	ND	U	**2**	10
Bis(2-Chloroisopropyl) Ether	108-60-1	30	8	0.8	250	30	mg/kg	ND	U	1	5	ND	U	0.2	5	ND	U	2.4	5	ND	U	2	10
Bis(2-Ethylhexyl) Phthalate	117-81-7	0.6	130	13	10000	13	mg/kg	4.4	J	2.1	5	ND	U	0.41	5	ND	U	4.8	5	ND	U	4.1	10
Caprolactam	105-60-2	NS	NS	NS	NS	NS	mg/kg	ND	U	1	5	ND	U	0.2	5	ND	U	2.4	5	ND	U	2	10
Carbazole	86-74-8	13	83	8.3	190000	13	mg/kg	ND	U	1	5	0.48	J	0.2	5	ND	U	2.4	5	ND	U	2	10
Chrysene	218-01-9	0.19	230	23	190000	23	mg/kg	9		1	5	4		0.2	5	14		2.4	5	10		2	10
Dibenz(A,H)Anthracene	53-70-3	0.036	160	16	190000	16	mg/kg	1.2	J	1	5	0.64	J	0.2	5	ND	U	2.4	5	ND	U	2	10
Dibenzofuran	132-64-9	10	260	26	190000	26	mg/kg	3.8	J	1	5	2.2		0.2	5	14		2.4	5	ND	U	2	10
Diethyl Phthalate	84-66-2	8200	2600	260	10000	8200	mg/kg	ND	U	2.1	5	ND	U	0.41	5	ND	U	4.8	5	ND	U	4.1	10
Dimethyl Phthalate	131-11-3	NS	NS	NS	NS	NS	mg/kg	ND	U	2.1	5	ND	U	0.41	5	ND	U	4.8	5	ND	U	4.1	10
Di-N-Butyl Phthalate	84-74-2	1000	4100	410	10000	1000	mg/kg	ND	U	2.1	5	ND	U	0.41	5	ND	U	4.8	5	ND	U	4.1	10
Di-N-Octylphthalate	117-84-0	300	10000	1000	10000	1000	mg/kg	ND	U	2.1	5	ND	U	0.41	5	ND	U	4.8	5	ND	U	4.1	10
Fluoranthene	206-44-0	26	3200	320	190000	320	mg/kg	2.3	J	1	5	7.5		0.2	5	10	J	2.4	5	ND	U	2	10

Table 7
Summary of Analytical Results for Waste in CAMU Areas
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (2 - 15 ft bgs)	PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500)	Location ID	BH-10-63				BH-10-64				BH-10-65				BH-10-69			
							Sample ID	BH-10-63-WC_12-14'				BH-10-64-WC_11-13'				BH-10-65_6-8'				BH-10-69-WC_5-8'			
							Sample Date	4/13/2011				4/13/2011				4/14/2011				4/12/2011			
							Sample Matrix	Waste Soil				Waste Soil				Waste Soil				Waste Soil			
							Sample Interval	12.0-14.0 ft bgs				11.0-13.0 ft bgs				6.0-8.0 ft bgs				5.0-8.0 ft bgs			
							Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Fluorene	86-73-7	190	3800	380	190000	380	mg/kg	6.5		1	5	4.3		0.2	5	24		2.4	5	ND	U	2	10
Hexachlorobenzene	118-74-1	0.1	0.96	0.096	190000	0.1	mg/kg	ND	U	**1**	5	ND	U	**0.2**	5	ND	U	**2.4**	5	ND	U	**2**	10
Hexachlorobutadiene	87-68-3	3.3	39	3.9	10000	3.9	mg/kg	ND	U	2.1	5	ND	U	0.41	5	ND	U	**4.8**	5	ND	U	**4.1**	10
Hexachlorocyclopentadiene	77-47-4	5	91	9.1	10000	9.1	mg/kg	ND	U	5.2	5	ND	U	1	5	ND	U	**12**	5	ND	U	**10**	10
Hexachloroethane	67-72-1	0.1	0.56	0.056	640	0.1	mg/kg	ND	U	**1**	5	ND	U	**0.2**	5	ND	U	**2.4**	5	ND	U	**2**	10
Indeno[1,2,3-cd]pyrene	193-39-5	0.36	28000	2800	190000	2800	mg/kg	1.2	J	1	5	1.4		0.2	5	3.4	J	2.4	5	ND	U	2	10
Isophorone	78-59-1	10	1.9	0.19	10000	10	mg/kg	ND	U	1	5	ND	U	0.2	5	ND	U	2.4	5	ND	U	2	10
Naphthalene	91-20-3	10	25	2.5	190000	10	mg/kg	5.4		1	5	8.4		0.2	5	110		2.4	5	7.3	J	2	10
Nitrobenzene	98-95-3	20	8.7	0.87	10000	20	mg/kg	ND	U	1	5	ND	U	0.2	5	ND	U	2.4	5	ND	U	2	10
N-Nitrosodi-N-Propylamine	621-64-7	0.037	0.0051	0.00051	10000	0.037	mg/kg	ND	U	**1**	5	ND	U	**0.2**	5	ND	U	**2.4**	5	ND	U	**2**	10
N-Nitrosodiphenylamine	86-30-6	53	83	8.3	190000	53	mg/kg	ND	U	1	5	ND	U	0.2	5	ND	U	2.4	5	ND	U	2	10
Pentachlorophenol	87-86-5	0.1	5	0.5	190000	0.5	mg/kg	ND	U	**5.2**	5	ND	U	**1**	5	ND	U	**12**	5	ND	U	**10**	10
Phenanthrene	85-01-8	110	10000	1000	190000	1000	mg/kg	14		1	5	14		0.2	5	55		2.4	5	7.1	J	2	10
Phenol	108-95-2	200	33	3.3	190000	200	mg/kg	ND	U	1	5	ND	U	0.2	5	ND	U	2.4	5	ND	U	2	10
Pyrene	129-00-0	13	2200	220	190000	220	mg/kg	3.9	J	1	5	7.3		0.2	5	17		2.4	5	4.9	J	2	10
Metals																							
Aluminum	7429-90-5	NS	NS	NS	190000	190000	mg/kg	6070		6.32	1	11600		6.1	1	10200		7.29	1	9620		6.1	1
Antimony	7440-36-0	0.6	27	2.7	190000	2.7	mg/kg	2.61		1.26	1	ND	U	1.21	1	4.55		1.45	1	ND	U	1.21	1
Arsenic	7440-38-2	1	29	2.9	190000	2.9	mg/kg	12		1.19	1	11		1.15	1	28.3		1.38	1	7.18		1.15	1
Barium	7440-39-3	200	8200	820	190000	820	mg/kg	91.6		0.05	1	215		0.049	1	508		0.058	1	157		0.049	1
Beryllium	7440-41-7	0.4	320	32	190000	32	mg/kg	0.426	J	0.085	1	0.648		0.082	1	0.49	J	0.099	1	0.158	J	0.083	1
Cadmium	7440-43-9	0.5	38	3.8	190000	3.8	mg/kg	ND	U	0.176	1	0.175	J	0.17	1	1.05		0.203	1	ND	U	0.17	1
Calcium	7440-70-2	NS	NS	NS	NS	NS	mg/kg	9710		7.7	1	5670		7.43	1	12100		8.88	1	14000		7.44	1
Chromium, Total	7440-47-3	NS	NS	NS	NS	NS	mg/kg	225		0.741	1	23.6		0.715	1	163		0.855	1	32.5		0.716	1
Cobalt	7440-48-4	3	140	14	190000	14	mg/kg	10.7		0.239	1	6.67		0.23	1	27.7		0.275	1	1.28		0.231	1
Copper	7440-50-8	100	43000	4300	190000	4300	mg/kg	275		0.276	1	53.2		0.267	1	684		0.319	1	192		0.267	1
Iron	7439-89-6	NS	NS	NS	190000	190000	mg/kg	65000		29.6	5	17500		5.71	1	77000		68.3	10	6060		5.71	1
Lead	7439-92-1	0.5	450	45	190000	45	mg/kg	161		0.754	1	330		0.727	1	1500		4.35	5	98.2		0.728	1
Magnesium	7439-95-4	NS	NS	NS	NS	NS	mg/kg	5420		3.19	1	2330		3.08	1	55100		3.68	1	2510		3.08	1
Manganese	7439-96-5	30	2000	200	190000	200	mg/kg	707		0.098	1	153		0.095	1	639		0.113	1	32.1		0.095	1
Mercury	7439-97-6	0.2	10	1	190000	1	mg/kg	0.67		0.003	1	ND	U	0.004	1	1.29		0.02	5	0.101	J	0.003	1
Nickel	7440-02-0	10	650	65	190000	65	mg/kg	35		0.239	1	15.9		0.23	1	332		0.275	1	11.4		0.231	1
Potassium	7440-09-7	NS	NS	NS	NS	NS	mg/kg	817		22.6	1	1510		21.8	1	1020		26.1	1	448		21.8	1
Selenium	7782-49-2	5	26	2.6	190000	5	mg/kg	ND	U	**6.16**	5	ND	U	1.19	1	ND	U	**7.1**	5	ND	U	1.19	1
Silver	7440-22-4	10	84	8.4	190000	10	mg/kg	ND	U	0.226	1	ND	U	0.218	1	0.299	J	0.261	1	ND	U	0.218	1
Sodium	7440-23-5	NS	NS	NS	NS	NS	mg/kg	290		46.9	1	276		45.2	1	328		54.1	1	61.7	J	45.3	1
Thallium	7440-28-0	0.2	14	1.4	190000	1.4	mg/kg	1.84	J	**1.82**	1	ND	U	**1.76**	1	2.32	J	**2.1**	1	ND	U	**1.76**	1
Vanadium	7440-62-2	72	72000	7200	190000	7200	mg/kg	35.7		0.239	1	30.6		0.23	1	95.6		0.275	1	36.6		0.231	1
Zinc	7440-66-6	200	12000	1200	190000	1200	mg/kg	404		0.829	1	196		0.8	1	2550		4.78	5	29.4		0.801	1
General Chemistry																							
Moisture, Percent	MOIST	NS	NS	NS	NS	NS	%	21.2		0.5	1	19.1		0.5	1	31		0.5	1	19.2		0.5	1

Notes:
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard
All soil samples in this table are considered saturated soils.

Qualifiers:
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

Exceedance Summary:
10 - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Direct Contact Standard

Table 7
Summary of Analytical Results for Waste in CAMU Areas
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (2 - 15 ft bgs)	PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500)	Location ID	BH-10-70				BH-10-77				BH-10-77			
							Sample ID	BH-10-70-WC@5'-8'				BH-10-77-WC_10-12'				BH-10-77-WC_6.5-7'			
							Sample Date	4/11/2011				4/13/2011				4/13/2011			
							Sample Matrix	Waste Soil				Waste Soil				Waste Soil			
							Sample Interval	5.0-8.0 ft bgs				10.0-12.0 ft bgs				6.5-7.0 ft bgs			
							Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Volatile Organic Compounds																			
1,1,1-Trichloroethane	71-55-6	20	7.2	0.72	10000.00	20	mg/kg	ND	U	0.003	1.9	ND	U	1.2	725.7	ND	U	0.11	86.54
1,1,2,2-Tetrachloroethane	79-34-5	0.03	0.0093	0.00093	44	0.03	mg/kg	ND	U	0.003	1.9	ND	U	**1.2**	725.7	ND	U	**0.11**	86.54
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	10000	10000	1000	10000	10000	mg/kg	ND	U	0.005	1.9	ND	U	2.4	725.7	ND	U	0.23	86.54
1,1,2-Trichloroethane	79-00-5	0.5	0.15	0.015	160	0.5	mg/kg	ND	U	0.003	1.9	ND	U	**1.2**	725.7	ND	U	0.11	86.54
1,1-Dichloroethane	75-34-3	16	3.9	0.39	1600	16	mg/kg	ND	U	0.003	1.9	ND	U	1.2	725.7	ND	U	0.11	86.54
1,1-Dichloroethene	75-35-4	0.7	0.19	0.019	10000	0.7	mg/kg	ND	U	0.003	1.9	ND	U	**1.2**	725.7	ND	U	0.11	86.54
1,2,4-Trichlorobenzene	120-82-1	7	27	2.7	10000	7	mg/kg	ND	U	0.003	1.9	ND	U	1.2	725.7	ND	U	0.11	86.54
1,2-Dibromo-3-Chloropropane	96-12-8	0.02	0.0092	0.00092	0.43	0.02	mg/kg	ND	U	0.005	1.9	ND	U	**2.4**	725.7	ND	U	**0.23**	86.54
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.005	0.0012	0.00012	4.3	0.005	mg/kg	ND	U	0.003	1.9	ND	U	**1.2**	725.7	ND	U	**0.11**	86.54
1,2-Dichlorobenzene	95-50-1	60	59	5.9	10000	60	mg/kg	ND	U	0.003	1.9	ND	U	1.2	725.7	ND	U	0.11	86.54
1,2-Dichloroethane	107-06-2	0.5	0.1	0.01	98	0.5	mg/kg	ND	U	0.003	1.9	ND	U	**1.2**	725.7	ND	U	0.11	86.54
1,2-Dichloropropane	78-87-5	0.5	0.11	0.011	260	0.5	mg/kg	ND	U	0.003	1.9	ND	U	**1.2**	725.7	ND	U	0.11	86.54
1,3-Dichlorobenzene	541-73-1	60	61	6.1	10000	60	mg/kg	ND	U	0.003	1.9	ND	U	1.2	725.7	ND	U	0.11	86.54
1,4-Dichlorobenzene	106-46-7	7.5	10	1	230	7.5	mg/kg	ND	U	0.003	1.9	ND	U	1.2	725.7	ND	U	0.11	86.54
2-Hexanone	591-78-6	4.4	1.1	0.11	460	4.4	mg/kg	ND	U	0.008	1.9	ND	U	3.5	725.7	ND	U	0.34	86.54
Acetone	67-64-1	9200	1000	100	10000	9200	mg/kg	0.088		0.019	1.9	ND	U	8.3	725.7	ND	U	0.79	86.54
Benzene	71-43-2	0.5	0.13	0.013	330	0.5	mg/kg	0.024		0.001	1.9	2.4	J	**0.59**	725.7	0.12	J	0.056	86.54
Bromodichloromethane	75-27-4	8	2.7	0.27	69	8	mg/kg	ND	U	0.003	1.9	ND	U	1.2	725.7	ND	U	0.11	86.54
Bromoform	75-25-2	8	3.5	0.35	2300	8	mg/kg	ND	U	0.003	1.9	ND	U	1.2	725.7	ND	U	0.11	86.54
Bromomethane	74-83-9	1	0.54	0.054	460	1	mg/kg	ND	U	0.005	1.9	ND	U	**2.4**	725.7	ND	U	0.23	86.54
Carbon Disulfide	75-15-0	620	530	53	10000	620	mg/kg	ND	U	0.003	1.9	ND	U	1.2	725.7	ND	U	0.11	86.54
Carbon Tetrachloride	56-23-5	0.5	0.26	0.026	170	0.5	mg/kg	ND	U	0.003	1.9	ND	U	**1.2**	725.7	ND	U	0.11	86.54
Chlorobenzene	108-90-7	10	6.1	0.61	4600	10	mg/kg	ND	U	0.003	1.9	ND	U	1.2	725.7	ND	U	0.11	86.54
Chloroethane	75-00-3	90	19	1.9	10000	90	mg/kg	ND	U	0.005	1.9	ND	U	2.4	725.7	ND	U	0.23	86.54
Chloroform	67-66-3	8	2	0.2	110	8	mg/kg	ND	U	0.003	1.9	ND	U	1.2	725.7	ND	U	0.11	86.54
Chloromethane	74-87-3	3	0.38	0.038	1400	3	mg/kg	ND	U	0.005	1.9	ND	U	2.4	725.7	ND	U	0.23	86.54
Cis-1,2-Dichloroethylene	156-59-2	7	1.6	0.16	10000	7	mg/kg	ND	U	0.003	1.9	ND	U	1.2	725.7	ND	U	0.11	86.54
Cis-1,3-Dichloropropene	10061-01-5	NS	NS	NS	NS	NS	mg/kg	ND	U	0.003	1.9	ND	U	1.2	725.7	ND	U	0.11	86.54
Cyclohexane	110-82-7	5300	6900	690	10000	5300	mg/kg	0.062		0.003	1.9	ND	U	1.2	725.7	0.32	J	0.11	86.54
Dibromochloromethane	124-48-1	8	2.5	0.25	95	8	mg/kg	ND	U	0.003	1.9	ND	U	1.2	725.7	ND	U	0.11	86.54
Dichlorodifluoromethane	75-71-8	100	100	10	10000	100	mg/kg	ND	U	0.005	1.9	ND	U	2.4	725.7	ND	U	0.23	86.54
Dimethyl Benzene/ Xylenes, Total	1330-20-7	1000	990	99	9100	1000	mg/kg	0.017		0.003	1.9	9.9		1.2	725.7	1.5		0.11	86.54
Ethylbenzene	100-41-4	70	46	4.6	10000	70	mg/kg	0.003	J	0.003	1.9	1.5	J	1.2	725.7	0.21	J	0.11	86.54
Isopropylbenzene (Cumene)	98-82-8	350	2500	250	10000	350	mg/kg	ND	U	0.003	1.9	ND	U	1.2	725.7	0.28	J	0.11	86.54
Methyl Acetate	79-20-9	10000	1900	190	10000	10000	mg/kg	ND	U	0.005	1.9	ND	U	2.4	725.7	0.29	J	0.23	86.54
Methyl Ethyl Ketone (2-Butanone)	78-93-3	400	76	7.6	10000	400	mg/kg	0.027		0.011	1.9	ND	U	4.7	725.7	ND	U	0.45	86.54
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	820	130	13	10000	820	mg/kg	ND	U	0.008	1.9	6.2	J	3.5	725.7	ND	U	0.34	86.54
Methylcyclohexane	108-87-2	NS	NS	NS	NS	NS	mg/kg	0.079		0.003	1.9	ND	U	1.2	725.7	1.6		0.11	86.54
Methylene Chloride	75-09-2	0.5	0.076	0.0076	5400	0.5	mg/kg	ND	U	0.005	1.9	ND	U	**2.4**	725.7	ND	U	0.23	86.54
Styrene	100-42-5	10	24	2.4	10000	10	mg/kg	ND	U	0.003	1.9	ND	U	1.2	725.7	ND	U	0.11	86.54
Tert-Butyl Methyl Ether	1634-04-4	2	0.28	0.028	3700	2	mg/kg	ND	U	0.001	1.9	ND	U	0.59	725.7	ND	U	0.056	86.54
Tetrachloroethylene(PCE)	127-18-4	0.5	0.43	0.043	4400	0.5	mg/kg	ND	U	0.003	1.9	ND	U	**1.2**	725.7	ND	U	0.11	86.54
Toluene	108-88-3	100	44	4.4	10000	100	mg/kg	0.003	J	0.003	1.9	3.2	J	1.2	725.7	0.21	J	0.11	86.54
Trans-1,2-Dichloroethene	156-60-5	10	2.3	0.23	5500	10	mg/kg	ND	U	0.003	1.9	ND	U	1.2	725.7	ND	U	0.11	86.54
Trans-1,3-Dichloropropene	10061-02-6	NS	NS	NS	NS	NS	mg/kg	ND	U	0.003	1.9	ND	U	1.2	725.7	ND	U	0.11	86.54
Trichloroethylene (TCE)	79-01-6	0.5	0.17	0.017	1500	0.5	mg/kg	ND	U	0.003	1.9	ND	U	**1.2**	725.7	ND	U	0.11	86.54
Trichlorofluoromethane	75-69-4	200	87	8.7	10000	200	mg/kg	ND	U	0.005	1.9	ND	U	2.4	725.7	ND	U	0.23	86.54
Vinyl Chloride	75-01-4	0.2	0.027	0.0027	580	0.2	mg/kg	ND	U	0.003	1.9	ND	U	**1.2**	725.7	ND	U	0.11	86.54

Table 7
Summary of Analytical Results for Waste in CAMU Areas
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (2 - 15 ft bgs)	PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500)	Location ID	BH-10-70				BH-10-77				BH-10-77			
							Sample ID	BH-10-70-WC@5'-8'				BH-10-77-WC_10-12'				BH-10-77-WC_6.5-7'			
							Sample Date	4/11/2011				4/13/2011				4/13/2011			
							Sample Matrix	Waste Soil				Waste Soil				Waste Soil			
							Sample Interval	5.0-8.0 ft bgs				10.0-12.0 ft bgs				6.5-7.0 ft bgs			
							Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Semi-Volatile Organic Compounds																			
2,4,5-Trichlorophenol	95-95-4	1000	6100	610	190000	1000	mg/kg	ND	U	5.8	1	ND	U	2.7	5	ND	U	4.4	1
2,4,6-Trichlorophenol	88-06-2	10	29	2.9	190000	10	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
2,4-Dichlorophenol	120-83-2	2	1	0.1	190000	2	mg/kg	ND	U	**2.9**	1	ND	U	1.3	5	ND	U	**2.2**	1
2,4-Dimethylphenol	105-67-9	200	87	8.7	10000	200	mg/kg	ND	U	5.8	1	ND	U	2.7	5	ND	U	4.4	1
2,4-Dinitrophenol	51-28-5	20	2.3	0.23	190000	20	mg/kg	ND	U	**29**	1	ND	U	13	5	ND	U	**22**	1
2,4-Dinitrotoluene	121-14-2	0.84	0.2	0.02	190000	0.84	mg/kg	ND	U	**5.8**	1	ND	U	**2.7**	5	ND	U	**4.4**	1
2,6-Dinitrotoluene	606-20-2	10	3	0.3	190000	10	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
2-Chloronaphthalene	91-58-7	820	18000	1800	190000	1800	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
2-Chlorophenol	95-57-8	4	4.4	0.44	10000	4	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
2-Methylnaphthalene	91-57-6	41	1600	160	190000	160	mg/kg	ND	U	2.9	1	8.7		1.3	5	ND	U	2.2	1
2-Methylphenol (O-Cresol)	95-48-7	510	85	8.5	190000	510	mg/kg	ND	U	5.8	1	ND	U	2.7	5	ND	U	4.4	1
2-Nitroaniline	88-74-4	31	5.5	0.55	190000	31	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
2-Nitrophenol	88-75-5	82	17	1.7	190000	82	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
3,3'-Dichlorobenzidine	91-94-1	0.58	32	3.2	190000	3.2	mg/kg	ND	U	**8.7**	1	ND	U	**4**	5	ND	U	**6.5**	1
3-Nitroaniline	99-09-2	3.1	0.48	0.048	190000	3.1	mg/kg	ND	U	**5.8**	1	ND	U	2.7	5	ND	U	**4.4**	1
4,6-Dinitro-2-Methylphenol	534-52-1	1	0.75	0.075	190000	1	mg/kg	ND	U	**14**	1	ND	U	**6.7**	5	ND	U	**11**	1
4-Bromophenyl Phenyl Ether	101-55-3	NS	NS	NS	NS	NS	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
4-Chloro-3-Methylphenol	59-50-7	51	110	11	190000	51	mg/kg	ND	U	5.8	1	ND	U	2.7	5	ND	U	4.4	1
4-Chloroaniline	106-47-8	1.3	1.6	0.16	190000	1.3	mg/kg	ND	U	**5.8**	1	ND	U	**2.7**	5	ND	U	**4.4**	1
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	NS	NS	NS	NS	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
4-Methylphenol (P-Cresol)	106-44-5	51	12	1.2	190000	51	mg/kg	ND	U	5.8	1	6.2	J	2.7	5	ND	U	4.4	1
4-Nitroaniline	100-01-6	13	1.9	0.19	190000	13	mg/kg	ND	U	5.8	1	ND	U	2.7	5	ND	U	4.4	1
4-Nitrophenol	100-02-7	6	4.1	0.41	190000	6	mg/kg	ND	U	**14**	1	ND	U	**6.7**	5	ND	U	**11**	1
Acenaphthene	83-32-9	380	4700	470	190000	470	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
Acenaphthylene	208-96-8	610	6900	690	190000	690	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
Acetophenone	98-86-2	1000	540	54	10000	1000	mg/kg	ND	U	5.8	1	ND	U	2.7	5	ND	U	4.4	1
Anthracene	120-12-7	6.6	350	35	190000	35	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
Atrazine	1912-24-9	0.3	0.13	0.013	190000	0.3	mg/kg	ND	U	**2.9**	1	ND	U	**1.3**	5	ND	U	**2.2**	1
Benzaldehyde	100-52-7	NS	NS	NS	NS	NS	mg/kg	ND	U	5.8	1	ND	U	2.7	5	ND	U	4.4	1
Benzo(A)Anthracene	56-55-3	0.36	320	32	190000	32	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
Benzo(A)Pyrene	50-32-8	0.02	46	4.6	190000	4.6	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
Benzo(B)Fluoranthene	205-99-2	0.12	170	17	190000	17	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
Benzo(G,H,I)Perylene	191-24-2	0.026	180	18	190000	18	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
Benzo(K)Fluoranthene	207-08-9	0.055	610	61	190000	61	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
Benzyl Butyl Phthalate	85-68-7	140	10000	1000	10000	1000	mg/kg	ND	U	5.8	1	ND	U	2.7	5	ND	U	4.4	1
Biphenyl (Diphenyl)	92-52-4	510	2200	220	190000	510	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
Bis(2-Chloroethoxy) Methane	111-91-1	31	8.2	0.82	10000	31	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	0.076	0.023	0.0023	7.7	0.076	mg/kg	ND	U	**2.9**	1	ND	U	**1.3**	5	ND	U	**2.2**	1
Bis(2-Chloroisopropyl) Ether	108-60-1	30	8	0.8	250	30	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
Bis(2-Ethylhexyl) Phthalate	117-81-7	0.6	130	13	10000	13	mg/kg	ND	U	5.8	1	3.5	J	2.7	5	ND	U	4.4	1
Caprolactam	105-60-2	NS	NS	NS	NS	NS	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
Carbazole	86-74-8	13	83	8.3	190000	13	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
Chrysene	218-01-9	0.19	230	23	190000	23	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
Dibenz(A,H)Anthracene	53-70-3	0.036	160	16	190000	16	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
Dibenzofuran	132-64-9	10	260	26	190000	26	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
Diethyl Phthalate	84-66-2	8200	2600	260	10000	8200	mg/kg	ND	U	5.8	1	ND	U	2.7	5	ND	U	4.4	1
Dimethyl Phthalate	131-11-3	NS	NS	NS	NS	NS	mg/kg	ND	U	5.8	1	ND	U	2.7	5	ND	U	4.4	1
Di-N-Butyl Phthalate	84-74-2	1000	4100	410	10000	1000	mg/kg	ND	U	5.8	1	ND	U	2.7	5	ND	U	4.4	1
Di-N-Octylphthalate	117-84-0	300	10000	1000	10000	1000	mg/kg	ND	U	5.8	1	ND	U	2.7	5	ND	U	4.4	1
Fluoranthene	206-44-0	26	3200	320	190000	320	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1

Table 7
Summary of Analytical Results for Waste in CAMU Areas
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (2 - 15 ft bgs)	PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500)	Location ID	BH-10-70				BH-10-77				BH-10-77			
							Sample ID	BH-10-70-WC@5'-8'				BH-10-77-WC_10-12'				BH-10-77-WC_6.5-7'			
							Sample Date	4/11/2011				4/13/2011				4/13/2011			
							Sample Matrix	Waste Soil				Waste Soil				Waste Soil			
							Sample Interval	5.0-8.0 ft bgs				10.0-12.0 ft bgs				6.5-7.0 ft bgs			
							Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Fluorene	86-73-7	190	3800	380	190000	380	mg/kg	ND	U	2.9	1	1.5	J	1.3	5	ND	U	2.2	1
Hexachlorobenzene	118-74-1	0.1	0.96	0.096	190000	0.1	mg/kg	ND	U	**2.9**	1	ND	U	**1.3**	5	ND	U	**2.2**	1
Hexachlorobutadiene	87-68-3	3.3	39	3.9	10000	3.9	mg/kg	ND	U	**5.8**	1	ND	U	2.7	5	ND	U	**4.4**	1
Hexachlorocyclopentadiene	77-47-4	5	91	9.1	10000	9.1	mg/kg	ND	U	**14**	1	ND	U	6.7	5	ND	U	**11**	1
Hexachloroethane	67-72-1	0.1	0.56	0.056	640	0.1	mg/kg	ND	U	**2.9**	1	ND	U	**1.3**	5	ND	U	**2.2**	1
Indeno[1,2,3-cd]pyrene	193-39-5	0.36	28000	2800	190000	2800	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
Isophorone	78-59-1	10	1.9	0.19	10000	10	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
Naphthalene	91-20-3	10	25	2.5	190000	10	mg/kg	ND	U	2.9	1	4.5	J	1.3	5	ND	U	2.2	1
Nitrobenzene	98-95-3	20	8.7	0.87	10000	20	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
N-Nitrosodi-N-Propylamine	621-64-7	0.037	0.0051	0.00051	10000	0.037	mg/kg	ND	U	**2.9**	1	ND	U	**1.3**	5	ND	U	**2.2**	1
N-Nitrosodiphenylamine	86-30-6	53	83	8.3	190000	53	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
Pentachlorophenol	87-86-5	0.1	5	0.5	190000	0.5	mg/kg	ND	U	**14**	1	ND	U	**6.7**	5	ND	U	**11**	1
Phenanthrene	85-01-8	110	10000	1000	190000	1000	mg/kg	3.8	J	2.9	1	4.7	J	1.3	5	ND	U	2.2	1
Phenol	108-95-2	200	33	3.3	190000	200	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
Pyrene	129-00-0	13	2200	220	190000	220	mg/kg	ND	U	2.9	1	ND	U	1.3	5	ND	U	2.2	1
Metals																			
Aluminum	7429-90-5	NS	NS	NS	190000	190000	mg/kg	153		7.19	1	21500		8.02	1	1270		6.31	1
Antimony	7440-36-0	0.6	27	2.7	190000	2.7	mg/kg	ND	U	1.43	1	ND	U	1.59	1	ND	U	1.26	1
Arsenic	7440-38-2	1	29	2.9	190000	2.9	mg/kg	ND	U	1.36	1	10.9		1.51	1	2.14	J	1.19	1
Barium	7440-39-3	200	8200	820	190000	820	mg/kg	25.3		0.057	1	1020		0.064	1	62.9		0.05	1
Beryllium	7440-41-7	0.4	320	32	190000	32	mg/kg	ND	U	0.097	1	0.872		0.108	1	ND	U	0.085	1
Cadmium	7440-43-9	0.5	38	3.8	190000	3.8	mg/kg	ND	U	0.2	1	1.97		0.223	1	ND	U	0.176	1
Calcium	7440-70-2	NS	NS	NS	NS	NS	mg/kg	115		8.76	1	16100		9.77	1	3610		7.69	1
Chromium, Total	7440-47-3	NS	NS	NS	NS	NS	mg/kg	0.926	J	0.843	1	77.4		0.941	1	4.81		0.741	1
Cobalt	7440-48-4	3	140	14	190000	14	mg/kg	ND	U	0.271	1	9.53		0.303	1	0.443	J	0.239	1
Copper	7440-50-8	100	43000	4300	190000	4300	mg/kg	1.46		0.314	1	163		0.351	1	3.41		0.276	1
Iron	7439-89-6	NS	NS	NS	190000	190000	mg/kg	219		6.73	1	32500		7.51	1	2280		5.91	1
Lead	7439-92-1	0.5	450	45	190000	45	mg/kg	7.74		0.857	1	208		0.956	1	131		0.753	1
Magnesium	7439-95-4	NS	NS	NS	NS	NS	mg/kg	56.8		3.63	1	19400		4.05	1	2830		3.19	1
Manganese	7439-96-5	30	2000	200	190000	200	mg/kg	2.23		0.111	1	399		0.124	1	33.5		0.098	1
Mercury	7439-97-6	0.2	10	1	190000	1	mg/kg	ND	U	0.004	1	24.4		0.217	50	0.264		0.004	1
Nickel	7440-02-0	10	650	65	190000	65	mg/kg	0.997	J	0.271	1	50.2		0.303	1	4.97		0.239	1
Potassium	7440-09-7	NS	NS	NS	NS	NS	mg/kg	ND	U	25.7	1	3290		28.7	1	151		22.6	1
Selenium	7782-49-2	5	26	2.6	190000	5	mg/kg	ND	U	1.4	1	ND	U	1.56	1	ND	U	1.23	1
Silver	7440-22-4	10	84	8.4	190000	10	mg/kg	ND	U	0.257	1	ND	U	0.287	1	ND	U	0.226	1
Sodium	7440-23-5	NS	NS	NS	NS	NS	mg/kg	ND	U	53.3	1	1200		59.5	1	48.1	J	46.8	1
Thallium	7440-28-0	0.2	14	1.4	190000	1.4	mg/kg	ND	U	**2.07**	1	ND	U	**2.31**	1	ND	U	**1.82**	1
Vanadium	7440-62-2	72	72000	7200	190000	7200	mg/kg	0.706	J	0.271	1	121		0.303	1	7.82		0.239	1
Zinc	7440-66-6	200	12000	1200	190000	1200	mg/kg	2.22	J	0.943	1	215		1.05	1	15.7		0.828	1
General Chemistry																			
Moisture, Percent	MOIST	NS	NS	NS	NS	NS	%	30.7		0.5	1	38.5		0.5	1	23.4		0.5	1

Notes:
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard
All soil samples in this table are considered saturated soils.

Qualifiers:
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

Exceedance Summary:
10 - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Direct Contact Standard

Table 8
Summary of Soil Sample Analytical Results for Vertical Delineation Soil Samples Beneath Waste in CAMU
AOI-10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (2 - 15 ft bgs)	PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500)	Location ID	BH-10-44				BH-10-45				BH-10-46				BH-10-55				BH-10-56			
							Sample ID	BH-10-44-WC_24-26'				BH-10-45-WC_18-20'				BH-10-46-WC_17-18'				BH-10-55-WC_20-22'				BH-10-56-WC_22-24'			
							Sample Date	4/12/2011				4/12/2011				4/12/2011				4/12/2011				4/12/2011			
							Sample Matrix	Soil				Soil				Soil				Soil				Soil			
							Sample Interval	24.0-26.0 ft bgs				18.0-20.0 ft bgs				17.0-18.0 ft bgs				20.0-22.0 ft bgs				22.0-24.0 ft bgs			
							Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Volatile Organic Compounds																											
1,1,1-Trichloroethane	71-55-6	20	7.2	0.72	10000.00	20	mg/kg	ND	U	0.1	70.5	ND	U	0.1	70.4	ND	U	0.002	1.1	ND	U	0.096	64.7	ND	U	0.11	70.3
1,1,2,2-Tetrachloroethane	79-34-5	0.03	0.0093	0.00093	44	0.03	mg/kg	ND	U	**0.1**	70.5	ND	U	**0.1**	70.4	ND	U	0.002	1.1	ND	U	**0.096**	64.7	ND	U	**0.11**	70.3
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	10000	10000	1000	10000	10000	mg/kg	ND	U	0.21	70.5	ND	U	0.2	70.4	ND	U	0.005	1.1	ND	U	0.19	64.7	ND	U	0.21	70.3
1,1,2-Trichloroethane	79-00-5	0.5	0.15	0.015	160	0.5	mg/kg	ND	U	0.1	70.5	ND	U	0.1	70.4	ND	U	0.002	1.1	ND	U	0.096	64.7	ND	U	0.11	70.3
1,1-Dichloroethane	75-34-3	16	3.9	0.39	1600	16	mg/kg	ND	U	0.1	70.5	ND	U	0.1	70.4	ND	U	0.002	1.1	ND	U	0.096	64.7	ND	U	0.11	70.3
1,1-Dichloroethene	75-35-4	0.7	0.19	0.019	10000	0.7	mg/kg	ND	U	0.1	70.5	ND	U	0.1	70.4	ND	U	0.002	1.1	ND	U	0.096	64.7	ND	U	0.11	70.3
1,2,4-Trichlorobenzene	120-82-1	7	27	2.7	10000	7	mg/kg	ND	U	0.1	70.5	ND	U	0.1	70.4	ND	U	0.002	1.1	ND	U	0.096	64.7	ND	U	0.11	70.3
1,2-Dibromo-3-Chloropropane	96-12-8	0.02	0.0092	0.00092	0.43	0.02	mg/kg	ND	U	**0.21**	70.5	ND	U	**0.2**	70.4	ND	U	0.005	1.1	ND	U	**0.19**	64.7	ND	U	**0.21**	70.3
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.005	0.0012	0.00012	4.3	0.005	mg/kg	ND	U	**0.1**	70.5	ND	U	**0.1**	70.4	ND	U	0.002	1.1	ND	U	**0.096**	64.7	ND	U	**0.11**	70.3
1,2-Dichlorobenzene	95-50-1	60	59	5.9	10000	60	mg/kg	ND	U	0.1	70.5	ND	U	0.1	70.4	ND	U	0.002	1.1	ND	U	0.096	64.7	ND	U	0.11	70.3
1,2-Dichloroethane	107-06-2	0.5	0.1	0.01	98	0.5	mg/kg	ND	U	0.1	70.5	ND	U	0.1	70.4	ND	U	0.002	1.1	ND	U	0.096	64.7	ND	U	0.11	70.3
1,2-Dichloropropane	78-87-5	0.5	0.11	0.011	260	0.5	mg/kg	ND	U	0.1	70.5	ND	U	0.1	70.4	ND	U	0.002	1.1	ND	U	0.096	64.7	ND	U	0.11	70.3
1,3-Dichlorobenzene	541-73-1	60	61	6.1	10000	60	mg/kg	ND	U	0.1	70.5	ND	U	0.1	70.4	ND	U	0.002	1.1	ND	U	0.096	64.7	ND	U	0.11	70.3
1,4-Dichlorobenzene	106-46-7	7.5	10	1	230	7.5	mg/kg	ND	U	0.1	70.5	ND	U	0.1	70.4	ND	U	0.002	1.1	ND	U	0.096	64.7	ND	U	0.11	70.3
2-Hexanone	591-78-6	4.4	1.1	0.11	460	4.4	mg/kg	ND	U	0.31	70.5	ND	U	0.31	70.4	ND	U	0.007	1.1	ND	U	0.29	64.7	ND	U	0.32	70.3
Acetone	67-64-1	9200	1000	100	10000	9200	mg/kg	ND	U	0.73	70.5	ND	U	0.72	70.4	1.1		0.017	1.1	ND	U	0.67	64.7	ND	U	0.74	70.3
Benzene	71-43-2	0.5	0.13	0.013	330	0.5	mg/kg	0.098	J	0.052	70.5	1.2		0.051	70.4	0.058		0.001	1.1	0.12	J	0.048	64.7	0.16	J	0.053	70.3
Bromodichloromethane	75-27-4	8	2.7	0.27	69	8	mg/kg	ND	U	0.1	70.5	ND	U	0.1	70.4	ND	U	0.002	1.1	ND	U	0.096	64.7	ND	U	0.11	70.3
Bromoform	75-25-2	8	3.5	0.35	2300	8	mg/kg	ND	U	0.1	70.5	ND	U	0.1	70.4	ND	U	0.002	1.1	ND	U	0.096	64.7	ND	U	0.11	70.3
Bromomethane	74-83-9	1	0.54	0.054	460	1	mg/kg	ND	U	0.21	70.5	ND	U	0.2	70.4	ND	U	0.005	1.1	ND	U	0.19	64.7	ND	U	0.21	70.3
Carbon Disulfide	75-15-0	620	530	53	10000	620	mg/kg	ND	U	0.1	70.5	ND	U	0.1	70.4	0.033		0.002	1.1	ND	U	0.096	64.7	ND	U	0.11	70.3
Carbon Tetrachloride	56-23-5	0.5	0.26	0.026	170	0.5	mg/kg	ND	U	0.1	70.5	ND	U	0.1	70.4	ND	U	0.002	1.1	ND	U	0.096	64.7	ND	U	0.11	70.3
Chlorobenzene	108-90-7	10	6.1	0.61	4600	10	mg/kg	ND	U	0.1	70.5	ND	U	0.1	70.4	ND	U	0.002	1.1	ND	U	0.096	64.7	ND	U	0.11	70.3
Chloroethane	75-00-3	90	19	1.9	10000	90	mg/kg	ND	U	0.21	70.5	ND	U	0.2	70.4	ND	U	0.005	1.1	ND	U	0.19	64.7	ND	U	0.21	70.3
Chloroform	67-66-3	8	2	0.2	110	8	mg/kg	ND	U	0.1	70.5	ND	U	0.1	70.4	ND	U	0.002	1.1	ND	U	0.096	64.7	ND	U	0.11	70.3
Chloromethane	74-87-3	3	0.38	0.038	1400	3	mg/kg	ND	U	0.21	70.5	ND	U	0.2	70.4	ND	U	0.005	1.1	ND	U	0.19	64.7	ND	U	0.21	70.3
Cis-1,2-Dichloroethylene	156-59-2	7	1.6	0.16	10000	7	mg/kg	ND	U	0.1	70.5	ND	U	0.1	70.4	ND	U	0.002	1.1	ND	U	0.096	64.7	ND	U	0.11	70.3
Cis-1,3-Dichloropropene	10061-01-5	NS	NS	NS	NS	NS	mg/kg	ND	U	0.1	70.5	ND	U	0.1	70.4	ND	U	0.002	1.1	ND	U	0.096	64.7	ND	U	0.11	70.3
Cyclohexane	110-82-7	5300	6900	690	10000	5300	mg/kg	0.42	J	0.1	70.5	2		0.1	70.4	0.041		0.002	1.1	0.46	J	0.096	64.7	ND	U	0.11	70.3
Dibromochloromethane	124-48-1	8	2.5	0.25	95	8	mg/kg	ND	U	0.1	70.5	ND	U	0.1	70.4	ND	U	0.002	1.1	ND	U	0.096	64.7	ND	U	0.11	70.3
Dichlorodifluoromethane	75-71-8	100	100	10	10000	100	mg/kg	ND	U	0.21	70.5	ND	U	0.2	70.4	ND	U	0.005	1.1	ND	U	0.19	64.7	ND	U	0.21	70.3
Dimethyl Benzene/ Xylenes, Total	1330-20-7	1000	990	99	9100	1000	mg/kg	0.9		0.1	70.5	2.6		0.1	70.4	0.5		0.002	1.1	0.4	J	0.096	64.7	0.59		0.11	70.3
Ethylbenzene	100-41-4	70	46	4.6	10000	70	mg/kg	0.26	J	0.1	70.5	0.52		0.1	70.4	0.1		0.002	1.1	0.14	J	0.096	64.7	0.21	J	0.11	70.3
Isopropylbenzene (Cumene)	98-82-8	350	2500	250	10000	350	mg/kg	0.46	J	0.1	70.5	6.4		0.1	70.4	0.025		0.002	1.1	0.29	J	0.096	64.7	0.19	J	0.11	70.3
Methyl Acetate	79-20-9	10000	1900	190	10000	10000	mg/kg	0.44	J	0.21	70.5	0.48	J	0.2	70.4	ND	U	0.005	1.1	ND	U	0.19	64.7	0.32	J	0.21	70.3
Methyl Ethyl Ketone (2-Butanone)	78-93-3	400	76	7.6	10000	400	mg/kg	ND	U	0.42	70.5	ND	U	0.41	70.4	0.26		0.01	1.1	ND	U	0.38	64.7	ND	U	0.42	70.3
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	820	130	13	10000	820	mg/kg	ND	U	0.31	70.5	ND	U	0.31	70.4	ND	U	0.007	1.1	ND	U	0.29	64.7	ND	U	0.32	70.3
Methylcyclohexane	108-87-2	NS	NS	NS	NS	NS	mg/kg	4		0.1	70.5	11		0.1	70.4	0.12		0.002	1.1	4.3		0.096	64.7	0.52	J	0.11	70.3
Methylene Chloride	75-09-2	0.5	0.076	0.0076	5400	0.5	mg/kg	ND	U	0.21	70.5	ND	U	0.2	70.4	ND	U	0.005	1.1	ND	U	0.19	64.7	ND	U	0.21	70.3
Styrene	100-42-5	10	24	2.4	10000	10	mg/kg	ND	U	0.1	70.5	ND	U	0.1	70.4	ND	U	0.002	1.1	ND	U	0.096	64.7	ND	U	0.11	70.3
Tert-Butyl Methyl Ether	1634-04-4	2	0.28	0.028	3700	2	mg/kg	ND	U	0.052	70.5	ND	U	0.051	70.4	ND	U	0.001	1.1	ND	U	0.048	64.7	ND	U	0.053	70.3
Tetrachloroethylene(PCE)	127-18-4	0.5	0.43	0.043	4400	0.5	mg/kg	ND	U	0.1	70.5	ND	U	0.1	70.4	ND	U	0.002	1.1	ND	U	0.096	64.7	ND	U	0.11	70.3
Toluene	108-88-3	100	44	4.4	10000	100	mg/kg	0.8		0.1	70.5	0.31	J	0.1	70.4	0.24		0.002	1.1	1.1		0.096	64.7	1.3		0.11	70.3
Trans-1,2-Dichloroethene	156-60-5	10	2.3	0.23	5500	10	mg/kg	ND	U	0.1	70.5	ND	U	0.1	70.4	ND	U	0.002	1.1	ND	U	0.096	64.7	ND	U	0.11	70.3
Trans-1,3-Dichloropropene	10061-02-6	NS	NS	NS	NS	NS	mg/kg	ND	U	0.1	70.5	ND	U	0.1	70.4	ND	U	0.002	1.1	ND	U	0.096	64.7	ND	U	0.11	70.3
Trichloroethylene (TCE)	79-01-6	0.5	0.17	0.017	1500	0.5	mg/kg	ND	U	0.1	70.5	ND	U	0.1	70.4	ND	U	0.002	1.1	ND	U	0.096	64.7	ND	U	0.11	70.3
Trichlorofluoromethane	75-69-4	200	87	8.7	10000	200	mg/kg	ND	U	0.21	70.5	ND	U	0.2	70.4	ND	U	0.005	1.1	ND	U	0.19	64.7	ND	U	0.21	70.3
Vinyl Chloride	75-01-4	0.2	0.027	0.0027	580	0.2	mg/kg	ND	U	0.1	70.5	ND	U	0.1	70.4	ND	U	0.002	1.1	ND	U	0.096	64.7	ND	U	0.11	70.3

Table 8
Summary of Soil Sample Analytical Results for Vertical Delineation Soil Samples Beneath Waste in CAMU
AOI-10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (2 - 15 ft bgs)	PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500)	Location ID	BH-10-44				BH-10-45				BH-10-46				BH-10-55				BH-10-56			
							Sample ID	BH-10-44-WC_24-26'				BH-10-45-WC_18-20'				BH-10-46-WC_17-18'				BH-10-55-WC_20-22'				BH-10-56-WC_22-24'			
							Sample Date	4/12/2011				4/12/2011				4/12/2011				4/12/2011				4/12/2011			
							Sample Matrix	Soil				Soil				Soil				Soil				Soil			
							Sample Interval	24.0-26.0 ft bgs				18.0-20.0 ft bgs				17.0-18.0 ft bgs				20.0-22.0 ft bgs				22.0-24.0 ft bgs			
							Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Semi-Volatile Organic Compounds																											
2,4,5-Trichlorophenol	95-95-4	1000	6100	610	190000	1000	mg/kg	ND	U	0.97	10	ND	U	0.48	5	ND	U	0.14	1	ND	U	0.49	5	ND	U	0.5	5
2,4,6-Trichlorophenol	88-06-2	10	29	2.9	190000	10	mg/kg	ND	U	0.48	10	ND	U	0.24	5	ND	U	0.07	1	ND	U	0.24	5	ND	U	0.25	5
2,4-Dichlorophenol	120-83-2	2	1	0.1	190000	2	mg/kg	ND	U	0.48	10	ND	U	0.24	5	ND	U	0.07	1	ND	U	0.24	5	ND	U	0.25	5
2,4-Dimethylphenol	105-67-9	200	87	8.7	10000	200	mg/kg	ND	U	0.97	10	ND	U	0.48	5	ND	U	0.14	1	0.63	J	0.49	5	0.97	J	0.5	5
2,4-Dinitrophenol	51-28-5	20	2.3	0.23	190000	20	mg/kg	ND	U	4.8	10	ND	U	2.4	5	ND	U	0.7	1	ND	U	2.4	5	ND	U	2.5	5
2,4-Dinitrotoluene	121-14-2	0.84	0.2	0.02	190000	0.84	mg/kg	ND	U	**0.97**	10	ND	U	0.48	5	ND	U	0.14	1	ND	U	0.49	5	ND	U	0.5	5
2,6-Dinitrotoluene	606-20-2	10	3	0.3	190000	10	mg/kg	ND	U	0.48	10	ND	U	0.24	5	ND	U	0.07	1	ND	U	0.24	5	ND	U	0.25	5
2-Chloronaphthalene	91-58-7	820	18000	1800	190000	1800	mg/kg	ND	U	0.48	10	ND	U	0.24	5	ND	U	0.07	1	ND	U	0.24	5	ND	U	0.25	5
2-Chlorophenol	95-57-8	4	4.4	0.44	10000	4	mg/kg	ND	U	0.48	10	ND	U	0.24	5	ND	U	0.07	1	ND	U	0.24	5	ND	U	0.25	5
2-Methylnaphthalene	91-57-6	41	1600	160	190000	160	mg/kg	21		0.48	10	25		0.24	5	1.8		0.07	1	12		0.24	5	17		0.25	5
2-Methylphenol (O-Cresol)	95-48-7	510	85	8.5	190000	510	mg/kg	ND	U	0.97	10	ND	U	0.48	5	ND	U	0.14	1	ND	U	0.49	5	0.53	J	0.5	5
2-Nitroaniline	88-74-4	31	5.5	0.55	190000	31	mg/kg	ND	U	0.48	10	ND	U	0.24	5	ND	U	0.07	1	ND	U	0.24	5	ND	U	0.25	5
2-Nitrophenol	88-75-5	82	17	1.7	190000	82	mg/kg	ND	U	0.48	10	ND	U	0.24	5	ND	U	0.07	1	ND	U	0.24	5	ND	U	0.25	5
3,3'-Dichlorobenzidine	91-94-1	0.58	32	3.2	190000	3.2	mg/kg	ND	U	1.5	10	ND	U	0.72	5	ND	U	0.21	1	ND	U	0.73	5	ND	U	0.75	5
3-Nitroaniline	99-09-2	3.1	0.48	0.048	190000	3.1	mg/kg	ND	U	0.97	10	ND	U	0.48	5	ND	U	0.14	1	ND	U	0.49	5	ND	U	0.5	5
4,6-Dinitro-2-Methylphenol	534-52-1	1	0.75	0.075	190000	1	mg/kg	ND	U	**2.4**	10	ND	U	**1.2**	5	ND	U	0.35	1	ND	U	**1.2**	5	ND	U	**1.2**	5
4-Bromophenyl Phenyl Ether	101-55-3	0.5	NS	NS	100	0.5	mg/kg	ND	U	0.48	10	ND	U	0.24	5	ND	U	0.07	1	ND	U	0.24	5	ND	U	0.25	5
4-Chloro-3-Methylphenol	59-50-7	51	110	11	190000	51	mg/kg	ND	U	0.97	10	ND	U	0.48	5	ND	U	0.14	1	ND	U	0.49	5	ND	U	0.5	5
4-Chloroaniline	106-47-8	1.3	1.6	0.16	190000	1.3	mg/kg	ND	U	0.97	10	ND	U	0.48	5	ND	U	0.14	1	ND	U	0.49	5	ND	U	0.5	5
4-Chlorophenyl Phenyl Ether	7005-72-3	0.5	NS	NS	100	0.5	mg/kg	ND	U	0.48	10	ND	U	0.24	5	ND	U	0.07	1	ND	U	0.24	5	ND	U	0.25	5
4-Methylphenol (P-Cresol)	106-44-5	51	12	1.2	190000	51	mg/kg	5		0.97	10	ND	U	0.48	5	ND	U	0.14	1	6.7		0.49	5	7.2		0.5	5
4-Nitroaniline	100-01-6	13	1.9	0.19	190000	13	mg/kg	ND	U	0.97	10	ND	U	0.48	5	ND	U	0.14	1	ND	U	0.49	5	ND	U	0.5	5
4-Nitrophenol	100-02-7	6	4.1	0.41	190000	6	mg/kg	ND	U	2.4	10	ND	U	1.2	5	ND	U	0.35	1	ND	U	1.2	5	ND	U	1.2	5
Acenaphthene	83-32-9	380	4700	470	190000	470	mg/kg	22		0.48	10	4.9		0.24	5	ND	U	0.07	1	8.7		0.24	5	7.3		0.25	5
Acenaphthylene	208-96-8	610	6900	690	190000	690	mg/kg	3.4		0.48	10	ND	U	0.24	5	ND	U	0.07	1	2.1		0.24	5	1.7		0.25	5
Acetophenone	98-86-2	1000	540	54	10000	1000	mg/kg	ND	U	0.97	10	ND	U	0.48	5	ND	U	0.14	1	ND	U	0.49	5	ND	U	0.5	5
Anthracene	120-12-7	6.6	350	35	190000	35	mg/kg	16		0.48	10	2.8		0.24	5	ND	U	0.07	1	5.9		0.24	5	6		0.25	5
Atrazine	1912-24-9	0.3	0.13	0.013	190000	0.3	mg/kg	ND	U	**0.48**	10	ND	U	0.24	5	ND	U	0.07	1	ND	U	0.24	5	ND	U	0.25	5
Benzaldehyde	100-52-7	NS	NS	NS	NS	NS	mg/kg	ND	U	0.97	10	ND	U	0.48	5	ND	U	0.14	1	ND	U	0.49	5	ND	U	0.5	5
Benzo(A)Anthracene	56-55-3	0.36	320	32	190000	32	mg/kg	14		0.48	10	2.8		0.24	5	0.11	J	0.07	1	7.1		0.24	5	5.3		0.25	5
Benzo(A)Pyrene	50-32-8	0.02	46	4.6	190000	4.6	mg/kg	9		0.48	10	2.2		0.24	5	0.21	J	0.07	1	6		0.24	5	4.5		0.25	5
Benzo(B)Fluoranthene	205-99-2	0.12	170	17	190000	17	mg/kg	10		0.48	10	2.6		0.24	5	0.076	J	0.07	1	6.9		0.24	5	5.3		0.25	5
Benzo(G,H,I)Perylene	191-24-2	0.026	180	18	190000	18	mg/kg	4.3		0.48	10	1.2	J	0.24	5	ND	U	0.07	1	3.1		0.24	5	2.5		0.25	5
Benzo(K)Fluoranthene	207-08-9	0.055	610	61	190000	61	mg/kg	5		0.48	10	0.9	J	0.24	5	ND	U	0.07	1	3.3		0.24	5	1.9		0.25	5
Benzyl Butyl Phthalate	85-68-7	140	10000	1000	10000	1000	mg/kg	ND	U	0.97	10	ND	U	0.48	5	ND	U	0.14	1	ND	U	0.49	5	ND	U	0.5	5
Biphenyl (Diphenyl)	92-52-4	510	2200	220	190000	510	mg/kg	2.8		0.48	10	0.63	J	0.24	5	0.1	J	0.07	1	1.7		0.24	5	2.2		0.25	5
Bis(2-Chloroethoxy) Methane	111-91-1	31	8.2	0.82	10000	31	mg/kg	ND	U	0.48	10	ND	U	0.24	5	ND	U	0.07	1	ND	U	0.24	5	ND	U	0.25	5
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	0.076	0.023	0.0023	7.7	0.076	mg/kg	ND	U	**0.48**	10	ND	U	**0.24**	5	ND	U	0.07	1	ND	U	**0.24**	5	ND	U	**0.25**	5
Bis(2-Chloroisopropyl) Ether	108-60-1	30	8	0.8	250	30	mg/kg	ND	U	0.48	10	ND	U	0.24	5	ND	U	0.07	1	ND	U	0.24	5	ND	U	0.25	5
Bis(2-Ethylhexyl) Phthalate	117-81-7	0.6	130	13	10000	13	mg/kg	1.3	J	0.97	10	2.1	J	0.48	5	0.17	J	0.14	1	1.5	J	0.49	5	0.58	J	0.5	5
Caprolactam	105-60-2	NS	NS	NS	NS	NS	mg/kg	ND	U	0.48	10	ND	U	0.24	5	ND	U	0.07	1	ND	U	0.24	5	ND	U	0.25	5
Carbazole	86-74-8	13	83	8.3	190000	13	mg/kg	1.4	J	0.48	10	0.51	J	0.24	5	ND	U	0.07	1	0.82	J	0.24	5	0.81	J	0.25	5
Chrysene	218-01-9	0.19	230	23	190000	23	mg/kg	13		0.48	10	3.7		0.24	5	0.46		0.07	1	7.1		0.24	5	6.4		0.25	5
Dibenz(A,H)Anthracene	53-70-3	0.036	160	16	190000	16	mg/kg	1.5	J	0.48	10	0.43	J	0.24	5	ND	U	0.07	1	1.1	J	0.24	5	0.85	J	0.25	5
Dibenzofuran	132-64-9	10	260	26	190000	26	mg/kg	7.5		0.48	10	3.5		0.24	5	0.082	J	0.07	1	3.7		0.24	5	3.3		0.25	5
Diethyl Phthalate	84-66-2	8200	2600	260	10000	8200	mg/kg	ND	U	0.97	10	ND	U	0.48	5	ND	U	0.14	1	ND	U	0.49	5	ND	U	0.5	5
Dimethyl Phthalate	131-11-3	0.5	NS	NS	100	0.5	mg/kg	ND	U	**0.97**	10	ND	U	0.48	5	ND	U	0.14	1	ND	U	0.49	5	ND	U	**0.5**	5
Di-N-Butyl Phthalate	84-74-2	1000	4100	410	10000	1000	mg/kg	ND	U	0.97	10	ND	U	0.48	5	ND	U	0.14	1	ND	U	0.49	5	ND	U	0.5	5
Di-N-Octylphthalate	117-84-0	300	10000	1000	10000	1000	mg/kg	ND	U	0.97	10	ND	U	0.48	5	ND	U	0.14	1	ND	U	0.49	5	ND	U	0.5	5

Table 8
Summary of Soil Sample Analytical Results for Vertical Delineation Soil Samples Beneath Waste in CAMU
AOI-10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (2 - 15 ft bgs)	PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500)	Location ID	BH-10-44				BH-10-45				BH-10-46				BH-10-55				BH-10-56			
							Sample ID	BH-10-44-WC_24-26'				BH-10-45-WC_18-20'				BH-10-46-WC_17-18'				BH-10-55-WC_20-22'				BH-10-56-WC_22-24'			
							Sample Date	4/12/2011				4/12/2011				4/12/2011				4/12/2011				4/12/2011			
							Sample Matrix	Soil				Soil				Soil				Soil				Soil			
							Sample Interval	24.0-26.0 ft bgs				18.0-20.0 ft bgs				17.0-18.0 ft bgs				20.0-22.0 ft bgs				22.0-24.0 ft bgs			
							Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Fluoranthene	206-44-0	26	3200	320	190000	320	mg/kg	32		0.48	10	4.6		0.24	5	0.089	J	0.07	1	15		0.24	5	12		0.25	5
Fluorene	86-73-7	190	3800	380	190000	380	mg/kg	17		0.48	10	6.1		0.24	5	0.11	J	0.07	1	6.8		0.24	5	6.1		0.25	5
Hexachlorobenzene	118-74-1	0.1	0.96	0.096	190000	0.1	mg/kg	ND	U	**0.48**	10	ND	U	**0.24**	5	ND	U	0.07	1	ND	U	**0.24**	5	ND	U	**0.25**	5
Hexachlorobutadiene	87-68-3	3.3	39	3.9	10000	3.9	mg/kg	ND	U	0.97	10	ND	U	0.48	5	ND	U	0.14	1	ND	U	0.49	5	ND	U	0.5	5
Hexachlorocyclopentadiene	77-47-4	5	91	9.1	10000	9.1	mg/kg	ND	U	2.4	10	ND	U	1.2	5	ND	U	0.35	1	ND	U	1.2	5	ND	U	1.2	5
Hexachloroethane	67-72-1	0.1	0.56	0.056	640	0.1	mg/kg	ND	U	**0.48**	10	ND	U	**0.24**	5	ND	U	0.07	1	ND	U	**0.24**	5	ND	U	**0.25**	5
Indeno[1,2,3-cd]pyrene	193-39-5	0.36	28000	2800	190000	2800	mg/kg	4		0.48	10	1	J	0.24	5	ND	U	0.07	1	2.9		0.24	5	2.1		0.25	5
Isophorone	78-59-1	10	1.9	0.19	10000	10	mg/kg	ND	U	0.48	10	ND	U	0.24	5	ND	U	0.07	1	ND	U	0.24	5	ND	U	0.25	5
Naphthalene	91-20-3	10	25	2.5	190000	10	mg/kg	41		0.48	10	9		0.24	5	1.3		0.07	1	27		0.24	5	34		2.5	50
Nitrobenzene	98-95-3	20	8.7	0.87	10000	20	mg/kg	ND	U	0.48	10	ND	U	0.24	5	ND	U	0.07	1	ND	U	0.24	5	ND	U	0.25	5
N-Nitrosodi-N-Propylamine	621-64-7	0.037	0.0051	0.00051	10000	0.037	mg/kg	ND	U	**0.48**	10	ND	U	**0.24**	5	ND	U	**0.07**	1	ND	U	**0.24**	5	ND	U	**0.25**	5
N-Nitrosodiphenylamine	86-30-6	53	83	8.3	190000	53	mg/kg	ND	U	0.48	10	ND	U	0.24	5	ND	U	0.07	1	ND	U	0.24	5	ND	U	0.25	5
Pentachlorophenol	87-86-5	0.1	5	0.5	190000	0.5	mg/kg	ND	U	**2.4**	10	ND	U	**1.2**	5	ND	U	0.35	1	ND	U	**1.2**	5	ND	U	**1.2**	5
Phenanthrene	85-01-8	110	10000	1000	190000	1000	mg/kg	58		0.48	10	20		0.24	5	1.3		0.07	1	24		0.24	5	20		0.25	5
Phenol	108-95-2	200	33	3.3	190000	200	mg/kg	ND	U	0.48	10	ND	U	0.24	5	ND	U	0.07	1	0.27	J	0.24	5	0.37	J	0.25	5
Pyrene	129-00-0	13	2200	220	190000	220	mg/kg	32		0.48	10	4.6		0.24	5	0.2	J	0.07	1	15		0.24	5	13		0.25	5
Metals																											
Aluminum	7429-90-5	NS	NS	NS	190000	190000	mg/kg	15400		7.43	1	21500		7.32	1	37400		10.4	1	12800		7.15	1	15500		7.28	1
Antimony	7440-36-0	0.6	27	2.7	190000	2.7	mg/kg	ND	U	1.48	1	ND	U	1.46	1	ND	U	2.08	1	ND	U	1.42	1	ND	U	1.45	1
Arsenic	7440-38-2	1	29	2.9	190000	2.9	mg/kg	17.6		1.4	1	6.88		1.38	1	57.3		1.97	1	12.3		1.35	1	18		1.38	1
Barium	7440-39-3	200	8200	820	190000	820	mg/kg	259		0.059	1	224		0.058	1	1180		0.083	1	345		0.057	1	245		0.058	1
Beryllium	7440-41-7	0.4	320	32	190000	32	mg/kg	1.41		0.1	1	1.19		0.099	1	1.04		0.141	1	1.45		0.097	1	1.61		0.099	1
Cadmium	7440-43-9	0.5	38	3.8	190000	3.8	mg/kg	1.26		0.207	1	ND	U	0.204	1	0.897	J	0.291	1	1.56		0.199	1	1.66		0.203	1
Calcium	7440-70-2	NS	NS	NS	NS	NS	mg/kg	3250		9.05	1	4740		8.92	1	183000		63.6	5	4830		8.72	1	4390		8.88	1
Chromium, Total	7440-47-3	NS	NS	NS	NS	NS	mg/kg	50.8		0.871	1	46.6		0.859	1	236		1.22	1	47.7		0.839	1	50.3		0.854	1
Cobalt	7440-48-4	3	140	14	190000	14	mg/kg	20.2		0.281	1	13.1		0.277	1	13.3		0.394	1	17.9		0.27	1	19.7		0.275	1
Copper	7440-50-8	100	43000	4300	190000	4300	mg/kg	103		0.325	1	52.7		0.32	1	409		0.457	1	97.4		0.313	1	109		0.319	1
Iron	7439-89-6	NS	NS	NS	190000	190000	mg/kg	23200		6.96	1	25200		6.86	1	16700		9.78	1	21200		6.7	1	23300		6.82	1
Lead	7439-92-1	0.5	450	45	190000	45	mg/kg	281		0.886	1	159		0.873	1	1400		1.25	1	304		0.853	1	316		0.869	1
Magnesium	7439-95-4	NS	NS	NS	#N/A	NS	mg/kg	3320		3.75	1	6760		3.7	1	36600		5.27	1	3140		3.61	1	3580		3.68	1
Manganese	7439-96-5	30	2000	200	190000	200	mg/kg	460		0.115	1	449		0.114	1	1030		0.162	1	369		0.111	1	424		0.113	1
Mercury	7439-97-6	0.2	10	1	190000	1	mg/kg	0.752		0.004	1	0.669		0.004	1	0.0304	J	0.006	1	0.735		0.004	1	0.906		0.004	1
Nickel	7440-02-0	10	650	65	190000	65	mg/kg	34.8		0.281	1	30.6		0.277	1	221		0.394	1	32.8		0.27	1	35.6		0.275	1
Potassium	7440-09-7	NS	NS	NS	#N/A	NS	mg/kg	1710		26.6	1	2050		26.2	1	243		37.4	1	1450		25.6	1	1720		26.1	1
Selenium	7782-49-2	5	26	2.6	190000	5	mg/kg	2.04	J	1.45	1	1.6	J	1.43	1	ND	U	2.03	1	2.76	J	1.39	1	3.57		1.42	1
Silver	7440-22-4	10	84	8.4	190000	10	mg/kg	0.496	J	0.266	1	ND	U	0.262	1	1.26		0.374	1	0.583	J	0.256	1	0.52	J	0.261	1
Sodium	7440-23-5	NS	NS	NS	NS	NS	mg/kg	167		55.1	1	300		54.3	1	653		77.4	1	215		53.1	1	656		54	1
Thallium	7440-28-0	0.2	14	1.4	190000	1.4	mg/kg	ND	U	**2.14**	1	3.53	J	**2.11**	1	ND	U	**3.01**	1	ND	U	**2.06**	1	ND	U	**2.1**	1
Vanadium	7440-62-2	72	72000	7200	190000	7200	mg/kg	34		0.281	1	52.3		0.277	1	488		0.394	1	30.3		0.27	1	31.1		0.275	1
Zinc	7440-66-6	200	12000	1200	190000	1200	mg/kg	427		0.975	1	204		0.961	1	570		1.37	1	399		0.939	1	457		0.956	1
General Chemistry																											
Moisture, Percent	MOIST	NS	NS	NS	NS	NS	%	32.3		0.5	1	31.3		0.5	1	52.3		0.5	1	32.4		0.5	1	33.6		0.5	1

Notes:
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard
All soil samples in this table are considered saturated soils.

Qualifiers:
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate)

Exceedance Summary:
10 - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Direct Contact

Table 8
Summary of Soil Sample Analytical Results for Vertical Delineation Soil Samples Beneath Waste in CAMU
AOI-10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (2 - 15 ft bgs)	PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500)	Location ID	BH-10-63				BH-10-64				BH-10-65				BH-10-69				BH-10-70				BH-10-77			
							Sample ID	BH-10-63-WC_21-23'				BH-10-64-WC_24-26'				BH-10-65_14-16'				BH-10-69-WC_15.5-16'				BH-10-70-WC@15.5-16'				BH-10-77-WC_20-22'			
							Sample Date	4/13/2011				4/13/2011				4/14/2011				4/12/2011				4/11/2011				4/13/2011			
							Sample Matrix	Soil				Soil				Soil				Soil				Soil				Soil			
							Sample Interval	21.0-23.0 ft bgs				24.0-26.0 ft bgs				14.0-16.0 ft bgs				15.5-16.0 ft bgs				15.5-16.0 ft bgs				20.0-22.0 ft bgs			
							Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Volatile Organic Compounds																															
1,1,1-Trichloroethane	71-55-6	20	7.2	0.72	10000.00	20	mg/kg	ND	U	0.088	62.7	ND	U	0.002	1	ND	U	0.002	1	ND	U	0.12	72.3	ND	U	0.069	55.5	ND	U	0.1	69.1
1,1,2,2-Tetrachloroethane	79-34-5	0.03	0.0093	0.00093	44	0.03	mg/kg	ND	U	**0.088**	62.7	ND	U	0.002	1	ND	U	0.002	1	ND	U	**0.12**	72.3	ND	U	**0.069**	55.5	ND	U	**0.1**	69.1
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	10000	10000	1000	10000	10000	mg/kg	ND	U	0.18	62.7	ND	U	0.004	1	ND	U	0.003	1	ND	U	0.24	72.3	ND	U	0.14	55.5	ND	U	0.21	69.1
1,1,2-Trichloroethane	79-00-5	0.5	0.15	0.015	160	0.5	mg/kg	ND	U	0.088	62.7	ND	U	0.002	1	ND	U	0.002	1	ND	U	0.12	72.3	ND	U	0.069	55.5	ND	U	0.1	69.1
1,1-Dichloroethane	75-34-3	16	3.9	0.39	1600	16	mg/kg	ND	U	0.088	62.7	ND	U	0.002	1	ND	U	0.002	1	ND	U	0.12	72.3	ND	U	0.069	55.5	ND	U	0.1	69.1
1,1-Dichloroethene	75-35-4	0.7	0.19	0.019	10000	0.7	mg/kg	ND	U	0.088	62.7	ND	U	0.002	1	ND	U	0.002	1	ND	U	0.12	72.3	ND	U	0.069	55.5	ND	U	0.1	69.1
1,2,4-Trichlorobenzene	120-82-1	7	27	2.7	10000	7	mg/kg	ND	U	0.088	62.7	ND	U	0.002	1	ND	U	0.002	1	ND	U	0.12	72.3	ND	U	0.069	55.5	ND	U	0.1	69.1
1,2-Dibromo-3-Chloropropane	96-12-8	0.02	0.0092	0.00092	0.43	0.02	mg/kg	ND	U	**0.18**	62.7	ND	U	0.004	1	ND	U	0.003	1	ND	U	**0.24**	72.3	ND	U	**0.14**	55.5	ND	U	**0.21**	69.1
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.005	0.0012	0.00012	4.3	0.005	mg/kg	ND	U	**0.088**	62.7	ND	U	0.002	1	ND	U	0.002	1	ND	U	**0.12**	72.3	ND	U	**0.069**	55.5	ND	U	**0.1**	69.1
1,2-Dichlorobenzene	95-50-1	60	59	5.9	10000	60	mg/kg	ND	U	0.088	62.7	ND	U	0.002	1	ND	U	0.002	1	ND	U	0.12	72.3	ND	U	0.069	55.5	ND	U	0.1	69.1
1,2-Dichloroethane	107-06-2	0.5	0.1	0.01	98	0.5	mg/kg	ND	U	0.088	62.7	ND	U	0.002	1	ND	U	0.002	1	ND	U	0.12	72.3	ND	U	0.069	55.5	ND	U	0.1	69.1
1,2-Dichloropropane	78-87-5	0.5	0.11	0.011	260	0.5	mg/kg	ND	U	0.088	62.7	ND	U	0.002	1	ND	U	0.002	1	ND	U	0.12	72.3	ND	U	0.069	55.5	ND	U	0.1	69.1
1,3-Dichlorobenzene	541-73-1	60	61	6.1	10000	60	mg/kg	ND	U	0.088	62.7	ND	U	0.002	1	ND	U	0.002	1	ND	U	0.12	72.3	ND	U	0.069	55.5	ND	U	0.1	69.1
1,4-Dichlorobenzene	106-46-7	7.5	10	1	230	7.5	mg/kg	ND	U	0.088	62.7	ND	U	0.002	1	ND	U	0.002	1	ND	U	0.12	72.3	ND	U	0.069	55.5	ND	U	0.1	69.1
2-Hexanone	591-78-6	4.4	1.1	0.11	460	4.4	mg/kg	ND	U	0.27	62.7	ND	U	0.005	1	ND	U	0.005	1	ND	U	0.36	72.3	ND	U	0.21	55.5	ND	U	0.31	69.1
Acetone	67-64-1	9200	1000	100	10000	9200	mg/kg	ND	U	0.62	62.7	0.14		0.012	1	0.16		0.011	1	ND	U	0.84	72.3	ND	U	0.48	55.5	ND	U	0.73	69.1
Benzene	71-43-2	0.5	0.13	0.013	330	0.5	mg/kg	0.51		0.044	62.7	0.03		9E-04	1	0.002	J	8E-04	1	0.12	J	0.06	72.3	0.35		0.034	55.5	ND	U	0.052	69.1
Bromodichloromethane	75-27-4	8	2.7	0.27	69	8	mg/kg	ND	U	0.088	62.7	ND	U	0.002	1	ND	U	0.002	1	ND	U	0.12	72.3	ND	U	0.069	55.5	ND	U	0.1	69.1
Bromoform	75-25-2	8	3.5	0.35	2300	8	mg/kg	ND	U	0.088	62.7	ND	U	0.002	1	ND	U	0.002	1	ND	U	0.12	72.3	ND	U	0.069	55.5	ND	U	0.1	69.1
Bromomethane	74-83-9	1	0.54	0.054	460	1	mg/kg	ND	U	0.18	62.7	ND	U	0.004	1	ND	U	0.003	1	ND	U	0.24	72.3	ND	U	0.14	55.5	ND	U	0.21	69.1
Carbon Disulfide	75-15-0	620	530	53	10000	620	mg/kg	ND	U	0.088	62.7	ND	U	0.002	1	ND	U	0.002	1	ND	U	0.12	72.3	ND	U	0.069	55.5	ND	U	0.1	69.1
Carbon Tetrachloride	56-23-5	0.5	0.26	0.026	170	0.5	mg/kg	ND	U	0.088	62.7	ND	U	0.002	1	ND	U	0.002	1	ND	U	0.12	72.3	ND	U	0.069	55.5	ND	U	0.1	69.1
Chlorobenzene	108-90-7	10	6.1	0.61	4600	10	mg/kg	ND	U	0.088	62.7	ND	U	0.002	1	ND	U	0.002	1	ND	U	0.12	72.3	ND	U	0.069	55.5	ND	U	0.1	69.1
Chloroethane	75-00-3	90	19	1.9	10000	90	mg/kg	ND	U	0.18	62.7	ND	U	0.004	1	ND	U	0.003	1	ND	U	0.24	72.3	ND	U	0.14	55.5	ND	U	0.21	69.1
Chloroform	67-66-3	8	2	0.2	110	8	mg/kg	ND	U	0.088	62.7	ND	U	0.002	1	ND	U	0.002	1	ND	U	0.12	72.3	ND	U	0.069	55.5	ND	U	0.1	69.1
Chloromethane	74-87-3	3	0.38	0.038	1400	3	mg/kg	ND	U	0.18	62.7	ND	U	0.004	1	ND	U	0.003	1	ND	U	0.24	72.3	ND	U	0.14	55.5	ND	U	0.21	69.1
Cis-1,2-Dichloroethylene	156-59-2	7	1.6	0.16	10000	7	mg/kg	ND	U	0.088	62.7	ND	U	0.002	1	ND	U	0.002	1	ND	U	0.12	72.3	ND	U	0.069	55.5	ND	U	0.1	69.1
Cis-1,3-Dichloropropene	10061-01-5	NS	NS	NS	NS	NS	mg/kg	ND	U	0.088	62.7	ND	U	0.002	1	ND	U	0.002	1	ND	U	0.12	72.3	ND	U	0.069	55.5	ND	U	0.1	69.1
Cyclohexane	110-82-7	5300	6900	690	10000	5300	mg/kg	1.9		0.088	62.7	0.081		0.002	1	0.071		0.002	1	0.5	J	0.12	72.3	2.1		0.069	55.5	1.6		0.1	69.1
Dibromochloromethane	124-48-1	8	2.5	0.25	95	8	mg/kg	ND	U	0.088	62.7	ND	U	0.002	1	ND	U	0.002	1	ND	U	0.12	72.3	ND	U	0.069	55.5	ND	U	0.1	69.1
Dichlorodifluoromethane	75-71-8	100	100	10	10000	100	mg/kg	ND	U	0.18	62.7	ND	U	0.004	1	ND	U	0.003	1	ND	U	0.24	72.3	ND	U	0.14	55.5	ND	U	0.21	69.1
Dimethyl Benzene/ Xylenes, Total	1330-20-7	1000	990	99	9100	1000	mg/kg	0.23	J	0.088	62.7	0.002	J	0.002	1	0.013		0.002	1	0.89		0.12	72.3	3.8		0.069	55.5	0.54		0.1	69.1
Ethylbenzene	100-41-4	70	46	4.6	10000	70	mg/kg	0.12	J	0.088	62.7	ND	U	0.002	1	0.002	J	0.002	1	0.31	J	0.12	72.3	0.78		0.069	55.5	ND	U	0.1	69.1
Isopropylbenzene (Cumene)	98-82-8	350	2500	250	10000	350	mg/kg	1		0.088	62.7	0.003	J	0.002	1	0.007	J	0.002	1	0.62		0.12	72.3	0.44		0.069	55.5	0.67		0.1	69.1
Methyl Acetate	79-20-9	10000	1900	190	10000	10000	mg/kg	ND	U	0.18	62.7	ND	U	0.004	1	ND	U	0.003	1	0.48	J	0.24	72.3	0.26	J	0.14	55.5	0.7		0.21	69.1
Methyl Ethyl Ketone (2-Butanone)	78-93-3	400	76	7.6	10000	400	mg/kg	ND	U	0.35	62.7	0.013	J	0.007	1	0.027		0.006	1	ND	U	0.48	72.3	ND	U	0.27	55.5	ND	U	0.42	69.1
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	820	130	13	10000	820	mg/kg	ND	U	0.27	62.7	ND	U	0.005	1	ND	U	0.005	1	ND	U	0.36	72.3	ND	U	0.21	55.5	ND	U	0.31	69.1
Methylcyclohexane	108-87-2	NS	NS	NS	NS	NS	mg/kg	10		0.088	62.7	0.11		0.002	1	0.35		0.002	1	4.5		0.12	72.3	5.8		0.069	55.5	9.6		0.1	69.1
Methylene Chloride	75-09-2	0.5	0.076	0.0076	5400	0.5	mg/kg	ND	U	0.18	62.7	ND	U	0.004	1	ND	U	0.003	1	ND	U	0.24	72.3	ND	U	0.14	55.5	ND	U	0.21	69.1
Styrene	100-42-5	10	24	2.4	10000	10	mg/kg	ND	U	0.088	62.7	ND	U	0.002	1	ND	U	0.002	1	ND	U	0.12	72.3	ND	U	0.069	55.5	ND	U	0.1	69.1
Tert-Butyl Methyl Ether	1634-04-4	2	0.28	0.028	3700	2	mg/kg	ND	U	0.044	62.7	ND	U	9E-04	1	ND	U	8E-04	1	ND	U	0.06	72.3	ND	U	0.034	55.5	ND	U	0.052	69.1
Tetrachloroethylene(PCE)	127-18-4	0.5	0.43	0.043	4400	0.5	mg/kg	ND	U	0.088	62.7	ND	U	0.002	1	ND	U	0.002	1	ND	U	0.12	72.3	ND	U	0.069	55.5	ND	U	0.1	69.1
Toluene	108-88-3	100	44	4.4	10000	100	mg/kg	ND	U	0.088	62.7	ND	U	0.002	1	ND	U	0.002	1	0.9		0.12	72.3	0.39		0.069	55.5	0.11	J	0.1	69.1
Trans-1,2-Dichloroethene	156-60-5	10	2.3	0.23	5500	10	mg/kg	ND	U	0.088	62.7	ND	U	0.002	1	ND	U	0.002	1	ND	U	0.12	72.3	ND	U	0.069	55.5	ND	U	0.1	69.1
Trans-1,3-Dichloropropene	10061-02-6	NS	NS	NS	NS	NS	mg/kg	ND	U	0.088	62.7	ND	U	0.002	1	ND	U	0.002	1	ND	U	0.12	72.3	ND	U	0.069	55.5	ND	U	0.1	69.1
Trichloroethylene (TCE)	79-01-6	0.5	0.17	0.017	1500	0.5	mg/kg	ND	U	0.088	62.7	ND	U	0.002	1	ND	U	0.002	1	ND	U	0.12	72.3	ND	U	0.069	55.5	ND	U	0.1	69.1
Trichlorofluoromethane	75-69-4	200	87	8.7	10000	200	mg/kg	ND	U	0.18	62.7	ND	U	0.004	1	ND	U	0.003	1	ND	U	0.24	72.3	ND	U	0.14	55.5	ND	U	0.21	69.1
Vinyl Chloride	75-01-4	0.2	0.027	0.0027	580	0.2	mg/kg	ND	U	0.088	62.7	ND	U	0.002	1	ND	U	0.002	1	ND	U	0.12	72.3	ND	U	0.069	55.5	ND	U	0.1	69.1

Table 8
Summary of Soil Sample Analytical Results for Vertical Delineation Soil Samples Beneath Waste in CAMU
AOI-10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (2 - 15 ft bgs)	PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500)	Location ID	BH-10-63				BH-10-64				BH-10-65				BH-10-69				BH-10-70				BH-10-77			
							Sample ID	BH-10-63-WC_21-23'				BH-10-64-WC_24-26'				BH-10-65_14-16'				BH-10-69-WC_15.5-16'				BH-10-70-WC@15.5-16'				BH-10-77-WC_20-22'			
							Sample Date	4/13/2011				4/13/2011				4/14/2011				4/12/2011				4/11/2011				4/13/2011			
							Sample Matrix	Soil				Soil				Soil				Soil				Soil				Soil			
							Sample Interval	21.0-23.0 ft bgs				24.0-26.0 ft bgs				14.0-16.0 ft bgs				15.5-16.0 ft bgs				15.5-16.0 ft bgs				20.0-22.0 ft bgs			
							Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Semi-Volatile Organic Compounds																															
2,4,5-Trichlorophenol	95-95-4	1000	6100	610	190000	1000	mg/kg	ND	U	0.46	5	ND	U	0.57	5	ND	U	0.1	1	ND	U	1.1	10	ND	U	0.82	10	ND	U	5	5
2,4,6-Trichlorophenol	88-06-2	10	29	2.9	190000	10	mg/kg	ND	U	0.23	5	ND	U	0.29	5	ND	U	0.05	1	ND	U	0.54	10	ND	U	0.41	10	ND	U	2.5	5
2,4-Dichlorophenol	120-83-2	2	1	0.1	190000	2	mg/kg	ND	U	0.23	5	ND	U	0.29	5	ND	U	0.05	1	ND	U	0.54	10	ND	U	0.41	10	ND	U	**2.5**	5
2,4-Dimethylphenol	105-67-9	200	87	8.7	10000	200	mg/kg	0.85	J	0.46	5	ND	U	0.57	5	ND	U	0.1	1	ND	U	1.1	10	ND	U	0.82	10	ND	U	5	5
2,4-Dinitrophenol	51-28-5	20	2.3	0.23	190000	20	mg/kg	ND	U	2.3	5	ND	U	2.9	5	ND	U	0.5	1	ND	U	5.4	10	ND	U	4.1	10	ND	U	**25**	5
2,4-Dinitrotoluene	121-14-2	0.84	0.2	0.02	190000	0.84	mg/kg	ND	U	0.46	5	ND	U	0.57	5	ND	U	0.1	1	ND	U	**1.1**	10	ND	U	0.82	10	ND	U	**5**	5
2,6-Dinitrotoluene	606-20-2	10	3	0.3	190000	10	mg/kg	ND	U	0.23	5	ND	U	0.29	5	ND	U	0.05	1	ND	U	0.54	10	ND	U	0.41	10	ND	U	2.5	5
2-Chloronaphthalene	91-58-7	820	18000	1800	190000	1800	mg/kg	ND	U	0.23	5	ND	U	0.29	5	ND	U	0.05	1	ND	U	0.54	10	ND	U	0.41	10	ND	U	2.5	5
2-Chlorophenol	95-57-8	4	4.4	0.44	10000	4	mg/kg	ND	U	0.23	5	ND	U	0.29	5	ND	U	0.05	1	ND	U	0.54	10	ND	U	0.41	10	ND	U	2.5	5
2-Methylnaphthalene	91-57-6	41	1600	160	190000	160	mg/kg	4		0.23	5	ND	U	0.29	5	0.16	J	0.05	1	28		0.54	10	4.9		0.41	10	3.5	J	2.5	5
2-Methylphenol (O-Cresol)	95-48-7	510	85	8.5	190000	510	mg/kg	ND	U	0.46	5	ND	U	0.57	5	ND	U	0.1	1	ND	U	1.1	10	ND	U	0.82	10	ND	U	5	5
2-Nitroaniline	88-74-4	31	5.5	0.55	190000	31	mg/kg	ND	U	0.23	5	ND	U	0.29	5	ND	U	0.05	1	ND	U	0.54	10	ND	U	0.41	10	ND	U	2.5	5
2-Nitrophenol	88-75-5	82	17	1.7	190000	82	mg/kg	ND	U	0.23	5	ND	U	0.29	5	ND	U	0.05	1	ND	U	0.54	10	ND	U	0.41	10	ND	U	2.5	5
3,3'-Dichlorobenzidine	91-94-1	0.58	32	3.2	190000	3.2	mg/kg	ND	U	0.69	5	ND	U	0.86	5	ND	U	0.15	1	ND	U	1.6	10	ND	U	1.2	10	ND	U	**7.5**	5
3-Nitroaniline	99-09-2	3.1	0.48	0.048	190000	3.1	mg/kg	ND	U	0.46	5	ND	U	0.57	5	ND	U	0.1	1	ND	U	1.1	10	ND	U	0.82	10	ND	U	**5**	5
4,6-Dinitro-2-Methylphenol	534-52-1	1	0.75	0.075	190000	1	mg/kg	ND	U	**1.2**	5	ND	U	**1.4**	5	ND	U	0.25	1	ND	U	**2.7**	10	ND	U	**2.1**	10	ND	U	**13**	5
4-Bromophenyl Phenyl Ether	101-55-3	0.5	NS	NS	100	0.5	mg/kg	ND	U	0.23	5	ND	U	0.29	5	ND	U	0.05	1	ND	U	**0.54**	10	ND	U	0.41	10	ND	U	**2.5**	5
4-Chloro-3-Methylphenol	59-50-7	51	110	11	190000	51	mg/kg	ND	U	0.46	5	ND	U	0.57	5	ND	U	0.1	1	ND	U	1.1	10	ND	U	0.82	10	ND	U	5	5
4-Chloroaniline	106-47-8	1.3	1.6	0.16	190000	1.3	mg/kg	ND	U	0.46	5	ND	U	0.57	5	ND	U	0.1	1	ND	U	1.1	10	ND	U	0.82	10	ND	U	**5**	5
4-Chlorophenyl Phenyl Ether	7005-72-3	0.5	NS	NS	100	0.5	mg/kg	ND	U	0.23	5	ND	U	0.29	5	ND	U	0.05	1	ND	U	**0.54**	10	ND	U	0.41	10	ND	U	**2.5**	5
4-Methylphenol (P-Cresol)	106-44-5	51	12	1.2	190000	51	mg/kg	ND	U	0.46	5	ND	U	0.57	5	ND	U	0.1	1	6.4		1.1	10	ND	U	0.82	10	ND	U	5	5
4-Nitroaniline	100-01-6	13	1.9	0.19	190000	13	mg/kg	ND	U	0.46	5	ND	U	0.57	5	ND	U	0.1	1	ND	U	1.1	10	ND	U	0.82	10	ND	U	5	5
4-Nitrophenol	100-02-7	6	4.1	0.41	190000	6	mg/kg	ND	U	1.2	5	ND	U	1.4	5	ND	U	0.25	1	ND	U	2.7	10	ND	U	2.1	10	ND	U	**13**	5
Acenaphthene	83-32-9	380	4700	470	190000	470	mg/kg	1.2		0.23	5	ND	U	0.29	5	ND	U	0.05	1	32		0.54	10	ND	U	0.41	10	3.2	J	2.5	5
Acenaphthylene	208-96-8	610	6900	690	190000	690	mg/kg	ND	U	0.23	5	ND	U	0.29	5	ND	U	0.05	1	3.9		0.54	10	ND	U	0.41	10	ND	U	2.5	5
Acetophenone	98-86-2	1000	540	54	10000	1000	mg/kg	ND	U	0.46	5	ND	U	0.57	5	ND	U	0.1	1	ND	U	1.1	10	0.83	J	0.82	10	ND	U	5	5
Anthracene	120-12-7	6.6	350	35	190000	35	mg/kg	0.74	J	0.23	5	ND	U	0.29	5	ND	U	0.05	1	21		0.54	10	ND	U	0.41	10	5.3	J	2.5	5
Atrazine	1912-24-9	0.3	0.13	0.013	190000	0.3	mg/kg	ND	U	0.23	5	ND	U	0.29	5	ND	U	0.05	1	ND	U	**0.54**	10	ND	U	**0.41**	10	ND	U	**2.5**	5
Benzaldehyde	100-52-7	NS	NS	NS	NS	NS	mg/kg	ND	U	0.46	5	ND	U	0.57	5	ND	U	0.1	1	ND	U	1.1	10	ND	U	0.82	10	ND	U	5	5
Benzo(A)Anthracene	56-55-3	0.36	320	32	190000	32	mg/kg	0.93	J	0.23	5	ND	U	0.29	5	ND	U	0.05	1	17		0.54	10	0.78	J	0.41	10	5.3	J	2.5	5
Benzo(A)Pyrene	50-32-8	0.02	46	4.6	190000	4.6	mg/kg	0.77	J	0.23	5	ND	U	0.29	5	ND	U	0.05	1	11		0.54	10	0.85	J	0.41	10	4.4	J	2.5	5
Benzo(B)Fluoranthene	205-99-2	0.12	170	17	190000	17	mg/kg	0.78	J	0.23	5	ND	U	0.29	5	ND	U	0.05	1	13		0.54	10	0.49	J	0.41	10	3.1	J	2.5	5
Benzo(G,H,I)Perylene	191-24-2	0.026	180	18	190000	18	mg/kg	0.67	J	0.23	5	ND	U	0.29	5	ND	U	0.05	1	5.3		0.54	10	0.47	J	0.41	10	3	J	2.5	5
Benzo(K)Fluoranthene	207-08-9	0.055	610	61	190000	61	mg/kg	ND	U	0.23	5	ND	U	0.29	5	ND	U	0.05	1	4.7		0.54	10	ND	U	0.41	10	ND	U	2.5	5
Benzyl Butyl Phthalate	85-68-7	140	10000	1000	10000	1000	mg/kg	ND	U	0.46	5	ND	U	0.57	5	ND	U	0.1	1	ND	U	1.1	10	ND	U	0.82	10	ND	U	5	5
Biphenyl (Diphenyl)	92-52-4	510	2200	220	190000	510	mg/kg	0.32	J	0.23	5	ND	U	0.29	5	ND	U	0.05	1	3.8		0.54	10	0.65	J	0.41	10	ND	U	2.5	5
Bis(2-Chloroethoxy) Methane	111-91-1	31	8.2	0.82	10000	31	mg/kg	ND	U	0.23	5	ND	U	0.29	5	ND	U	0.05	1	ND	U	0.54	10	ND	U	0.41	10	ND	U	2.5	5
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	0.076	0.023	0.0023	7.7	0.076	mg/kg	ND	U	**0.23**	5	ND	U	**0.29**	5	ND	U	0.05	1	ND	U	**0.54**	10	ND	U	**0.41**	10	ND	U	**2.5**	5
Bis(2-Chloroisopropyl) Ether	108-60-1	30	8	0.8	250	30	mg/kg	ND	U	0.23	5	ND	U	0.29	5	ND	U	0.05	1	ND	U	0.54	10	ND	U	0.41	10	ND	U	2.5	5
Bis(2-Ethylhexyl) Phthalate	117-81-7	0.6	130	13	10000	13	mg/kg	1.6	J	0.46	5	ND	U	0.57	5	ND	U	0.1	1	4.5	J	1.1	10	ND	U	0.82	10	ND	U	5	5
Caprolactam	105-60-2	NS	NS	NS	NS	NS	mg/kg	ND	U	0.23	5	ND	U	0.29	5	ND	U	0.05	1	ND	U	0.54	10	3.6		0.41	10	ND	U	2.5	5
Carbazole	86-74-8	13	83	8.3	190000	13	mg/kg	0.24	J	0.23	5	ND	U	0.29	5	ND	U	0.05	1	1.5	J	0.54	10	ND	U	0.41	10	ND	U	2.5	5
Chrysene	218-01-9	0.19	230	23	190000	23	mg/kg	1.6		0.23	5	ND	U	0.29	5	0.056	J	0.05	1	17		0.54	10	1.6	J	0.41	10	9.7	J	2.5	5
Dibenz(A,H)Anthracene	53-70-3	0.036	160	16	190000	16	mg/kg	0.34	J	0.23	5	ND	U	0.29	5	ND	U	0.05	1	2	J	0.54	10	ND	U	0.41	10	ND	U	2.5	5
Dibenzofuran	132-64-9	10	260	26	190000	26	mg/kg	0.95	J	0.23	5	ND	U	0.29	5	ND	U	0.05	1	9.3		0.54	10	ND	U	0.41	10	ND	U	2.5	5
Diethyl Phthalate	84-66-2	8200	2600	260	10000	8200	mg/kg	ND	U	0.46	5	ND	U	0.57	5	ND	U	0.1	1	ND	U	1.1	10	ND	U	0.82	10	ND	U	5	5
Dimethyl Phthalate	131-11-3	0.5	NS	NS	100	0.5	mg/kg	ND	U	0.46	5	ND	U	**0.57**	5	ND	U	0.1	1	ND	U	**1.1**	10	ND	U	**0.82**	10	ND	U	**5**	5
Di-N-Butyl Phthalate	84-74-2	1000	4100	410	10000	1000	mg/kg	ND	U	0.46	5	ND	U	0.57	5	ND	U	0.1	1	ND	U	1.1	10	ND	U	0.82	10	ND	U	5	5
Di-N-Octylphthalate	117-84-0	300	10000	1000	10000	1000	mg/kg	ND	U	0.46	5	ND	U	0.57	5	ND	U	0.1	1	ND	U	1.1	10	ND	U	0.82	10	ND	U	5	5

Table 8
Summary of Soil Sample Analytical Results for Vertical Delineation Soil Samples Beneath Waste in CAMU
AOI-10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (2 - 15 ft bgs)	PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500)	Location ID	BH-10-63				BH-10-64				BH-10-65				BH-10-69				BH-10-70				BH-10-77			
							Sample ID	BH-10-63-WC_21-23'				BH-10-64-WC_24-26'				BH-10-65_14-16'				BH-10-69-WC_15.5-16'				BH-10-70-WC@15.5-16'				BH-10-77-WC_20-22'			
							Sample Date	4/13/2011				4/13/2011				4/14/2011				4/12/2011				4/11/2011				4/13/2011			
							Sample Matrix	Soil				Soil				Soil				Soil				Soil				Soil			
							Sample Interval	21.0-23.0 ft bgs				24.0-26.0 ft bgs				14.0-16.0 ft bgs				15.5-16.0 ft bgs				15.5-16.0 ft bgs				20.0-22.0 ft bgs			
							Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Fluoranthene	206-44-0	26	3200	320	190000	320	mg/kg	0.87	J	0.23	5	ND	U	0.29	5	0.054	J	0.05	1	39		0.54	10	ND	U	0.41	10	3.9	J	2.5	5
Fluorene	86-73-7	190	3800	380	190000	380	mg/kg	1.6		0.23	5	ND	U	0.29	5	ND	U	0.05	1	22		0.54	10	0.52	J	0.41	10	4.9	J	2.5	5
Hexachlorobenzene	118-74-1	0.1	0.96	0.096	190000	0.1	mg/kg	ND	U	**0.23**	5	ND	U	**0.29**	5	ND	U	0.05	1	ND	U	**0.54**	10	ND	U	**0.41**	10	ND	U	**2.5**	5
Hexachlorobutadiene	87-68-3	3.3	39	3.9	10000	3.9	mg/kg	ND	U	0.46	5	ND	U	0.57	5	ND	U	0.1	1	ND	U	1.1	10	ND	U	0.82	10	ND	U	**5**	5
Hexachlorocyclopentadiene	77-47-4	5	91	9.1	10000	9.1	mg/kg	ND	U	1.2	5	ND	U	1.4	5	ND	U	0.25	1	ND	U	2.7	10	ND	U	2.1	10	ND	U	**13**	5
Hexachloroethane	67-72-1	0.1	0.56	0.056	640	0.1	mg/kg	ND	U	**0.23**	5	ND	U	**0.29**	5	ND	U	0.05	1	ND	U	**0.54**	10	ND	U	**0.41**	10	ND	U	**2.5**	5
Indeno[1,2,3-cd]pyrene	193-39-5	0.36	28000	2800	190000	2800	mg/kg	0.37	J	0.23	5	ND	U	0.29	5	ND	U	0.05	1	4.8		0.54	10	ND	U	0.41	10	ND	U	2.5	5
Isophorone	78-59-1	10	1.9	0.19	10000	10	mg/kg	ND	U	0.23	5	ND	U	0.29	5	ND	U	0.05	1	ND	U	0.54	10	ND	U	0.41	10	ND	U	2.5	5
Naphthalene	91-20-3	10	25	2.5	190000	10	mg/kg	1.1	J	0.23	5	ND	U	0.29	5	0.063	J	0.05	1	52		0.54	10	1.6	J	0.41	10	2.9	J	2.5	5
Nitrobenzene	98-95-3	20	8.7	0.87	10000	20	mg/kg	ND	U	0.23	5	ND	U	0.29	5	ND	U	0.05	1	ND	U	0.54	10	ND	U	0.41	10	ND	U	2.5	5
N-Nitrosodi-N-Propylamine	621-64-7	0.037	0.0051	0.00051	10000	0.037	mg/kg	ND	U	**0.23**	5	ND	U	**0.29**	5	ND	U	**0.05**	1	ND	U	**0.54**	10	ND	U	**0.41**	10	ND	U	**2.5**	5
N-Nitrosodiphenylamine	86-30-6	53	83	8.3	190000	53	mg/kg	ND	U	0.23	5	ND	U	0.29	5	ND	U	0.05	1	ND	U	0.54	10	ND	U	0.41	10	ND	U	2.5	5
Pentachlorophenol	87-86-5	0.1	5	0.5	190000	0.5	mg/kg	ND	U	**1.2**	5	ND	U	**1.4**	5	ND	U	0.25	1	ND	U	**2.7**	10	ND	U	**2.1**	10	ND	U	**13**	5
Phenanthrene	85-01-8	110	10000	1000	190000	1000	mg/kg	3.7		0.23	5	ND	U	0.29	5	0.13	J	0.05	1	66		2.7	50	2.1		0.41	10	7.3	J	2.5	5
Phenol	108-95-2	200	33	3.3	190000	200	mg/kg	ND	U	0.23	5	ND	U	0.29	5	ND	U	0.05	1	ND	U	0.54	10	ND	U	0.41	10	ND	U	2.5	5
Pyrene	129-00-0	13	2200	220	190000	220	mg/kg	1.6		0.23	5	ND	U	0.29	5	0.083	J	0.05	1	42		0.54	10	1.5	J	0.41	10	13	J	2.5	5
Metals																															
Aluminum	7429-90-5	NS	NS	NS	190000	190000	mg/kg	8110		6.95	1	26600		8.64	1	25000		7.56	1	19100		8.15	1	12800		6.22	1	25700		7.57	1
Antimony	7440-36-0	0.6	27	2.7	190000	2.7	mg/kg	ND	U	1.38	1	ND	U	1.72	1	ND	U	1.5	1	ND	U	1.62	1	ND	U	1.24	1	ND	U	1.5	1
Arsenic	7440-38-2	1	29	2.9	190000	2.9	mg/kg	8.88		1.31	1	7.7		1.63	1	6.82		1.43	1	21.7		1.54	1	3.96		1.17	1	29.8		1.43	1
Barium	7440-39-3	200	8200	820	190000	820	mg/kg	140		0.055	1	186		0.069	1	324		0.06	1	308		0.065	1	74.9		0.049	1	114		0.06	1
Beryllium	7440-41-7	0.4	320	32	190000	32	mg/kg	0.452	J	0.094	1	1.18		0.117	1	1.12		0.102	1	1.7		0.11	1	0.59	J	0.084	1	1.1		0.102	1
Cadmium	7440-43-9	0.5	38	3.8	190000	3.8	mg/kg	0.229	J	0.193	1	ND	U	0.241	1	ND	U	0.211	1	1.67		0.227	1	0.876		0.173	1	0.73	J	0.211	1
Calcium	7440-70-2	NS	NS	NS	NS	NS	mg/kg	19200		8.46	1	3910		10.5	1	4350		9.22	1	3760		9.93	1	2120		7.58	1	25900		9.22	1
Chromium, Total	7440-47-3	NS	NS	NS	NS	NS	mg/kg	42.1		0.815	1	51.8		1.01	1	51.9		0.887	1	71.4		0.956	1	27.3		0.729	1	67.8		0.888	1
Cobalt	7440-48-4	3	140	14	190000	14	mg/kg	5.36		0.262	1	11.4		0.326	1	12		0.286	1	22		0.308	1	6.88		0.235	1	4.7		0.286	1
Copper	7440-50-8	100	43000	4300	190000	4300	mg/kg	61.3		0.304	1	8.22		0.378	1	13.1		0.331	1	129		0.357	1	10.8		0.272	1	26.1		0.331	1
Iron	7439-89-6	NS	NS	NS	190000	190000	mg/kg	19500		6.5	1	29500		8.09	1	29100		7.08	1	27200		7.63	1	19600		5.82	1	18500		7.09	1
Lead	7439-92-1	0.5	450	45	190000	45	mg/kg	115		0.829	1	17.4		1.03	1	291		0.902	1	417		0.972	1	40.9		0.742	1	259		0.903	1
Magnesium	7439-95-4	NS	NS	NS	#N/A	NS	mg/kg	9560		3.51	1	6980		4.36	1	7020		3.82	1	3990		4.12	1	3870		3.14	1	23000		3.82	1
Manganese	7439-96-5	30	2000	200	190000	200	mg/kg	387		0.108	1	407		0.134	1	352		0.117	1	533		0.126	1	405		0.096	1	259		0.117	1
Mercury	7439-97-6	0.2	10	1	190000	1	mg/kg	2.36		0.02	5	0.0127	J	0.005	1	0.0844	J	0.004	1	1.03		0.005	1	0.0074	J	0.003	1	0.422		0.004	1
Nickel	7440-02-0	10	650	65	190000	65	mg/kg	67.4		0.262	1	27.2		0.326	1	29.7		0.286	1	41.3		0.308	1	16		0.235	1	17.8		0.286	1
Potassium	7440-09-7	NS	NS	NS	#N/A	NS	mg/kg	1200		24.9	1	2690		30.9	1	2320		27.1	1	2060		29.2	1	2020		22.2	1	2790		27.1	1
Selenium	7782-49-2	5	26	2.6	190000	5	mg/kg	ND	U	1.35	1	ND	U	1.68	1	ND	U	1.47	1	2.46	J	1.59	1	ND	U	1.21	1	ND	U	1.47	1
Silver	7440-22-4	10	84	8.4	190000	10	mg/kg	ND	U	0.249	1	0.832	J	0.309	1	ND	U	0.271	1	0.757	J	0.292	1	ND	U	0.222	1	ND	U	0.271	1
Sodium	7440-23-5	NS	NS	NS	NS	NS	mg/kg	491		51.5	1	299		64.1	1	272		56.1	1	203		60.4	1	1150		46.1	1	921		56.1	1
Thallium	7440-28-0	0.2	14	1.4	190000	1.4	mg/kg	ND	U	**2**	1	ND	U	**2.49**	1	ND	U	**2.18**	1	ND	U	**2.35**	1	ND	U	**1.79**	1	ND	U	**2.18**	1
Vanadium	7440-62-2	72	72000	7200	190000	7200	mg/kg	31.1		0.262	1	59		0.326	1	55.8		0.286	1	40.9		0.308	1	28.7		0.235	1	73		0.286	1
Zinc	7440-66-6	200	12000	1200	190000	1200	mg/kg	110		0.911	1	66.7		1.13	1	91.9		0.992	1	544		1.07	1	44.8		0.816	1	136		0.993	1
General Chemistry																															
Moisture, Percent	MOIST	NS	NS	NS	NS	NS	%	29		0.5	1	41.8		0.5	1	34.8		0.5	1	39.5		0.5	1	19.1		0.5	1	34.2		0.5	1

Notes:
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard
All soil samples in this table are considered saturated soils.

Qualifiers:
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate)

Exceedance Summary:
10 - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Direct Contact

Table 9
Summary of Post-Excavation Soil Analytical Results - VGO Release Area
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (0 - 2 ft bgs)	PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500)	Location ID	SS-1				SS-2				SS-3				SS-4				SS-5				SS-6			
						Sample ID	SS-1				SS-2				SS-3				SS-4				SS-5				SS-6			
						Sample Date	4/15/2011				4/15/2011				4/15/2011				4/15/2011				4/15/2011				4/15/2011			
						Sample Matrix	Soil				Soil				Soil				Soil				Soil				Soil			
						Sample Interval	Grab Soil				Grab Soil				Grab Soil				Grab Soil				Grab Soil				Grab Soil			
						Unit	Result	Q	MDL	DF	Result	Q	MDL	DF	Result	Q	MDL	DF	Result	Q	MDL	DF	Result	Q	MDL	DF	Result	Q	MDL	DF
Volatile Organic Compounds																														
Benzene	71-43-2	0.5	0.13	290	0.5	mg/kg	0.01		0.0006	1.11	0.008		0.0006	1.01	0.01		0.0006	1.06	0.01		0.0005	0.9	0.005		0.0004	0.83	0.028		0.0005	0.84
Ethylbenzene	100-41-4	70	46	10000	70	mg/kg	0.002	J	0.001	1.11	ND		0.001	1.01	0.003	J	0.001	1.06	0.023		0.001	0.9	ND		0.0009	0.83	0.002	J	0.0009	0.84
Isopropylbenzene (Cumene)	98-82-8	350	2500	10000	2500	mg/kg	ND		0.001	1.11	ND		0.001	1.01	ND		0.001	1.06	0.005		0.001	0.9	ND		0.0009	0.83	ND		0.0009	0.84
Naphthalene	91-20-3	10	25	56000	25	mg/kg	0.06		0.001	1.11	0.016		0.001	1.01	0.042		0.001	1.06	0.77		0.059	52.5	0.021		0.0009	0.83	0.018		0.0009	0.84
Toluene	108-88-3	100	44	10000	100	mg/kg	0.013		0.001	1.11	0.006		0.001	1.01	0.023		0.001	1.06	0.033		0.001	0.9	0.005		0.0009	0.83	0.007		0.0009	0.84
1,2,4-Trimethylbenzene	95-63-6	6.2	35	560	35	mg/kg	0.23		0.052	1.11	0.005	J	0.001	1.01	0.029		0.001	1.06	0.65		0.059	52.5	0.012		0.0009	0.83	0.016		0.0009	0.84
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	5.3	9.3	480	9.3	mg/kg	0.45		0.001	48.4	0.005	J	0.001	1.01	0.025		0.001	1.06	0.19	J	0.059	52.5	0.005		0.0009	0.83	0.011		0.0009	0.84
Dimethyl Benzene/ Xylenes, Total	1330-20-7	1000	990	8000	1000	mg/kg	0.011		0.001	1.11	0.003	J	0.001	1.01	0.014		0.001	1.06	0.18		0.001	0.9	0.004	J	0.0009	0.83	0.009		0.0009	0.84
Tert-Butyl Methyl Ether	1634-04-4	2	0.28	3200	2	mg/kg	ND		0.0006	1.11	ND		0.0006	1.01	ND		0.0006	1.06	ND		0.0005	0.9	ND		0.0004	0.83	0.002	J	0.0005	0.84
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.005	0.0012	3.7	0.005	mg/kg	ND		0.001	1.11	ND		0.001	1.01	ND		0.001	1.06	ND		0.001	0.9	ND		0.0009	0.83	ND		0.0009	0.84
1,2-Dichloroethane	107-06-2	0.5	0.1	86	0.5	mg/kg	ND		0.001	1.11	ND		0.001	1.01	ND		0.001	1.06	ND		0.001	0.9	ND		0.0009	0.83	ND		0.0009	0.84
Semi-Volatile Organic Compounds																														
Anthracene	120-12-7	6.6	350	190000	350	mg/kg	0.75		0.0072	10	0.24		0.0075	10	0.76		0.0072	10	0.55		0.0075	10	0.84		0.0072	10	0.42		0.015	20
Benzo(A)Anthracene	56-55-3	0.36	320	110	110	mg/kg	0.75		0.0036	10	0.53		0.0037	10	1.8		0.018	50	0.97		0.0037	10	1.4		0.0036	10	0.69		0.0073	20
Benzo(A)Pyrene	50-32-8	0.02	46	11	11	mg/kg	0.58		0.0036	10	0.48		0.0037	10	1.4		0.018	50	0.88		0.0037	10	1		0.0036	10	0.54		0.0073	20
Benzo(B)Fluoranthene	205-99-2	0.12	170	110	110	mg/kg	0.76		0.0029	10	0.59	B	0.003	10	1.7		0.014	50	0.96		0.003	10	1.4		0.0057	20	0.8	B	0.0058	20
Benzo(G,H,I)Perylene	191-24-2	0.026	180	170000	180	mg/kg	1.1		0.022	10	1		0.022	10	2.3		0.022	10	1.4		0.022	10	1.8		0.021	10	0.94		0.044	20
Chrysene	218-01-9	0.19	230	11000	230	mg/kg	3.1		0.022	10	1.7		0.022	10	5.5		0.022	10	3		0.022	10	4.8		0.021	10	2.5		0.044	20
Fluorene	86-73-7	190	3800	110000	3800	mg/kg	1.4		0.036	10	0.2		0.037	10	0.75		0.036	10	0.64		0.037	10	1		0.036	10	0.46		0.073	20
Phenanthrene	85-01-8	110	10000	190000	10000	mg/kg	3.9	B	0.014	10	0.83	B	0.015	10	3.6	B	0.014	10	2.6	B	0.015	10	4.1	B	0.014	10	1.5	B	0.029	20
Pyrene	129-00-0	13	2200	84000	2200	mg/kg	ND		7.3	10	ND		1.2	10	5.6		0.036	10	ND		0.0051	10	4.5		0.036	10	ND		2.3	20
Metals																														
Lead	7439-92-1	0.5	450	1000	450	mg/kg	169		0.622	1	209		0.664	1	270		0.648	1	190		0.667	1	233		0.638	1	169		0.651	1

Notes:
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard

All soil samples collected and analyzed were unsaturated.

Qualifiers:
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

Exceedance Summary:
10 - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Direct Contact Standard

Table 9
Summary of Post-Excavation Soil Analytical Results - VGO Release Area
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500)	PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500)	PADEP Non-Residential Direct Contact (0 - 2 ft bgs)	PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500)	Location ID	SS-7				SS-8				SS-9				SS-10			
						Sample ID	SS-7				SS-8				SS-9				SS-10			
						Sample Date	4/15/2011				4/15/2011				4/15/2011				4/15/2011			
						Sample Matrix	Soil				Soil				Soil				Soil			
						Sample Interval	Grab Soil				Grab Soil				Grab Soil				Grab Soil			
						Unit	Result	Q	MDL	DF	Result	Q	MDL	DF	Result	Q	MDL	DF	Result	Q	MDL	DF
Volatile Organic Compounds																						
Benzene	71-43-2	0.5	0.13	290	0.5	mg/kg	0.007		0.0006	1.1	0.001	J	0.0005	0.99	0.002	J	0.0005	1.02	0.003	J	0.0005	1
Ethylbenzene	100-41-4	70	46	10000	70	mg/kg	0.002	J	0.001	1.1	ND		0.001	0.99	ND		0.001	1.02	ND		0.001	1
Isopropylbenzene (Cumene)	98-82-8	350	2500	10000	2500	mg/kg	0.003	J	0.001	1.1	ND		0.001	0.99	ND		0.001	1.02	ND		0.001	1
Naphthalene	91-20-3	10	25	56000	25	mg/kg	0.048		0.001	1.1	0.002	J	0.001	0.99	0.011		0.001	1.02	0.002	J	0.001	1
Toluene	108-88-3	100	44	10000	100	mg/kg	0.001	J	0.001	1.1	ND		0.001	0.99	0.001	J	0.001	1.02	ND		0.001	1
1,2,4-Trimethylbenzene	95-63-6	6.2	35	560	35	mg/kg	0.22		0.001	1.1	ND		0.001	0.99	0.006		0.001	1.02	ND		0.001	1
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	5.3	9.3	480	9.3	mg/kg	0.086		0.001	1.1	ND		0.001	0.99	0.002	J	0.001	1.02	ND		0.001	1
Dimethyl Benzene/ Xylenes, Total	1330-20-7	1000	990	8000	1000	mg/kg	0.024		0.001	1.1	ND		0.001	0.99	0.001	J	0.001	1.02	ND		0.001	1
Tert-Butyl Methyl Ether	1634-04-4	2	0.28	3200	2	mg/kg	ND		0.0006	1.1	ND		0.0005	0.99	ND		0.0005	1.02	ND		0.0005	1
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.005	0.0012	3.7	0.005	mg/kg	ND		0.001	1.1	ND		0.001	0.99	ND		0.001	1.02	ND		0.001	1
1,2-Dichloroethane	107-06-2	0.5	0.1	86	0.5	mg/kg	ND		0.001	1.1	ND		0.001	0.99	ND		0.001	1.02	ND		0.001	1
Semi-Volatile Organic Compounds																						
Anthracene	120-12-7	6.6	350	190000	350	mg/kg	0.16		0.0078	10	0.2		0.0068	10	0.15		0.0068	10	0.17		0.0067	10
Benzo(A)Anthracene	56-55-3	0.36	320	110	110	mg/kg	0.3		0.0039	10	0.27		0.0034	10	0.42		0.0034	10	0.35		0.0034	10
Benzo(A)Pyrene	50-32-8	0.02	46	11	11	mg/kg	0.3		0.0039	10	0.27		0.0034	10	0.43		0.0034	10	0.41		0.0034	10
Benzo(B)Fluoranthene	205-99-2	0.12	170	110	110	mg/kg	0.39		0.0031	10	0.34	B	0.0027	10	0.47	B	0.0027	10	0.43		0.0027	10
Benzo(G,H,I)Perylene	191-24-2	0.026	180	170000	180	mg/kg	0.79		0.023	10	0.55		0.02	10	0.81		0.02	10	0.82		0.02	10
Chrysene	218-01-9	0.19	230	11000	230	mg/kg	0.79		0.023	10	0.9		0.02	10	0.98		0.02	10	1		0.02	10
Fluorene	86-73-7	190	3800	110000	3800	mg/kg	0.23		0.039	10	0.29		0.034	10	0.19		0.034	10	0.26		0.034	10
Phenanthrene	85-01-8	110	10000	190000	10000	mg/kg	0.79	B	0.016	10	1.3	B	0.014	10	1.1	B	0.014	10	1.2	B	0.013	10
Pyrene	129-00-0	13	2200	84000	2200	mg/kg	0.74		0.039	10	ND		0.55	10	0.89		0.034	10	0.8		0.034	10
Metals																						
Lead	7439-92-1	0.5	450	1000	450	mg/kg	440		0.671	1	96.8		0.61	1	111		0.592	1	116		0.601	1

Notes:
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard

All soil samples collected and analyzed were unsaturated.

Qualifiers:
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

Exceedance Summary:
10 - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Direct Contact Standard

Table 10
Summary of Shallow Groundwater Analytical Results
April 2011
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500	Location	W-1				W-2				W-5				W-6				W-11				W-12				W-15			
			Sample ID	W-1_04272011				W-2_04262011				W-5_04262011				W-6_04262011				W-11_04262011				W-12_04262011				W-15_04262011			
			Sample Date	4/27/2011				4/26/2011				4/26/2011				4/26/2011				4/26/2011				4/26/2011				4/26/2011			
			Sample Matrix	Groundwater				Groundwater				Groundwater				Groundwater				Groundwater				Groundwater				Groundwater			
			Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Volatile Organic Compounds																															
1,2,4-Trimethylbenzene	95-63-6	62	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	4		0.5	1	ND	U	0.5	1
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.05	ug/l	ND	U	0.0095	1	ND	U	0.0095	1	ND	U	0.0095	1	ND	U	0.0095	1	ND	U	0.0094	1	ND	U	0.0095	1	ND	U	0.0094	1
1,2-Dichloroethane	107-06-2	5	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	53	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	0.6	J	0.5	1	ND	U	0.5	1
Benzene	71-43-2	5	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	8		0.5	1	ND	U	0.5	1
Ethylbenzene	100-41-4	700	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	3		0.5	1	ND	U	0.5	1
Isopropylbenzene (Cumene)	98-82-8	3500	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	2		0.5	1	ND	U	0.5	1
Tert-Butyl Methyl Ether	1634-04-4	20	ug/l	2		0.5	1	ND	U	0.5	1	3		0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1
Toluene	108-88-3	1000	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	1		0.5	1	0.8	J	0.5	1
Xylenes (Total)	1330-20-7	10000	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	10		0.5	1	ND	U	0.5	1
Semi Volatile Organic Compounds																															
Chrysene	218-01-9	1.9	ug/l	20		1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	1	J	1	1	1	J	1	1
Fluorene	86-73-7	1900	ug/l	13		1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	1	J	1	1	ND	U	1	1
Naphthalene	91-20-3	100	ug/l	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	1	J	1	1	ND	U	1	1
Phenanthrene	85-01-8	1100	ug/l	13		1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1
Pyrene	129-00-0	130	ug/l	37		1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	2	J	1	1	2	J	1	1
Metals																															
Lead (Dissolved)	7439-92-1	5	ug/l	ND	U	0.052	1	ND	U	0.052	1	ND	U	0.052	1	0.072	J	0.052	1	ND	U	0.052	1	0.18	J	0.052	1	0.96	J	0.052	1

Notes:
DF - Dilution Factor
PADEP - Pennsylvania Department of Environmental Protection
ug/l - Micrograms per liter
MSC - PADEP's Medium Specific Concentration for Impact to Groundwater
RL - Reporting limit (limit of quantitation)
ND - Not detected

Qualifiers:
Q - Qualifier
U - Analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

Exceedance Summary:
10 - Reporting limit exceeds the PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500
10 - Compound exceeds the PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500

Table 10
Summary of Shallow Groundwater Analytical Results
April 2011
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500	Location	W-16				W-17				W-20				W-22				W-23				W-25				W-27			
			Sample ID	W-16_04272011				W-17_04272011				W-20_04272011				W-22_04272011				W-23_04272011				W-25_04262011				W-27_04262011			
			Sample Date	4/27/2011				4/27/2011				4/27/2011				4/27/2011				4/27/2011				4/26/2011				4/26/2011			
			Sample Matrix	Groundwater				Groundwater				Groundwater				Groundwater				Groundwater				Groundwater				Groundwater			
			Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Volatile Organic Compounds																															
1,2,4-Trimethylbenzene	95-63-6	62	ug/l	ND	U	0.5	1	0.9	J	0.5	1	ND	U	0.5	1	ND	U	0.5	1	8		0.5	1	ND	U	0.5	1	ND	U	0.5	1
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.05	ug/l	ND	U	0.0095	1	ND	U	0.0094	1	ND	U	0.0095	1	ND	U	0.0095	1	ND	U	0.0095	1	ND	U	0.0094	1	ND	U	0.0095	1
1,2-Dichloroethane	107-06-2	5	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	53	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	2		0.5	1	ND	U	0.5	1	ND	U	0.5	1
Benzene	71-43-2	5	ug/l	0.6	J	0.5	1	0.9	J	0.5	1	ND	U	0.5	1	ND	U	0.5	1	12		0.5	1	ND	U	0.5	1	ND	U	0.5	1
Ethylbenzene	100-41-4	700	ug/l	ND	U	0.5	1	0.6	J	0.5	1	ND	U	0.5	1	ND	U	0.5	1	1		0.5	1	ND	U	0.5	1	ND	U	0.5	1
Isopropylbenzene (Cumene)	98-82-8	3500	ug/l	26		0.5	1	43		0.5	1	ND	U	0.5	1	ND	U	0.5	1	1	J	0.5	1	ND	U	0.5	1	ND	U	0.5	1
Tert-Butyl Methyl Ether	1634-04-4	20	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1
Toluene	108-88-3	1000	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	2		0.5	1	ND	U	0.5	1	ND	U	0.5	1
Xylenes (Total)	1330-20-7	10000	ug/l	0.6	J	0.5	1	3		0.5	1	ND	U	0.5	1	ND	U	0.5	1	13		0.5	1	ND	U	0.5	1	ND	U	0.5	1
Semi Volatile Organic Compounds																															
Chrysene	218-01-9	1.9	ug/l	ND	U	1	1	ND	U	1	1	ND	U	1	1	1	J	1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1
Fluorene	86-73-7	1900	ug/l	ND	U	1	1	ND	U	1	1	ND	U	1	1	1	J	1	1	1	J	1	1	ND	U	1	1	ND	U	1	1
Naphthalene	91-20-3	100	ug/l	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	3	J	1	1	ND	U	1	1	ND	U	1	1
Phenanthrene	85-01-8	1100	ug/l	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1
Pyrene	129-00-0	130	ug/l	ND	U	1	1	1	J	1	1	ND	U	1	1	2	J	1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1
Metals																															
Lead (Dissolved)	7439-92-1	5	ug/l	0.18	J	0.052	1	0.084	J	0.052	1	3.2	0	0.052	1	0.2	J	0.052	1	ND	U	0.052	1	ND	U	0.052	1	0.11	J	0.052	1

Notes:
DF - Dilution Factor
PADEP - Pennsylvania Department of Environmental Protection
ug/l - Micrograms per liter
MSC - PADEP's Medium Specific Concentration for Impact to Groundwater
RL - Reporting limit (limit of quantitation)
ND - Not detected

Qualifiers:
Q - Qualifier
U - Analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

Exceedance Summary:
10 - Reporting limit exceeds the PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500
10 - Compound exceeds the PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500

Table 10
Summary of Shallow Groundwater Analytical Results
April 2011
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500	Location	W-28				W-29				W-30				W-31				W-32				W-33				W-34			
			Sample ID	W-28_04262011				W-29_04262011				W-30_04262011				W-31_04262011				W-32_04272011				W-33_04272011				W-34_04272011			
			Sample Date	4/26/2011				4/26/2011				4/26/2011				4/26/2011				4/27/2011				4/27/2011				4/27/2011			
			Sample Matrix	Groundwater				Groundwater				Groundwater				Groundwater				Groundwater				Groundwater				Groundwater			
			Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Volatile Organic Compounds																															
1,2,4-Trimethylbenzene	95-63-6	62	ug/l	1	J	0.5	1	ND	U	0.5	1	ND	U	0.5	1	28		0.5	1	6		0.5	1	36		5	10	9		0.5	1
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.05	ug/l	ND	U	0.0095	1	ND	U	0.0094	1	ND	U	0.0094	1	ND	U	0.0095	1	ND	U	0.0094	1	ND	U	0.0094	1	ND	U	0.0095	1
1,2-Dichloroethane	107-06-2	5	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	2		0.5	1	ND	U	**5**	10	ND	U	0.5	1
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	53	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	9		0.5	1	1	J	0.5	1	11	J	5	10	2		0.5	1
Benzene	71-43-2	5	ug/l	0.5	J	0.5	1	ND	U	0.5	1	ND	U	0.5	1	10		0.5	1	56		0.5	1	250		**5**	10	7		0.5	1
Ethylbenzene	100-41-4	700	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	5		0.5	1	1		0.5	1	13		5	10	2		0.5	1
Isopropylbenzene (Cumene)	98-82-8	3500	ug/l	23		0.5	1	ND	U	0.5	1	ND	U	0.5	1	9		0.5	1	8		0.5	1	ND	U	5	10	1	J	0.5	1
Tert-Butyl Methyl Ether	1634-04-4	20	ug/l	ND	U	0.5	1	0.6	J	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	5	10	ND	U	0.5	1
Toluene	108-88-3	1000	ug/l	0.8	J	0.5	1	ND	U	0.5	1	ND	U	0.5	1	4		0.5	1	1		0.5	1	60		5	10	11		0.5	1
Xylenes (Total)	1330-20-7	10000	ug/l	1		0.5	1	ND	U	0.5	1	ND	U	0.5	1	21		0.5	1	4		0.5	1	70		5	10	19		0.5	1
Semi Volatile Organic Compounds																															
Chrysene	218-01-9	1.9	ug/l	2	J	1	1	ND	U	0.9	1	ND	U	1	1	4	J	1	1	4	J	1	1	6		1	1	ND	U	1	1
Fluorene	86-73-7	1900	ug/l	12		1	1	1	J	0.9	1	ND	U	1	1	5	J	1	1	12		1	1	36		1	1	5	J	1	1
Naphthalene	91-20-3	100	ug/l	3	J	1	1	ND	U	0.9	1	ND	U	1	1	13		1	1	24		1	1	330		5	5	11		1	1
Phenanthrene	85-01-8	1100	ug/l	21		1	1	2	J	0.9	1	ND	U	1	1	17		1	1	13		1	1	66		1	1	10		1	1
Pyrene	129-00-0	130	ug/l	8		1	1	ND	U	0.9	1	ND	U	1	1	9		1	1	6		1	1	16		1	1	1	J	1	1
Metals																															
Lead (Dissolved)	7439-92-1	5	ug/l	0.19	J	0.052	1	ND	U	0.052	1	0.13	J	0.052	1	6	0	0.052	1	0.37	J	0.052	1	0.068	J	0.052	1	ND	U	0.052	1

Notes:
DF - Dilution Factor
PADEP - Pennsylvania Department of Environmental Protection
ug/l - Micrograms per liter
MSC - PADEP's Medium Specific Concentration for Impact to Groundwater
RL - Reporting limit (limit of quantitation)
ND - Not detected

Qualifiers:
Q - Qualifier
U - Analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

Exceedance Summary:
10 - Reporting limit exceeds the PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500
10 - Compound exceeds the PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500

Table 11
Summary of Intermediate Groundwater Analytical Results
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500	Location	W-1D				W-9				W-13				W-19				W-26				W-32D			
			Sample ID	W-1D_04262011				W-9_04262011				W-13_04262011				W-19_04272011				W-26_04262011				W-32D_04272011			
			Sample Date	4/26/2011				4/26/2011				4/26/2011				4/27/2011				4/26/2011				4/27/2011			
			Sample Matrix	Groundwater				Groundwater				Groundwater				Groundwater				Groundwater				Groundwater			
			Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Volatile Organic Compounds																											
1,2,4-Trimethylbenzene	95-63-6	62	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.05	ug/l	ND	U	0.0095	1	ND	U	0.0094	1	ND	U	0.0095	1	ND	U	0.0095	1	ND	U	0.0095	1	ND	U	0.0094	1
1,2-Dichloroethane	107-06-2	5	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	53	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1
Benzene	71-43-2	5	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1
Ethylbenzene	100-41-4	700	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1
Isopropylbenzene (Cumene)	98-82-8	3500	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1
Tert-Butyl Methyl Ether	1634-04-4	20	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	0.6	J	0.5	1	ND	U	0.5	1
Toluene	108-88-3	1000	ug/l	0.8	J	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1
Xylenes (Total)	1330-20-7	10000	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1
Semi Volatile Organic Compounds																											
Chrysene	218-01-9	1.9	ug/l	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	0.9	1	ND	U	1	1	ND	U	**10**	1
Fluorene	86-73-7	1900	ug/l	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	0.9	1	ND	U	1	1	ND	U	10	1
Naphthalene	91-20-3	100	ug/l	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	0.9	1	ND	U	1	1	ND	U	10	1
Phenanthrene	85-01-8	1100	ug/l	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	0.9	1	ND	U	1	1	ND	U	10	1
Pyrene	129-00-0	130	ug/l	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	0.9	1	ND	U	1	1	ND	U	10	1
Metals																											
Lead (Dissolved)	7439-92-1	5	ug/l	ND	U	0.052	1	ND	U	0.052	1	ND	U	0.052	1	ND	U	0.052	1	ND	U	0.052	1	ND	U	0.052	1

Notes:
DF - Dilution Factor
PADEP - Pennsylvania Department of Environmental Protection
ug/l - Micrograms per liter
MSC - PADEP's Medium Specific Concentration for Impact to Groundwater
RL - Reporting limit (limit of quantitation)
ND - Not detected

Qualifiers:
Q - Qualifier
U - Analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

Exceedance Summary:
10 - Reporting limit exceeds the PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500
10 - Compound exceeds the PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500

Table 12
Summary of Surface Water Analytical Results:
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PA Code Chapter 93 Surface Water Human Health Criteria	PA Code Chapter 93 Fish and Aquatic Life CCC	PA Code Chapter 93 Fish and Aquatic Life CMC	Location ID	SWS-1				SWS-1				SWS-2				SWS-2				SWS-3			
					Sample ID	SWS-1_040711				SWS-1_040711 FILTERED				SWS-2_040711				SWS-2_040711 FILTERED				SWS-3_040711			
					Sample Date	4/7/2011				4/7/2011				4/7/2011				4/7/2011				4/7/2011			
					Sample Matrix	Surface Water				Surface Water				Surface Water				Surface Water				Surface Water			
					Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Volatile Organic Compounds																									
1,2,4-Trimethylbenzene	95-63-6	NS	NS	NS	ug/l	ND	U	2	1	–	–	–	–	ND	U	2	1	–	–	–	–	ND	U	2	1
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	NS	NS	NS	ug/l	ND	U	0.029	1	–	–	–	–	ND	U	0.029	1	–	–	–	–	ND	U	0.03	1
1,2-Dichloroethane	107-06-2	0.38	3100	15000	ug/l	ND	U	**1**	1	–	–	–	–	ND	U	**1**	1	–	–	–	–	ND	U	**1**	1
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	NS	NS	NS	ug/l	ND	U	2	1	–	–	–	–	ND	U	2	1	–	–	–	–	ND	U	2	1
Benzene	71-43-2	1.2	130	640	ug/l	ND	U	1	1	–	–	–	–	ND	U	1	1	–	–	–	–	ND	U	1	1
Dimethyl Benzene/ Xylenes, Total	1330-20-7	70000	210	1100	ug/l	ND	U	1	1	–	–	–	–	ND	U	1	1	–	–	–	–	ND	U	1	1
Ethylbenzene	100-41-4	530	580	2900	ug/l	ND	U	1	1	–	–	–	–	ND	U	1	1	–	–	–	–	ND	U	1	1
Isopropylbenzene (Cumene)	98-82-8	NS	NS	NS	ug/l	ND	U	2	1	–	–	–	–	ND	U	2	1	–	–	–	–	ND	U	2	1
Tert-Butyl Methyl Ether	1634-04-4	NS	NS	NS	ug/l	ND	U	1	1	–	–	–	–	ND	U	1	1	–	–	–	–	ND	U	1	1
Toluene	108-88-3	1300	330	1700	ug/l	ND	U	1	1	–	–	–	–	ND	U	1	1	–	–	–	–	ND	U	1	1
Semi-Volatile Organic Compounds																									
Chrysene	218-01-9	NS	NS	NS	ug/l	ND	U	5	1	–	–	–	–	ND	U	5	1	–	–	–	–	ND	U	5	1
Fluorene	86-73-7	NS	NS	NS	ug/l	ND	U	5	1	–	–	–	–	ND	U	5	1	–	–	–	–	ND	U	5	1
Naphthalene	91-20-3	NS	43	140	ug/l	ND	U	5	1	–	–	–	–	ND	U	5	1	–	–	–	–	ND	U	5	1
Phenanthrene	85-01-8	NS	1	5	ug/l	ND	U	**5**	1	–	–	–	–	ND	U	**5**	1	–	–	–	–	ND	U	**5**	1
Pyrene	129-00-0	NS	NS	NS	ug/l	ND	U	5	1	–	–	–	–	ND	U	5	1	–	–	–	–	ND	U	5	1
Metals																									
Aluminum (Dissolved)	7429-90-5	NS	NS	NS	ug/l	–	–	–	–	ND	U	200	1	–	–	–	–	ND	U	200	1	–	–	–	–
Aluminum	7429-90-5	NS	NS	750	ug/l	ND	U	200	1	–	–	–	–	ND	U	200	1	ND	U	200	1	ND	U	200	1
Antimony (Dissolved)	7440-36-0	NS	NS	NS	ug/l	–	–	–	–	ND	U	20	1	–	–	–	–	ND	U	20	1	–	–	–	–
Antimony	7440-36-0	5.6	220	1100	ug/l	ND	U	**20**	1	–	–	–	–	ND	U	**20**	1	ND	U	20	1	ND	U	**20**	1
Arsenic (Dissolved)	7440-38-2	NS	NS	NS	ug/l	–	–	–	–	ND	U	20	1	–	–	–	–	ND	U	20	1	–	–	–	–
Arsenic	7440-38-2	10	150	340	ug/l	ND	U	**20**	1	–	–	–	–	ND	U	**20**	1	ND	U	20	1	ND	U	**20**	1
Barium (Dissolved)	7440-39-3	NS	NS	NS	ug/l	–	–	–	–	40.8	0	5	1	–	–	–	–	93.9	0	5	1	–	–	–	–
Barium	7440-39-3	2400	4100	21000	ug/l	85.3	0	5	1	–	–	–	–	97.2	0	5	1	93.9	0	5	1	91	0	5	1
Beryllium (Dissolved)	7440-41-7	NS	NS	NS	ug/l	–	–	–	–	ND	U	5	1	–	–	–	–	ND	U	5	1	–	–	–	–
Beryllium	7440-41-7	NS	NS	NS	ug/l	ND	U	5	1	–	–	–	–	ND	U	5	1	ND	U	5	1	ND	U	5	1
Cadmium (Dissolved)	7440-43-9	NS	0.71	8.80	ug/l	–	–	–	–	ND	U	**5**	1	–	–	–	–	ND	U	5	1	–	–	–	–
Cadmium	7440-43-9	NS	NS	NS	ug/l	ND	U	5	1	–	–	–	–	ND	U	5	1	ND	U	5	1	ND	U	5	1
Calcium (Dissolved)	7440-70-2	NS	NS	NS	ug/l	–	–	–	–	67000	0	200	1	–	–	–	–	78000	0	200	1	–	–	–	–
Calcium	7440-70-2	NS	NS	NS	ug/l	68300	0	200	1	–	–	–	–	75700	0	200	1	78000	0	200	1	94300	0	200	1
Chromium, Total (Dissolved)	7440-47-3	NS	10.00	16.00	ug/l	–	–	–	–	ND	U	**15**	1	–	–	–	–	ND	U	15	1	–	–	–	–
Chromium, Total	7440-47-3	NS	NS	NS	ug/l	ND	U	15	1	–	–	–	–	ND	U	15	1	ND	U	15	1	ND	U	15	1
Cobalt (Dissolved)	7440-48-4	NS	NS	NS	ug/l	–	–	–	–	ND	U	5	1	–	–	–	–	ND	U	5	1	–	–	–	–
Cobalt	7440-48-4	NS	19	95	ug/l	ND	U	5	1	–	–	–	–	ND	U	5	1	ND	U	5	1	ND	U	5	1
Copper (Dissolved)	7440-50-8	NS	986.68	1684.87	ug/l	–	–	–	–	ND	U	10	1	–	–	–	–	ND	U	10	1	–	–	–	–
Copper	7440-50-8	NS	NS	NS	ug/l	ND	U	10	1	–	–	–	–	ND	U	10	1	ND	U	10	1	ND	U	10	1
Iron (Dissolved)	7439-89-6	NS	NS	NS	ug/l	–	–	–	–	268	0	200	1	–	–	–	–	540	0	200	1	–	–	–	–
Iron	7439-89-6	NS	NS	NS	ug/l	740	0	200	1	–	–	–	–	1850	0	200	1	540	0	200	1	693	0	200	1

Table 12
Summary of Surface Water Analytical Results:
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PA Code Chapter 93 Surface Water Human Health Criteria	PA Code Chapter 93 Fish and Aquatic Life CCC	PA Code Chapter 93 Fish and Aquatic Life CMC	Location ID	SWS-1				SWS-1				SWS-2				SWS-2				SWS-3			
					Sample ID	SWS-1_040711				SWS-1_040711 FILTERED				SWS-2_040711				SWS-2_040711 FILTERED				SWS-3_040711			
					Sample Date	4/7/2011				4/7/2011				4/7/2011				4/7/2011				4/7/2011			
					Sample Matrix	Surface Water				Surface Water				Surface Water				Surface Water				Surface Water			
					Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Lead (Dissolved)	7439-92-1	NS	3.47	215.91	ug/l	--	--	--	--	ND	U	**15**	1	--	--	--	--	ND	U	15	1	--	--	--	--
Lead	7439-92-1	NS	NS	NS	ug/l	19.3	0	15	1	--	--	--	--	ND	U	15	1	ND	U	15	1	ND	U	15	1
Magnesium (Dissolved)	7439-95-4	NS	NS	NS	ug/l	--	--	--	--	27500	0	100	1	--	--	--	--	33600	0	100	1	--	--	--	--
Magnesium	7439-95-4	NS	NS	NS	ug/l	28000	0	100	1	--	--	--	--	32100	0	100	1	33600	0	100	1	57600	0	100	1
Manganese (Dissolved)	7439-96-5	NS	NS	NS	ug/l	--	--	--	--	67.3	0	5	1	--	--	--	--	260	0	5	1	--	--	--	--
Manganese	7439-96-5	NS	NS	NS	ug/l	100	0	5	1	--	--	--	--	310	0	5	1	260	0	5	1	167	0	5	1
Mercury (Dissolved)	7439-97-6	NS	0.77	1.4	ug/l	--	--	--	--	ND	U	0.2	1	--	--	--	--	ND	U	0.2	1	--	--	--	--
Mercury	7439-97-6	0.05	NS	NS	ug/l	ND	U	**0.2**	1	--	--	--	--	ND	U	**0.2**	1	ND	U	0.2	1	ND	U	**0.2**	1
Nickel (Dissolved)	7440-02-0	NS	188.01	1692.75	ug/l	--	--	--	--	ND	U	10	1	--	--	--	--	18.1	0	10	1	--	--	--	--
Nickel	7440-02-0	610	NS	NS	ug/l	ND	U	10	1	--	--	--	--	18.2	0	10	1	18.1	0	10	1	ND	U	10	1
Potassium (Dissolved)	7440-09-7	NS	NS	NS	ug/l	--	--	--	--	5390	0	500	1	--	--	--	--	5670	0	500	1	--	--	--	--
Potassium	7440-09-7	NS	NS	NS	ug/l	5430	0	500	1	--	--	--	--	5630	0	500	1	5670	0	500	1	7250	0	500	1
Selenium (Dissolved)	7782-49-2	NS	4.6	NS	ug/l	--	--	--	--	ND	U	**20**	1	--	--	--	--	ND	U	20	1	--	--	--	--
Selenium	7782-49-2	NS	NS	NS	ug/l	ND	U	20	1	--	--	--	--	ND	U	20	1	ND	U	20	1	ND	U	20	1
Silver (Dissolved)	7440-22-4	NS	NS	23235308.62	ug/l	--	--	--	--	ND	U	5	1	--	--	--	--	ND	U	5	1	--	--	--	--
Silver	7440-22-4	NS	NS	NS	ug/l	ND	U	5	1	--	--	--	--	ND	U	5	1	ND	U	5	1	ND	U	5	1
Sodium (Dissolved)	7440-23-5	NS	NS	NS	ug/l	--	--	--	--	18800	0	1000	1	--	--	--	--	19100	0	1000	1	--	--	--	--
Sodium	7440-23-5	NS	NS	NS	ug/l	18700	0	1000	1	--	--	--	--	18700	0	1000	1	19100	0	1000	1	22800	0	1000	1
Thallium (Dissolved)	7440-28-0	NS	NS	NS	ug/l	--	--	--	--	ND	U	30	1	--	--	--	--	ND	U	30	1	--	--	--	--
Thallium	7440-28-0	0.24	13	65	ug/l	ND	U	**30**	1	--	--	--	--	ND	U	**30**	1	ND	U	30	1	ND	U	**30**	1
Vanadium (Dissolved)	7440-62-2	NS	NS	NS	ug/l	--	--	--	--	ND	U	5	1	--	--	--	--	ND	U	5	1	--	--	--	--
Vanadium	7440-62-2	NS	100	510	ug/l	ND	U	5	1	--	--	--	--	ND	U	5	1	ND	U	5	1	ND	U	5	1
Zinc (Dissolved)	7440-66-6	NS	427.94	424.46	ug/l	--	--	--	--	ND	U	20	1	--	--	--	--	109	0	20	1	--	--	--	--
Zinc	7440-66-6	NS	NS	NS	ug/l	29.5	0	20	1	--	--	--	--	138	0	20	1	109	0	20	1	42.5	0	20	1
General Chemistry																									
Lime (As Calcium Carbonate)	471-34-1	NS	NS	NS	mg/l	270		6	2	--	--	--	--	327		15	5	--	--	--	--	487		15	5

Notes:
DF - Dilution Factor
ug/l - micrograms per kilogram
mg/l - milligrams per kilogram
CCC - Criteria Continous Concentration PA Title 25, Chapter 93.8
CMC - Criteria Maximum Concentration PA Title 25, Chapter 93.8
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard
-- - No Data Available

Qualifiers:
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate)

Exceedance Summary:
10 - RL exceeds at least on the Surface Water Criteria
10 - Concentration exceeds the PA Code Chapter 93 Surface Water Human Health Criteria
10 - Concentration exceeds the PA Code Chapter 93 Fish and Aquatic Life CCC
10 - Concentration exceeds the PA Code Chapter 93 Fish and Aquatic Life CMC

Table 12
Summary of Surface Water Analytical Results:
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PA Code Chapter 93 Surface Water Human Health Criteria	PA Code Chapter 93 Fish and Aquatic Life CCC	PA Code Chapter 93 Fish and Aquatic Life CMC	Location ID	SWS-3				SWS-4				SWS-4				SWS-5				SWS-5			
					Sample ID	SWS-3_040711 FILTERED				SWS-4_040711				SWS-4_040711 FILTERED				SWS-5_040711				SWS-5_040711 FILTERED			
					Sample Date	4/7/2011				4/7/2011				4/7/2011				4/7/2011				4/7/2011			
					Sample Matrix	Surface Water				Surface Water				Surface Water				Surface Water				Surface Water			
					Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Volatile Organic Compounds																									
1,2,4-Trimethylbenzene	95-63-6	NS	NS	NS	ug/l	--	--	--	--	ND	U	2	1	--	--	--	--	ND	U	2	1	--	--	--	--
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	NS	NS	NS	ug/l	--	--	--	--	ND	U	0.029	1	--	--	--	--	ND	U	0.03	1	--	--	--	--
1,2-Dichloroethane	107-06-2	0.38	3100	15000	ug/l	--	--	--	--	ND	U	**1**	1	--	--	--	--	ND	U	**1**	1	--	--	--	--
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	NS	NS	NS	ug/l	--	--	--	--	ND	U	2	1	--	--	--	--	ND	U	2	1	--	--	--	--
Benzene	71-43-2	1.2	130	640	ug/l	--	--	--	--	ND	U	1	1	--	--	--	--	ND	U	1	1	--	--	--	--
Dimethyl Benzene/ Xylenes, Total	1330-20-7	70000	210	1100	ug/l	--	--	--	--	ND	U	1	1	--	--	--	--	ND	U	1	1	--	--	--	--
Ethylbenzene	100-41-4	530	580	2900	ug/l	--	--	--	--	ND	U	1	1	--	--	--	--	ND	U	1	1	--	--	--	--
Isopropylbenzene (Cumene)	98-82-8	NS	NS	NS	ug/l	--	--	--	--	ND	U	2	1	--	--	--	--	ND	U	2	1	--	--	--	--
Tert-Butyl Methyl Ether	1634-04-4	NS	NS	NS	ug/l	--	--	--	--	ND	U	1	1	--	--	--	--	ND	U	1	1	--	--	--	--
Toluene	108-88-3	1300	330	1700	ug/l	--	--	--	--	ND	U	1	1	--	--	--	--	ND	U	1	1	--	--	--	--
Semi-Volatile Organic Compounds																									
Chrysene	218-01-9	NS	NS	NS	ug/l	--	--	--	--	ND	U	5	1	--	--	--	--	ND	U	5	1	--	--	--	--
Fluorene	86-73-7	NS	NS	NS	ug/l	--	--	--	--	ND	U	5	1	--	--	--	--	ND	U	5	1	--	--	--	--
Naphthalene	91-20-3	NS	43	140	ug/l	--	--	--	--	ND	U	5	1	--	--	--	--	ND	U	5	1	--	--	--	--
Phenanthrene	85-01-8	NS	1	5	ug/l	--	--	--	--	ND	U	**5**	1	--	--	--	--	ND	U	**5**	1	--	--	--	--
Pyrene	129-00-0	NS	NS	NS	ug/l	--	--	--	--	ND	U	5	1	--	--	--	--	ND	U	5	1	--	--	--	--
Metals																									
Aluminum (Dissolved)	7429-90-5	NS	NS	NS	ug/l	ND	U	200	1	--	--	--	--	ND	U	200	1	--	--	--	--	ND	U	200	1
Aluminum	7429-90-5	NS	NS	750	ug/l	--	--	--	--	ND	U	200	1	--	--	--	--	217	0	200	1	--	--	--	--
Antimony (Dissolved)	7440-36-0	NS	NS	NS	ug/l	ND	U	20	1	--	--	--	--	ND	U	20	1	--	--	--	--	ND	U	20	1
Antimony	7440-36-0	5.6	220	1100	ug/l	--	--	--	--	ND	U	**20**	1	--	--	--	--	ND	U	**20**	1	--	--	--	--
Arsenic (Dissolved)	7440-38-2	NS	NS	NS	ug/l	ND	U	20	1	--	--	--	--	ND	U	20	1	--	--	--	--	ND	U	20	1
Arsenic	7440-38-2	10	150	340	ug/l	--	--	--	--	ND	U	**20**	1	--	--	--	--	ND	U	**20**	1	--	--	--	--
Barium (Dissolved)	7440-39-3	NS	NS	NS	ug/l	82.3	0	5	1	--	--	--	--	124	0	5	1	--	--	--	--	111	0	5	1
Barium	7440-39-3	2400	4100	21000	ug/l	--	--	--	--	138	0	5	1	--	--	--	--	124	0	5	1	--	--	--	--
Beryllium (Dissolved)	7440-41-7	NS	NS	NS	ug/l	ND	U	5	1	--	--	--	--	ND	U	5	1	--	--	--	--	ND	U	5	1
Beryllium	7440-41-7	NS	NS	NS	ug/l	--	--	--	--	ND	U	5	1	--	--	--	--	ND	U	5	1	--	--	--	--
Cadmium (Dissolved)	7440-43-9	NS	0.71	8.80	ug/l	ND	U	**5**	1	--	--	--	--	ND	U	**5**	1	--	--	--	--	ND	U	**5**	1
Cadmium	7440-43-9	NS	NS	NS	ug/l	--	--	--	--	ND	U	5	1	--	--	--	--	ND	U	5	1	--	--	--	--
Calcium (Dissolved)	7440-70-2	NS	NS	NS	ug/l	91600	0	200	1	--	--	--	--	119000	0	200	1	--	--	--	--	109000	0	200	1
Calcium	7440-70-2	NS	NS	NS	ug/l	--	--	--	--	119000	0	200	1	--	--	--	--	110000	0	200	1	--	--	--	--
Chromium, Total (Dissolved)	7440-47-3	NS	10.00	16.00	ug/l	ND	U	**15**	1	--	--	--	--	ND	U	**15**	1	--	--	--	--	ND	U	**15**	1
Chromium, Total	7440-47-3	NS	NS	NS	ug/l	--	--	--	--	ND	U	15	1	--	--	--	--	ND	U	15	1	--	--	--	--
Cobalt (Dissolved)	7440-48-4	NS	NS	NS	ug/l	ND	U	5	1	--	--	--	--	ND	U	5	1	--	--	--	--	ND	U	5	1
Cobalt	7440-48-4	NS	19	95	ug/l	--	--	--	--	ND	U	5	1	--	--	--	--	ND	U	5	1	--	--	--	--
Copper (Dissolved)	7440-50-8	NS	986.68	1684.87	ug/l	ND	U	10	1	--	--	--	--	ND	U	10	1	--	--	--	--	ND	U	10	1
Copper	7440-50-8	NS	NS	NS	ug/l	--	--	--	--	ND	U	10	1	--	--	--	--	ND	U	10	1	--	--	--	--
Iron (Dissolved)	7439-89-6	NS	NS	NS	ug/l	ND	U	200	1	--	--	--	--	ND	U	200	1	--	--	--	--	ND	U	200	1
Iron	7439-89-6	NS	NS	NS	ug/l	--	--	--	--	1600	0	200	1	--	--	--	--	1470	0	200	1	--	--	--	--

Table 12
Summary of Surface Water Analytical Results:
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	PA Code Chapter 93 Surface Water Human Health Criteria	PA Code Chapter 93 Fish and Aquatic Life CCC	PA Code Chapter 93 Fish and Aquatic Life CMC	Location ID	SWS-3				SWS-4				SWS-4				SWS-5				SWS-5			
					Sample ID	SWS-3_040711 FILTERED				SWS-4_040711				SWS-4_040711 FILTERED				SWS-5_040711				SWS-5_040711 FILTERED			
					Sample Date	4/7/2011				4/7/2011				4/7/2011				4/7/2011				4/7/2011			
					Sample Matrix	Surface Water				Surface Water				Surface Water				Surface Water				Surface Water			
					Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Lead (Dissolved)	7439-92-1	NS	3.47	215.91	ug/l	ND	U	**15**	1	–	–	–	–	ND	U	**15**	1	–	–	–	–	ND	U	**15**	1
Lead	7439-92-1	NS	NS	NS	ug/l	–	–	–	–	ND	U	15	1	–	–	–	–	ND	U	15	1	–	–	–	–
Magnesium (Dissolved)	7439-95-4	NS	NS	NS	ug/l	56400	0	100	1	–	–	–	–	74700	0	100	1	–	–	–	–	70400	0	100	1
Magnesium	7439-95-4	NS	NS	NS	ug/l	–	–	–	–	74700	0	100	1	–	–	–	–	69600	0	100	1	–	–	–	–
Manganese (Dissolved)	7439-96-5	NS	NS	NS	ug/l	8.1	0	5	1	–	–	–	–	197	0	5	1	–	–	–	–	94.3	0	5	1
Manganese	7439-96-5	NS	NS	NS	ug/l	–	–	–	–	426	0	5	1	–	–	–	–	304	0	5	1	–	–	–	–
Mercury (Dissolved)	7439-97-6	NS	0.77	1.4	ug/l	ND	U	0.2	1	–	–	–	–	ND	U	0.2	1	–	–	–	–	ND	U	0.2	1
Mercury	7439-97-6	0.05	NS	NS	ug/l	–	–	–	–	ND	U	**0.2**	1	–	–	–	–	ND	U	**0.2**	1	–	–	–	–
Nickel (Dissolved)	7440-02-0	NS	188.01	1692.75	ug/l	ND	U	10	1	–	–	–	–	ND	U	10	1	–	–	–	–	ND	U	10	1
Nickel	7440-02-0	610	NS	NS	ug/l	–	–	–	–	ND	U	10	1	–	–	–	–	ND	U	10	1	–	–	–	–
Potassium (Dissolved)	7440-09-7	NS	NS	NS	ug/l	7100	0	500	1	–	–	–	–	11000	0	500	1	–	–	–	–	10300	0	500	1
Potassium	7440-09-7	NS	NS	NS	ug/l	–	–	–	–	11100	0	500	1	–	–	–	–	10400	0	500	1	–	–	–	–
Selenium (Dissolved)	7782-49-2	NS	4.6	NS	ug/l	ND	U	**20**	1	–	–	–	–	ND	U	**20**	1	–	–	–	–	ND	U	**20**	1
Selenium	7782-49-2	NS	NS	NS	ug/l	–	–	–	–	ND	U	20	1	–	–	–	–	ND	U	20	1	–	–	–	–
Silver (Dissolved)	7440-22-4	NS	NS	23235308.62	ug/l	ND	U	5	1	–	–	–	–	ND	U	5	1	–	–	–	–	ND	U	5	1
Silver	7440-22-4	NS	NS	NS	ug/l	–	–	–	–	ND	U	5	1	–	–	–	–	ND	U	5	1	–	–	–	–
Sodium (Dissolved)	7440-23-5	NS	NS	NS	ug/l	21600	0	1000	1	–	–	–	–	18500	0	1000	1	–	–	–	–	17300	0	1000	1
Sodium	7440-23-5	NS	NS	NS	ug/l	–	–	–	–	17800	0	1000	1	–	–	–	–	17100	–	1000	1	–	–	–	–
Thallium (Dissolved)	7440-28-0	NS	NS	NS	ug/l	ND	U	30	1	–	–	–	–	ND	U	30	1	–	–	–	–	ND	U	30	1
Thallium	7440-28-0	0.24	13	65	ug/l	–	–	–	–	ND	U	**30**	1	–	–	–	–	ND	U	**30**	1	–	–	–	–
Vanadium (Dissolved)	7440-62-2	NS	NS	NS	ug/l	ND	U	5	1	–	–	–	–	ND	U	5	1	–	–	–	–	ND	U	5	1
Vanadium	7440-62-2	NS	100	510	ug/l	–	–	–	–	ND	U	5	1	–	–	–	–	ND	U	5	1	–	–	–	–
Zinc (Dissolved)	7440-66-6	NS	427.94	424.46	ug/l	21.8	0	20	1	–	–	–	–	ND	U	20	1	–	–	–	–	ND	U	20	1
Zinc	7440-66-6	NS	NS	NS	ug/l	–	–	–	–	ND	U	20	1	–	–	–	–	ND	U	20	1	–	–	–	–
General Chemistry																									
Lime (As Calcium Carbonate)	471-34-1	NS	NS	NS	mg/l	–	–	–	–	614		15	5	–	–	–	–	586		15	5	–		–	–

Notes:
DF - Dilution Factor
ug/l - micrograms per kilogram
mg/l - milligrams per kilogram
CCC - Criteria Continous Concentration PA Title 25, Chapter 93.8
CMC - Criteria Maximum Concentration PA Title 25, Chapter 93.8
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard
– - No Data Available

Qualifiers:
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate)

Exceedance Summary:
10 - RL exceeds at least on the Surface Water Criteria
10 - Concentration exceeds the PA Code Chapter 93 Surface Water Human Health Criteria
10 - Concentration exceeds the PA Code Chapter 93 Fish and Aquatic Life CCC
10 - Concentration exceeds the PA Code Chapter 93 Fish and Aquatic Life CMC

Table 13
Summary of Sediment Analytical Results
AOI-10
Sunoco Philadelphia Refinery
Philadelphia, PA

Chemical Name	CAS No	SEL [or equivalent] Ecological Screening Criteria (mg/kg)		LEL [or equivalent] Ecological Screening Criteria (mg/kg)		PADEP's Residential Soil MSC: 0-15 ft bgs	Location ID	SED-1			
							Sample ID	SED-1_040711			
							Sample Date	4/7/2011			
							Sample Matrix	Sediment			
							Unit	Result	Q	RL	DF
Volatile Organic Compounds											
1,2,4-Trimethylbenzene	95-63-6	NS		NS		130.00	mg/kg	ND	U	0.01	1.06
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	NS		NS		0.01	mg/kg	ND	U	0.01	1.06
1,2-Dichlorobenzene	95-50-1	NS		0.29	e	60.00	mg/kg	ND	U	0.01	1.06
1,2-Dichloroethane	107-06-2	NS		0.26	e	0.50	mg/kg	ND	U	0.01	1.06
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	NS		NS		110.00	mg/kg	ND	U	0.01	1.06
1,3-Dichlorobenzene	541-73-1	NS		1.32	e	60.00	mg/kg	ND	U	0.01	1.06
1,4-Dichlorobenzene	106-46-7	NS		0.32	e	7.50	mg/kg	ND	U	0.01	1.06
1-Methylnaphthalene	90-12-0	NS		NS		NS	mg/kg	6		0.31	100
Benzene	71-43-2	NS		0.14	e	0.50	mg/kg	0.01		0.01	1.06
Dimethyl Benzene/ Xylenes, Total	1330-20-7	NS		0.43	e	1000.00	mg/kg	ND	U	0.01	1.06
Ethylbenzene	100-41-4	NS		0.18	e	70.00	mg/kg	ND	U	0.01	1.06
Isopropylbenzene (Cumene)	98-82-8	NS		NS		84.00	mg/kg	ND	U	0.01	1.06
Tert-Butyl Methyl Ether	1634-04-4	NS		NS		2.00	mg/kg	ND	U	0.01	1.06
Toluene	108-88-3	NS		1.22	e	100.00	mg/kg	ND	U	0.01	1.06
Semi-Volatile Organic Compounds											
2,4-Dimethylphenol	105-67-9	NS		0.30	e	73.00	mg/kg	ND	U	3.1	10
2,4-Dinitrophenol	51-28-5	NS		0.01	e	7.30	mg/kg	ND	U	18	10
2-Methylphenol (O-Cresol)	95-48-7	NS		0.06	e	180.00	mg/kg	ND	U	3.1	10
2-Nitrophenol	88-75-5	NS		NS		29.00	mg/kg	ND	U	3.1	10
6-Methylchrysene	1705-85-7	NS		NS		NS	mg/kg	ND	U	3.1	10
Anthracene	120-12-7	0.37	a	0.22	c	35.00	mg/kg	**0.66**		0.031	10
Benzenethiol	108-98-5	NS		NS		NS	mg/kg	ND	U	18	10
Benzo(A)Anthracene	56-55-3	1.48	a	0.32	c	2.50	mg/kg	**0.52**		0.031	10
Benzo(A)Pyrene	50-32-8	1.44	a	0.37	c	0.57	mg/kg	**0.54**		0.031	10
Benzo(B)Fluoranthene	205-99-2	NS		10.40	e	4.00	mg/kg	0.55		0.031	10
Benzo(G,H,I)Perylene	191-24-2	0.32	a	0.17	c	18.00	mg/kg	**0.64**		0.031	10
Benzo(K)Fluoranthene	207-08-9	1.34	a	0.24	c	57.00	mg/kg	ND	U	3.1	10
Benzyl Butyl Phthalate	85-68-7	NS		1.97	e	300.00	mg/kg	ND	U	3.1	10
Bis(2-Ethylhexyl) Phthalate	117-81-7	NS		0.18	e	13.00	mg/kg	ND	U	6.2	10
Chrysene	218-01-9	0.46	a	0.34	c	23.00	mg/kg	**0.89**		0.031	10
Dibenz(A,H)Acridine	226-36-8	NS		NS		NS	mg/kg	ND	U	3.1	10
Dibenz(A,H)Anthracene	53-70-3	0.13	a	0.06	c	0.57	mg/kg	ND	U	3.1	10
Diethyl Phthalate	84-66-2	NS		NS		2900.00	mg/kg	ND	U	3.1	10
Dimethyl Phthalate	131-11-3	NS		0.32	e	NS	mg/kg	ND	U	3.1	10
Di-N-Butyl Phthalate	84-74-2	NS		NS		370.00	mg/kg	ND	U	3.1	10
Di-N-Octylphthalate	117-84-0	NS		NS		1000.00	mg/kg	ND	U	3.1	10
Fluoranthene	206-44-0	1.02	a	0.75	c	320.00	mg/kg	ND	U	3.1	10
Fluorene	86-73-7	4.792	a	0.19	c	300.00	mg/kg	**0.36**		0.031	10
Naphthalene	91-20-3	NS		0.16	d	10.00	mg/kg	**7.7**		0.31	100
Phenanthrene	85-01-8	0.16	a	0.56	c	1000.00	mg/kg	**2.3**		0.031	10
Phenol	108-95-2	NS		0.05	e	200.00	mg/kg	ND	U	3.1	10
Pyrene	129-00-0	0.85	a	0.49	c	220.00	mg/kg	**1.2**		0.031	10
Metals											
Aluminum	7429-90-5	NS		NS		190000.00	mg/kg	15400		36.4	1
Antimony	7440-36-0	NS		2.00	d	2.70	mg/kg	ND	U	3.64	1
Arsenic	7440-38-2	33	b	6.00	c	2.90	mg/kg	**24**		3.64	1
Barium	7440-39-3	NS		NS		820.00	mg/kg	331		0.909	1
Beryllium	7440-41-7	NS		NS		32.00	mg/kg	1.12		0.909	1
Cadmium	7440-43-9	10	b	0.60	c	3.80	mg/kg	**2.22**		0.909	1
Calcium	7440-70-2	NS		NS		NS	mg/kg	4150		36.4	1
Chromium, Total	7440-47-3	110	b	26.00	c	NS	mg/kg	**89.7**		2.73	1
Cobalt	7440-48-4	NS		50.00	e	5.00	mg/kg	15		0.909	1
Copper	7440-50-8	110	b	16.00	c	4300.00	mg/kg	**573**		1.82	1
Iron	7439-89-6	40000	b	20000.00	c	150000.00	mg/kg	**44500**		36.4	1
Lead	7439-92-1	250	b	31.00	c	45.00	mg/kg	**3610**		13.6	5
Magnesium	7439-95-4	NS		NS		NS	mg/kg	3370		18.2	1
Manganese	7439-96-5	1100	b	460.00	c	200.00	mg/kg	**461**		0.909	1
Mercury	7439-97-6	2	b	0.20	c	1.00	mg/kg	**3.59**		0.882	5
Nickel	7440-02-0	75	b	16.00	c	65.00	mg/kg	**45.6**		1.82	1
Potassium	7440-09-7	NS		NS		NS	mg/kg	1780		90.9	1
Selenium	7782-49-2	NS		NS		5.00	mg/kg	5.3		3.64	1
Silver	7440-22-4	NS		1.00	d	10.00	mg/kg	**2.96**		0.909	1
Sodium	7440-23-5	NS		NS		NS	mg/kg	264		182	1
Thallium	7440-28-0	NS		NS		1.40	mg/kg	ND	U	5.46	1
Vanadium	7440-62-2	NS		NS		1500.00	mg/kg	68		0.909	1
Zinc	7440-66-6	820	b	120.00	c	1200.00	mg/kg	**503**		3.64	1
General Chemistry											
Moisture, Percent	MOIST	NS		NS		NS	%	46.1		0.5	1
Total Organic Carbon	TOC	100000	b	10000	c	NS	mg/kg	**302000**		18300	1
Grain Size Analysis											
0.001 Mm	GS.001MM	NS		NS		NS	% passing	1		1	1
0.002 Mm	GS.002MM	NS		NS		NS	% passing	2		1	1
0.005 Mm	GS.005MM	NS		NS		NS	% passing	6		1	1
0.02 Mm	GS.02MM	NS		NS		NS	% passing	13		1	1
0.05 Mm	GS.05MM	NS		NS		NS	% passing	22		1	1
0.064 Mm	GS.064MM	NS		NS		NS	% passing	28		1	1
0.075 Mm	GS.075MM	NS		NS		NS	% passing	30.7		1	1
0.15 Mm	GS.15MM	NS		NS		NS	% passing	37.3		1	1
0.3 Mm	GS.3MM	NS		NS		NS	% passing	45		1	1
0.6 Mm	GS.6MM	NS		NS		NS	% passing	52.3		1	1
1.18 Mm	GS1.18MM	NS		NS		NS	% passing	60.7		1	1
2.36 Mm	GS2.36MM	NS		NS		NS	% passing	68.8		1	1
3.35 Mm	GS3.35MM	NS		NS		NS	% passing	78.3		1	1
4.75 Mm	GS4.75MM	NS		NS		NS	% passing	84.6		1	1
19 Mm	GS19MM	NS		NS		NS	% passing	100		1	1
37.5 Mm	GS37.5MM	NS		NS		NS	% passing	100		1	1
75 Mm	GS75MM	NS		NS		NS	% passing	100		1	1

Notes:

15 Result is greater than the 'SEL' criteria [as defined by the hierarchy below]
15 Result is greater than the 'LEL' criteria [as defined by the hierarchy below]
15 Result is greater than the PADEP Residential Soil MSC for surface soils between 0 and 15ft. bgs

DF - Dilution Factor
LEL - Low Ecological Level
MDL - Laboratory Method Detection Limit
MSC - Medium Specific Concentration
NS - No standard currently available.
Q - Lab Qualifier if data was not validated)
RL - Laboratory Reporting Detection Limit
SEL - Severe Ecological Level

The hierarchy for selecting the SEL:
a. Calculated Site Specific SEL using site specific TOC (302,000 mg/kg)
b. Ontario Sediment SEL (if no Site Specific SEL is available)
The hierarchy for selecting the LEL:
c. Ontario Sediment LEL
d. NOAA ERL Sediment Benchmark (if no Ontario Sediment LEL is available)
e. SD EPA R5 Sediment Benchmark (if no NOAA ERL is available)

Data Qualifiers

U Compound analyzed but not detected at a level greater than or equal to the MDL.

Table 13
Summary of Sediment Analytical Results
AOI-10
Sunoco Philadelphia Refinery
Philadelphia, PA

Chemical Name	CAS No	SEL [or equivalent] Ecological Screening Criteria (mg/kg)		LEL [or equivalent] Ecological Screening Criteria (mg/kg)		PADEP's Residential Soil MSC: 0-15 ft bgs	Location ID	SED-2			
							Sample ID	SED-2_040711			
							Sample Date	4/7/2011			
							Sample Matrix	Sediment			
							Unit	Result	Q	RL	DF
Volatile Organic Compounds											
1,2,4-Trimethylbenzene	95-63-6	NS		NS		130.00	mg/kg	ND	U	0.014	1.15
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	NS		NS		0.01	mg/kg	ND	U	0.014	1.15
1,2-Dichlorobenzene	95-50-1	NS		0.29	e	60.00	mg/kg	ND	U	0.014	1.15
1,2-Dichloroethane	107-06-2	NS		0.26	e	0.50	mg/kg	ND	U	0.014	1.15
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	NS		NS		110.00	mg/kg	ND	U	0.014	1.15
1,3-Dichlorobenzene	541-73-1	NS		1.32	e	60.00	mg/kg	ND	U	0.014	1.15
1,4-Dichlorobenzene	106-46-7	NS		0.32	e	7.50	mg/kg	ND	U	0.014	1.15
1-Methylnaphthalene	90-12-0	NS		NS		NS	mg/kg	ND	U	0.039	10
Benzene	71-43-2	NS		0.14	e	0.50	mg/kg	ND	U	0.014	1.15
Dimethyl Benzene/ Xylenes, Total	1330-20-7	NS		0.43	e	1000.00	mg/kg	ND	U	0.014	1.15
Ethylbenzene	100-41-4	NS		0.18	e	70.00	mg/kg	ND	U	0.014	1.15
Isopropylbenzene (Cumene)	98-82-8	NS		NS		84.00	mg/kg	ND	U	0.014	1.15
Tert-Butyl Methyl Ether	1634-04-4	NS		NS		2.00	mg/kg	ND	U	0.014	1.15
Toluene	108-88-3	NS		1.22	e	100.00	mg/kg	ND	U	0.014	1.15
Semi-Volatile Organic Compounds											
2,4-Dimethylphenol	105-67-9	NS		0.30	e	73.00	mg/kg	ND	U	4	10
2,4-Dinitrophenol	51-28-5	NS		0.01	e	7.30	mg/kg	ND	U	24	10
2-Methylphenol (O-Cresol)	95-48-7	NS		0.06	e	180.00	mg/kg	ND	U	4	10
2-Nitrophenol	88-75-5	NS		NS		29.00	mg/kg	ND	U	4	10
6-Methylchrysene	1705-85-7	NS		NS		NS	mg/kg	ND	U	4	10
Anthracene	120-12-7	0.05957	a	0.22	c	35.00	mg/kg	ND	U	0.039	10
Benzenethiol	108-98-5	NS		NS		NS	mg/kg	ND	U	24	10
Benzo(A)Anthracene	56-55-3	0.23828	a	0.32	c	2.50	mg/kg	ND	U	0.039	10
Benzo(A)Pyrene	50-32-8	0.23184	a	0.37	c	0.57	mg/kg	ND	U	0.039	10
Benzo(B)Fluoranthene	205-99-2	NS		10.40	e	4.00	mg/kg	ND	U	0.039	10
Benzo(G,H,I)Perylene	191-24-2	0.05152	a	0.17	c	18.00	mg/kg	ND	U	0.039	10
Benzo(K)Fluoranthene	207-08-9	0.21574	a	0.24	c	57.00	mg/kg	ND	U	4	10
Benzyl Butyl Phthalate	85-68-7	NS		1.97	e	300.00	mg/kg	ND	U	4	10
Bis(2-Ethylhexyl) Phthalate	117-81-7	NS		0.18	e	13.00	mg/kg	ND	U	7.9	10
Chrysene	218-01-9	0.07406	a	0.34	c	23.00	mg/kg	ND	U	0.039	10
Dibenz(A,H)Acridine	226-36-8	NS		NS		NS	mg/kg	ND	U	4	10
Dibenz(A,H)Anthracene	53-70-3	0.02093	a	0.06	c	0.57	mg/kg	ND	U	4	10
Diethyl Phthalate	84-66-2	NS		NS		2900.00	mg/kg	ND	U	4	10
Dimethyl Phthalate	131-11-3	NS		0.32	e	NS	mg/kg	ND	U	4	10
Di-N-Butyl Phthalate	84-74-2	NS		NS		370.00	mg/kg	ND	U	4	10
Di-N-Octylphthalate	117-84-0	NS		NS		1000.00	mg/kg	ND	U	4	10
Fluoranthene	206-44-0	0.16422	a	0.75	c	320.00	mg/kg	ND	U	4	10
Fluorene	86-73-7	0.771512	a	0.19	c	300.00	mg/kg	ND	U	0.039	10
Naphthalene	91-20-3	NS		0.16	d	10.00	mg/kg	ND	U	0.039	10
Phenanthrene	85-01-8	0.02576	a	0.56	c	1000.00	mg/kg	ND	U	0.039	10
Phenol	108-95-2	NS		0.05	e	200.00	mg/kg	ND	U	4	10
Pyrene	129-00-0	0.13685	a	0.49	c	220.00	mg/kg	ND	U	0.039	10
Metals											
Aluminum	7429-90-5	NS		NS		190000.00	mg/kg	35900		47.5	1
Antimony	7440-36-0	NS		2.00	d	2.70	mg/kg	ND	U	4.75	1
Arsenic	7440-38-2	33	b	6.00	c	2.90	mg/kg	**91.7**		4.75	1
Barium	7440-39-3	NS		NS		820.00	mg/kg	832		1.19	1
Beryllium	7440-41-7	NS		NS		32.00	mg/kg	ND	U	1.19	1
Cadmium	7440-43-9	10	b	0.60	c	3.80	mg/kg	**2.03**		1.19	1
Calcium	7440-70-2	NS		NS		NS	mg/kg	166000		238	5
Chromium, Total	7440-47-3	110	b	26.00	c	NS	mg/kg	**186**		3.56	1
Cobalt	7440-48-4	NS		50.00	e	5.00	mg/kg	14.2		1.19	1
Copper	7440-50-8	110	b	16.00	c	4300.00	mg/kg	**425**		2.38	1
Iron	7439-89-6	40000	b	20000.00	c	150000.00	mg/kg	**21300**		47.5	1
Lead	7439-92-1	250	b	31.00	c	45.00	mg/kg	**897**		3.56	1
Magnesium	7439-95-4	NS		NS		NS	mg/kg	31600		23.8	1
Manganese	7439-96-5	1100	b	460.00	c	200.00	mg/kg	**1140**		1.19	1
Mercury	7439-97-6	2	b	0.20	c	1.00	mg/kg	ND	U	0.229	1
Nickel	7440-02-0	75	b	16.00	c	65.00	mg/kg	**207**		2.38	1
Potassium	7440-09-7	NS		NS		NS	mg/kg	1300		119	1
Selenium	7782-49-2	NS		NS		5.00	mg/kg	ND	U	4.75	1
Silver	7440-22-4	NS		1.00	d	10.00	mg/kg	**2.01**		1.19	1
Sodium	7440-23-5	NS		NS		NS	mg/kg	793		238	1
Thallium	7440-28-0	NS		NS		1.40	mg/kg	ND	U	7.13	1
Vanadium	7440-62-2	NS		NS		1500.00	mg/kg	287		1.19	1
Zinc	7440-66-6	820	b	120.00	c	1200.00	mg/kg	**738**		4.75	1
General Chemistry											
Moisture, Percent	MOIST	NS		NS		NS	%	57.9		0.5	1
Total Organic Carbon	TOC	100000	b	10000	c	NS	mg/kg	**16100**		6490	1
Grain Size Analysis											
0.001 Mm	GS.001MM	NS		NS		NS	% passing	ND	U	1	1
0.002 Mm	GS.002MM	NS		NS		NS	% passing	ND	U	1	1
0.005 Mm	GS.005MM	NS		NS		NS	% passing	ND	U	1	1
0.02 Mm	GS.02MM	NS		NS		NS	% passing	4		1	1
0.05 Mm	GS.05MM	NS		NS		NS	% passing	8.5		1	1
0.064 Mm	GS.064MM	NS		NS		NS	% passing	10.5		1	1
0.075 Mm	GS.075MM	NS		NS		NS	% passing	11.6		1	1
0.15 Mm	GS.15MM	NS		NS		NS	% passing	14.4		1	1
0.3 Mm	GS.3MM	NS		NS		NS	% passing	23.3		1	1
0.6 Mm	GS.6MM	NS		NS		NS	% passing	48.1		1	1
1.18 Mm	GS1.18MM	NS		NS		NS	% passing	65		1	1
2.36 Mm	GS2.36MM	NS		NS		NS	% passing	79		1	1
3.35 Mm	GS3.35MM	NS		NS		NS	% passing	84		1	1
4.75 Mm	GS4.75MM	NS		NS		NS	% passing	88.2		1	1
19 Mm	GS19MM	NS		NS		NS	% passing	100		1	1
37.5 Mm	GS37.5MM	NS		NS		NS	% passing	100		1	1
75 Mm	GS75MM	NS		NS		NS	% passing	100		1	1

Notes:

15 Result is greater than the 'SEL' criteria [as defined by the hierarchy below]
15 Result is greater than the 'LEL' criteria [as defined by the hierarchy below]
15 Result is greater than the PADEP Residential Soil MSC for surface soils between 0 and 15ft. bgs

DF - Dilution Factor
LEL - Low Ecological Level
MDL - Laboratory Method Detection Limit
MSC - Medium Specific Concentration
NS - No standard currently available.
Q - Lab Qualifier if data was not validated
RL - Laboratory Reporting Detection Limit
SEL - Severe Ecological Level

The hierarchy for selecting the SEL:
a. Calculated Site Specific SEL using site specific TOC (16,100 mg/kg)
b. Ontario Sediment SEL (if no Site Specific SEL is available)
The hierarchy for selecting the LEL:
c. Ontario Sediment LEL
d. NOAA ERL Sediment Benchmark (if no Ontario Sediment LEL is available)
e. SD EPA R5 Sediment Benchmark (if no NOAA ERL is available)

Data Qualifiers
U Compound analyzed but not detected at a level greater than or equal to the MDL.

Table 13
Summary of Sediment Analytical Results
AOI-10
Sunoco Philadelphia Refinery
Philadelphia, PA

Chemical Name	CAS No	SEL [or equivalent] Ecological Screening Criteria (mg/kg)		LEL [or equivalent] Ecological Screening Criteria (mg/kg)		PADEP's Residential Soil MSC: 0-15 ft bgs	Location ID	SED-3				SED-4				SED-5			
							Sample ID	SED-3_040711				SED-4_040711				SED-5_040711			
							Sample Date	4/7/2011				4/7/2011				4/7/2011			
							Sample Matrix	Sediment				Sediment				Sediment			
							Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Volatile Organic Compounds																			
1,2,4-Trimethylbenzene	95-63-6	NS		NS		130.00	mg/kg	0.007		0.006	0.81	ND	U	0.007	0.92	0.035		0.009	1.03
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	NS		NS		0.01	mg/kg	ND	U	0.006	0.81	ND	U	0.007	0.92	ND	U	0.009	1.03
1,2-Dichlorobenzene	95-50-1	NS		0.29	e	60.00	mg/kg	ND	U	0.006	0.81	ND	U	0.007	0.92	ND	U	0.009	1.03
1,2-Dichloroethane	107-06-2	NS		0.26	e	0.50	mg/kg	ND	U	0.006	0.81	ND	U	0.007	0.92	ND	U	0.009	1.03
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	NS		NS		110.00	mg/kg	ND	U	0.006	0.81	ND	U	0.007	0.92	0.015		0.009	1.03
1,3-Dichlorobenzene	541-73-1	NS		1.32	e	60.00	mg/kg	ND	U	0.006	0.81	ND	U	0.007	0.92	ND	U	0.009	1.03
1,4-Dichlorobenzene	106-46-7	NS		0.32	e	7.50	mg/kg	ND	U	0.006	0.81	ND	U	0.007	0.92	ND	U	0.009	1.03
1-Methylnaphthalene	90-12-0	NS		NS		NS	mg/kg	0.034		0.024	10	0.29		0.024	10	0.18		0.028	10
Benzene	71-43-2	NS		0.14	e	0.50	mg/kg	0.01		0.006	0.81	0.032		0.007	0.92	0.041		0.009	1.03
Dimethyl Benzene/ Xylenes, Total	1330-20-7	NS		0.43	e	1000.00	mg/kg	0.01		0.006	0.81	0.015		0.007	0.92	0.31		0.009	1.03
Ethylbenzene	100-41-4	NS		0.18	e	70.00	mg/kg	ND	U	0.006	0.81	ND	U	0.007	0.92	0.024		0.009	1.03
Isopropylbenzene (Cumene)	98-82-8	NS		NS		84.00	mg/kg	ND	U	0.006	0.81	ND	U	0.007	0.92	ND	U	0.009	1.03
Tert-Butyl Methyl Ether	1634-04-4	NS		NS		2.00	mg/kg	ND	U	0.006	0.81	ND	U	0.007	0.92	ND	U	0.009	1.03
Toluene	108-88-3	NS		1.22	e	100.00	mg/kg	ND	U	0.006	0.81	0.029		0.007	0.92	0.34		0.009	1.03
Semi-Volatile Organic Compounds																			
2,4-Dimethylphenol	105-67-9	NS		0.30	e	73.00	mg/kg	ND	U	2.4	10	ND	U	2.4	10	ND	U	2.8	10
2,4-Dinitrophenol	51-28-5	NS		0.01	e	7.30	mg/kg	ND	U	14	10	ND	U	14	10	ND	U	17	10
2-Methylphenol (O-Cresol)	95-48-7	NS		0.06	e	180.00	mg/kg	ND	U	2.4	10	ND	U	2.4	10	ND	U	2.8	10
2-Nitrophenol	88-75-5	NS		NS		29.00	mg/kg	ND	U	2.4	10	ND	U	2.4	10	ND	U	2.8	10
6-Methylchrysene	1705-85-7	NS		NS		NS	mg/kg	ND	U	2.4	10	ND	U	2.4	10	ND	U	2.8	10
Anthracene	120-12-7	0.20091	a	0.22	c	35.00	mg/kg	0.18		0.024	10	0.15		0.024	10	0.15		0.028	10
Benzenethiol	108-98-5	NS		NS		NS	mg/kg	ND	U	14	10	ND	U	14	10	ND	U	17	10
Benzo(A)Anthracene	56-55-3	0.80364	a	0.32	c	2.50	mg/kg	**0.6**		0.024	10	**0.38**		0.024	10	0.28		0.028	10
Benzo(A)Pyrene	50-32-8	0.78192	a	0.37	c	0.57	mg/kg	0.37		0.024	10	0.32		0.024	10	0.25		0.028	10
Benzo(B)Fluoranthene	205-99-2	NS		10.40	e	4.00	mg/kg	0.64		0.024	10	0.42		0.024	10	0.38		0.028	10
Benzo(G,H,I)Perylene	191-24-2	0.17376	a	0.17	c	18.00	mg/kg	**0.19**		0.024	10	**0.21**		0.024	10	**0.18**		0.028	10
Benzo(K)Fluoranthene	207-08-9	0.72762	a	0.24	c	57.00	mg/kg	ND	U	2.4	10	ND	U	2.4	10	ND	U	2.8	10
Benzyl Butyl Phthalate	85-68-7	NS		1.97	e	300.00	mg/kg	ND	U	2.4	10	ND	U	2.4	10	ND	U	2.8	10
Bis(2-Ethylhexyl) Phthalate	117-81-7	NS		0.18	e	13.00	mg/kg	ND	U	4.8	10	ND	U	4.8	10	ND	U	5.6	10
Chrysene	218-01-9	0.24978	a	0.34	c	23.00	mg/kg	**1.1**		0.024	10	**0.44**		0.024	10	**0.35**		0.028	10
Dibenz(A,H)Acridine	226-36-8	NS		NS		NS	mg/kg	ND	U	2.4	10	ND	U	2.4	10	ND	U	2.8	10
Dibenz(A,H)Anthracene	53-70-3	0.07059	a	0.06	c	0.57	mg/kg	ND	U	2.4	10	ND	U	2.4	10	ND	U	2.8	10
Diethyl Phthalate	84-66-2	NS		NS		2900.00	mg/kg	ND	U	2.4	10	ND	U	2.4	10	ND	U	2.8	10
Dimethyl Phthalate	131-11-3	NS		0.32	e	NS	mg/kg	ND	U	2.4	10	ND	U	2.4	10	ND	U	2.8	10
Di-N-Butyl Phthalate	84-74-2	NS		NS		370.00	mg/kg	ND	U	2.4	10	ND	U	2.4	10	ND	U	2.8	10
Di-N-Octylphthalate	117-84-0	NS		NS		1000.00	mg/kg	ND	U	2.4	10	ND	U	2.4	10	ND	U	2.8	10
Fluoranthene	206-44-0	0.55386	a	0.75	c	320.00	mg/kg	ND	U	2.4	10	ND	U	2.4	10	ND	U	2.8	10
Fluorene	86-73-7	2.602056	a	0.19	c	300.00	mg/kg	0.046		0.024	10	0.046		0.024	10	0.04		0.028	10
Naphthalene	91-20-3	NS		0.16	d	10.00	mg/kg	0.07		0.024	10	**0.53**		0.024	10	**0.68**		0.028	10
Phenanthrene	85-01-8	0.08688	a	0.56	c	1000.00	mg/kg	0.43		0.024	10	0.53		0.024	10	0.46		0.028	10
Phenol	108-95-2	NS		0.05	e	200.00	mg/kg	ND	U	2.4	10	ND	U	2.4	10	ND	U	2.8	10
Pyrene	129-00-0	0.46155	a	0.49	c	220.00	mg/kg	**1.6**		0.024	10	**0.63**		0.024	10	0.41		0.028	10
Metals																			
Aluminum	7429-90-5	NS		NS		190000.00	mg/kg	12300		28.4	1	14300		28.7	1	22300		32.9	1
Antimony	7440-36-0	NS		2.00	d	2.70	mg/kg	ND	U	2.84	1	ND	U	2.87	1	ND	U	3.29	1
Arsenic	7440-38-2	33	b	6.00	c	2.90	mg/kg	**7.48**		2.84	1	**21.9**		2.87	1	**14.6**		3.29	1
Barium	7440-39-3	NS		NS		820.00	mg/kg	236		0.71	1	96.3		0.716	1	225		0.822	1
Beryllium	7440-41-7	NS		NS		32.00	mg/kg	ND	U	0.71	1	0.956		0.716	1	0.936		0.822	1
Cadmium	7440-43-9	10	b	0.60	c	3.80	mg/kg	**1.58**		0.71	1	**1.26**		0.716	1	**1.2**		0.822	1
Calcium	7440-70-2	NS		NS		NS	mg/kg	7130		28.4	1	6660		28.7	1	12600		32.9	1
Chromium, Total	7440-47-3	110	b	26.00	c	NS	mg/kg	**45.2**		2.13	1	**64.7**		2.15	1	**66.4**		2.47	1
Cobalt	7440-48-4	NS		50.00	e	5.00	mg/kg	8.29		0.71	1	7.98		0.716	1	11.5		0.822	1
Copper	7440-50-8	110	b	16.00	c	4300.00	mg/kg	**111**		1.42	1	**74.4**		1.43	1	**109**		1.64	1
Iron	7439-89-6	40000	b	20000.00	c	150000.00	mg/kg	19300		28.4	1	19400		28.7	1	**21700**		32.9	1
Lead	7439-92-1	250	b	31.00	c	45.00	mg/kg	**328**		2.13	1	**306**		2.15	1	**319**		2.47	1
Magnesium	7439-95-4	NS		NS		NS	mg/kg	6940		14.2	1	3870		14.3	1	7190		16.4	1
Manganese	7439-96-5	1100	b	460.00	c	200.00	mg/kg	236		0.71	1	375		0.716	1	**508**		0.822	1
Mercury	7439-97-6	2	b	0.20	c	1.00	mg/kg	**0.604**		0.139	1	**0.288**		0.14	1	**0.524**		0.156	1
Nickel	7440-02-0	75	b	16.00	c	65.00	mg/kg	**31.3**		1.42	1	**85.6**		1.43	1	**44.1**		1.64	1
Potassium	7440-09-7	NS		NS		NS	mg/kg	2290		71	1	1670		71.6	1	1530		82.2	1
Selenium	7782-49-2	NS		NS		5.00	mg/kg	ND	U	2.84	1	ND	U	2.87	1	ND	U	3.29	1
Silver	7440-22-4	NS		1.00	d	10.00	mg/kg	0.969		0.71	1	0.855		0.716	1	**1.11**		0.822	1
Sodium	7440-23-5	NS		NS		NS	mg/kg	295		142	1	ND	U	143	1	188		164	1
Thallium	7440-28-0	NS		NS		1.40	mg/kg	ND	U	4.26	1	ND	U	4.3	1	ND	U	4.93	1
Vanadium	7440-62-2	NS		NS		1500.00	mg/kg	50.1		0.71	1	71.6		0.716	1	94.7		0.822	1
Zinc	7440-66-6	820	b	120.00	c	1200.00	mg/kg	**503**		2.84	1	**1710**		14.3	5	**339**		3.29	1
General Chemistry																			
Moisture, Percent	MOIST	NS		NS		NS	%	30.3		0.5	1	30.9		0.5	1	40.4		0.5	1
Total Organic Carbon	TOC	100000	b	10000	c	NS	mg/kg	**55900**		3490	1	**47800**		3400	1	**59900**		6360	1
Grain Size Analysis																			
0.001 Mm	GS.001MM	NS		NS		NS	% passing	ND	U	1	1	1		1	1	2		1	1
0.002 Mm	GS.002MM	NS		NS		NS	% passing	ND	U	1	1	2		1	1	8		1	1
0.005 Mm	GS.005MM	NS		NS		NS	% passing	1		1	1	3.5		1	1	12.5		1	1
0.02 Mm	GS.02MM	NS		NS		NS	% passing	3		1	1	9.5		1	1	22.5		1	1
0.05 Mm	GS.05MM	NS		NS		NS	% passing	7.5		1	1	13		1	1	38		1	1
0.064 Mm	GS.064MM	NS		NS		NS	% passing	9		1	1	14		1	1	48.5		1	1
0.075 Mm	GS.075MM	NS		NS		NS	% passing	9.5		1	1	14.9		1	1	53.9		1	1
0.15 Mm	GS.15MM	NS		NS		NS	% passing	14		1	1	16.8		1	1	67.9		1	1
0.3 Mm	GS.3MM	NS		NS		NS	% passing	26.3		1	1	19.8		1	1	75.1		1	1
0.6 Mm	GS.6MM	NS		NS		NS	% passing	44.7		1	1	26.1		1	1	78.3		1	1
1.18 Mm	GS1.18MM	NS		NS		NS	% passing	54.4		1	1	37.6		1	1	80.9		1	1
2.36 Mm	GS2.36MM	NS		NS		NS	% passing	60.7		1	1	50.5		1	1	84.9		1	1
3.35 Mm	GS3.35MM	NS		NS		NS	% passing	66.5		1	1	60.6		1	1	91.1		1	1
4.75 Mm	GS4.75MM	NS		NS		NS	% passing	74.1		1	1	72		1	1	95		1	1
19 Mm	GS19MM	NS		NS		NS	% passing	100		1	1	100		1	1	100		1	1
37.5 Mm	GS37.5MM	NS		NS		NS	% passing	100		1	1	100		1	1	100		1	1
75 Mm	GS75MM	NS		NS		NS	% passing	100		1	1	100		1	1	100		1	1

Notes:

15 Result is greater than the 'SEL' criteria [as defined by the hierarchy below]
15 Result is greater than the 'LEL' criteria [as defined by the hierarchy below]
15 Result is greater than the PADEP Residential Soil MSC for surface soils between 0 and 15ft. bgs

DF - Dilution Factor
LEL - Low Ecological Level
MDL - Laboratory Method Detection Limit
MSC - Medium Specific Concentration
NS - No standard currently available.
Q - Lab Qualifier if data was not validated)
RL - Laboratory Reporting Detection Limit
SEL - Severe Ecological Level

The hierarchy for selecting the SEL:
a. Calculated Site Specific SEL using site specific TOC (54,533.33 mg/kg)
b. Ontario Sediment SEL (if no Site Specific SEL is available)
The hierarchy for selecting the LEL:
c. Ontario Sediment LEL
d. NOAA ERL Sediment Benchmark (if no Ontario Sediment LEL is available)
e. SD EPA R5 Sediment Benchmark (if no NOAA ERL is available)

Data Qualifiers
U Compound analyzed but not detected at a level greater than or equal to the MDL.

Table 14
Summary of Soil Samples Screened for Protection of Indoor Air
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	USEPA-PA Defaults Nonresidential Volatilization to Indoor Air Screening Limit	USEPA-PA Defaults Nonresidential PELs Volatilization to Indoor Air Screen Screening Limit	Location ID	BH-10-36				BH-10-37				BH-10-38				BH-10-39				BH-10-40				BH-10-41				BH-10-78			
				Sample ID	BH-10-36_0-2'				BH-10-37_0-2'				BH-10-38_0-2'				BH-10-39_0-2'				BH-10-40_0-2'				BH-10-41_0-2'				BH-10-78_0-2'			
				Sample Date	4/5/2011				4/5/2011				4/5/2011				4/5/2011				4/5/2011				4/5/2011				4/21/2011			
				Sample Matrix	Soil				Soil				Soil				Soil				Soil				Soil				Soil			
				Sample Interval	0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs			
				Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Volatile Organic Compounds																																
1,2,4-Trimethylbenzene	95-63-6	29	310	mg/kg	ND	U	0.001	0.91	ND	U	0.001	0.93	ND	U	0.002	1.52	0.4	J	0.16	121.6	ND	U	0.0009	0.79	0.014		0.002	1.05	ND	U	0.001	0.82
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.29	1000	mg/kg	ND	U	0.001	0.91	ND	U	0.001	0.93	ND	U	0.002	1.52	ND	U	0.16	121.6	ND	U	0.0009	0.79	ND	U	0.002	1.05	ND	U	0.001	0.82
1,2-Dichloroethane	107-06-2	0.83	8.3	mg/kg	ND	U	0.001	0.91	ND	U	0.001	0.93	ND	U	0.002	1.52	ND	U	0.16	121.6	ND	U	0.0009	0.79	ND	U	0.002	1.05	ND	U	0.001	0.82
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	6.4	87	mg/kg	ND	U	0.001	0.91	ND	U	0.001	0.93	ND	U	0.002	1.52	ND	U	0.16	121.6	ND	U	0.0009	0.79	0.007	J	0.002	1.05	ND	U	0.001	0.82
Benzene	71-43-2	0.63	380	mg/kg	0.008		0.0006	0.91	0.008		0.0006	0.93	ND	U	9E-04	1.52	0.12	J	0.08	121.6	0.003	J	0.0005	0.79	0.008	J	8E-04	1.05	0.001	J	0.0005	0.82
Dimethyl Benzene/ Xylenes, Total	1330-20-7	77	170	mg/kg	ND	U	0.001	0.91	ND	U	0.001	0.93	ND	U	0.002	1.52	0.18	J	0.16	121.6	ND	U	0.0009	0.79	0.012		0.002	1.05	ND	U	0.001	0.82
Ethylbenzene	100-41-4	9.5	110	mg/kg	ND	U	0.001	0.91	ND	U	0.001	0.93	ND	U	0.002	1.52	0.24	J	0.16	121.6	ND	U	0.0009	0.79	ND	U	0.002	1.05	ND	U	0.001	0.82
Isopropylbenzene (Cumene)	98-82-8	360	360	mg/kg	ND	U	0.001	0.91	ND	U	0.001	0.93	ND	U	0.002	1.52	2.5		0.16	121.6	ND	U	0.0009	0.79	ND	U	0.002	1.05	ND	U	0.001	0.82
Tert-Butyl Methyl Ether	1634-04-4	86	6400	mg/kg	ND	U	0.0006	0.91	ND	U	0.0006	0.93	ND	U	9E-04	1.52	ND	U	0.08	121.6	ND	U	0.0005	0.79	ND	U	8E-04	1.05	ND	U	0.0005	0.82
Toluene	108-88-3	110	240	mg/kg	0.009		0.001	0.91	0.005	J	0.001	0.93	ND	U	0.002	1.52	ND	U	0.16	121.6	0.001	J	0.0009	0.79	0.01		0.002	1.05	ND	U	0.001	0.82
Semi-Volatile Organic Compounds																																
Anthracene	120-12-7	NS	NS	mg/kg	0.46	J	0.2	5	1.9		0.21	5	ND	U	0.2	5	12		2.2	5	4.7		0.19	5	ND	U	1.2	5	0.43		0.039	1
Benzo(A)Anthracene	56-55-3	NS	NS	mg/kg	1.8		0.2	5	6.5		0.21	5	ND	U	0.2	5	22		2.2	5	11		0.19	5	ND	U	1.2	5	0.91		0.039	1
Benzo(A)Pyrene	50-32-8	NS	NS	mg/kg	1.8		0.2	5	6.5		0.21	5	ND	U	0.2	5	16		2.2	5	9.2		0.19	5	ND	U	1.2	5	0.66		0.039	1
Benzo(B)Fluoranthene	205-99-2	NS	NS	mg/kg	2.4		0.2	5	9.3		0.21	5	ND	U	0.2	5	25		2.2	5	12		0.19	5	ND	U	1.2	5	0.81		0.039	1
Benzo(G,H,I)Perylene	191-24-2	NS	NS	mg/kg	1.3		0.2	5	3.9		0.21	5	ND	U	0.2	5	9.9	J	2.2	5	4.8		0.19	5	ND	U	1.2	5	0.33		0.039	1
Chrysene	218-01-9	NS	NS	mg/kg	2.2		0.2	5	6.2		0.21	5	ND	U	0.2	5	23		2.2	5	10		0.19	5	ND	U	1.2	5	0.82		0.039	1
Fluorene	86-73-7	NS	NS	mg/kg	ND	U	0.2	5	0.83	J	0.21	5	ND	U	0.2	5	7	J	2.2	5	1.3		0.19	5	ND	U	1.2	5	0.14	J	0.039	1
Naphthalene	91-20-3	NS	NS	mg/kg	0.39	J	0.2	5	1.1		0.21	5	ND	U	0.2	5	ND	U	2.2	5	0.51	J	0.19	5	ND	U	1.2	5	0.085	J	0.039	1
Phenanthrene	85-01-8	NS	NS	mg/kg	1.9		0.2	5	8.6		0.21	5	0.24	J	0.2	5	50		2.2	5	18		0.19	5	ND	U	1.2	5	1.3		0.039	1
Pyrene	129-00-0	NS	NS	mg/kg	3.1		0.2	5	10		0.21	5	ND	U	0.2	5	51		2.2	5	20		0.19	5	ND	U	1.2	5	1.3		0.039	1
Metals																																
Lead	7439-92-1	NS	NS	mg/kg	390		0.0627	10	540		0.132	20	11.6		0.012	2	415		0.068	10	65.1		0.0121	2	186		0.039	5	79.3		0.0123	2
General Chemistry																																
Moisture, Percent	MOIST	NS	NS	%	18.7		0.5	1	21.8		0.5	1	16.9		0.5	1	23.9		0.5	1	15		0.5	1	34		0.5	1	15.3		0.5	1

Notes:
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard

All soil samples collected and analyzed were unsaturated.

Qualifiers:
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

Exceedance Summary:
10 - Result exceeds the USEPA-PA Default Nonresidential Volatilization to Indoor Air
10 - Result Exceeds the USEPA-PA Defaults Nonresidential PELs Volatilization to Indoor Air Screen

Table 14
Summary of Soil Samples Screened for Protection of Indoor Air
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Chemical Name	CAS No	USEPA-PA Defaults Nonresidential Volatilization to Indoor Air Screening Limit	USEPA-PA Defaults Nonresidential PELs Volatilization to Indoor Air Screen Screening Limit	Location ID	BH-10-79				BH-10-80				W-1D				W-29				W-30				W-31			
				Sample ID	BH-10-79_0-2'				BH-10-80_0-2'				W-1D_0-2'				W-29_0-2'				W-30@0'-2'				W-31@0'-2'			
				Sample Date	4/21/2011				4/21/2011				4/5/2011				4/19/2011				4/15/2011				4/15/2011			
				Sample Matrix	Soil				Soil				Soil				Soil				Soil				Soil			
				Sample Interval	0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs				0-2 ft bgs			
				Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Volatile Organic Compounds																												
1,2,4-Trimethylbenzene	95-63-6	29	310	mg/kg	ND	U	0.0009	0.8	ND	U	0.001	0.81	ND	U	0.0009	0.8	ND	U	0.001	0.95	0.004	J	0.003	1.45	0.092	J	0.075	63.87
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.29	1000	mg/kg	ND	U	0.0009	0.8	ND	U	0.001	0.81	ND	U	0.0009	0.8	ND	U	0.001	0.95	ND	U	0.003	1.45	ND	U	0.075	63.87
1,2-Dichloroethane	107-06-2	0.83	8.3	mg/kg	ND	U	0.0009	0.8	ND	U	0.001	0.81	ND	U	0.0009	0.8	ND	U	0.001	0.95	ND	U	0.003	1.45	ND	U	0.075	63.87
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	6.4	87	mg/kg	ND	U	0.0009	0.8	ND	U	0.001	0.81	ND	U	0.0009	0.8	ND	U	0.001	0.95	0.003	J	0.003	1.45	0.086	J	0.075	63.87
Benzene	71-43-2	0.63	380	mg/kg	0.004	J	0.0005	0.8	0.009		0.0005	0.81	0.001	J	0.0005	0.8	0.004	J	0.0005	0.95	0.012	J	0.001	1.45	0.089	J	0.037	63.87
Dimethyl Benzene/ Xylenes, Total	1330-20-7	77	170	mg/kg	ND	U	0.0009	0.8	ND	U	0.001	0.81	ND	U	0.0009	0.8	0.001	J	0.001	0.95	ND	U	0.003	1.45	0.14	J	0.075	63.87
Ethylbenzene	100-41-4	9.5	110	mg/kg	ND	U	0.0009	0.8	ND	U	0.001	0.81	ND	U	0.0009	0.8	ND	U	0.001	0.95	ND	U	0.003	1.45	0.076	J	0.075	63.87
Isopropylbenzene (Cumene)	98-82-8	360	360	mg/kg	ND	U	0.0009	0.8	ND	U	0.001	0.81	ND	U	0.0009	0.8	ND	U	0.001	0.95	ND	U	0.003	1.45	0.4		0.075	63.87
Tert-Butyl Methyl Ether	1634-04-4	86	6400	mg/kg	ND	U	0.0005	0.8	ND	U	0.0005	0.81	ND	U	0.0005	0.8	ND	U	0.0005	0.95	ND	U	0.001	1.45	ND	U	0.037	63.87
Toluene	108-88-3	110	240	mg/kg	0.001	J	0.0009	0.8	0.001	J	0.001	0.81	ND	U	0.0009	0.8	0.006		0.001	0.95	0.004	J	0.003	1.45	0.094	J	0.075	63.87
Semi-Volatile Organic Compounds																												
Anthracene	120-12-7	NS	NS	mg/kg	ND	U	0.038	1	0.57		0.04	1	2.3		0.19	5	0.83		0.038	1	ND	U	0.057	1	0.49	J	0.39	10
Benzo(A)Anthracene	56-55-3	NS	NS	mg/kg	0.041	J	0.038	1	1.7		0.04	1	3.7		0.19	5	0.9		0.038	1	0.07	J	0.057	1	0.78	J	0.39	10
Benzo(A)Pyrene	50-32-8	NS	NS	mg/kg	0.046	J	0.038	1	1.4		0.04	1	2.7		0.19	5	0.84		0.038	1	ND	U	0.057	1	0.59	J	0.39	10
Benzo(B)Fluoranthene	205-99-2	NS	NS	mg/kg	0.046	J	0.038	1	1.9		0.04	1	3.7		0.19	5	0.97		0.038	1	ND	U	0.057	1	0.54	J	0.39	10
Benzo(G,H,I)Perylene	191-24-2	NS	NS	mg/kg	ND	U	0.038	1	0.79		0.04	1	1.4		0.19	5	0.76		0.038	1	ND	U	0.057	1	ND	U	0.39	10
Chrysene	218-01-9	NS	NS	mg/kg	ND	U	0.038	1	1.6		0.04	1	3.2		0.19	5	1.1		0.038	1	0.4		0.057	1	2.6		0.39	10
Fluorene	86-73-7	NS	NS	mg/kg	ND	U	0.038	1	0.15	J	0.04	1	1		0.19	5	0.14	J	0.038	1	ND	U	0.057	1	ND	U	0.39	10
Naphthalene	91-20-3	NS	NS	mg/kg	ND	U	0.038	1	0.18	J	0.04	1	0.42	J	0.19	5	1.3		0.038	1	0.11	J	0.057	1	ND	U	0.39	10
Phenanthrene	85-01-8	NS	NS	mg/kg	ND	U	0.038	1	1.9		0.04	1	7.9		0.19	5	1.4		0.038	1	0.35		0.057	1	0.51	J	0.39	10
Pyrene	129-00-0	NS	NS	mg/kg	0.042	J	0.038	1	2.9		0.04	1	6.9		0.19	5	1.5		0.038	1	0.28	J	0.057	1	2.2		0.39	10
Metals																												
Lead	7439-92-1	NS	NS	mg/kg	145		0.0292	5	234		0.0599	10	76.5		0.0116	2	259		0.0575	10	1990		0.431	50	955		0.152	25
General Chemistry																												
Moisture, Percent	MOIST	NS	NS	%	12.6		0.5	1	16.5		0.5	1	13.6		0.5	1	13.9		0.5	1	42		0.5	1	14.6		0.5	1

Notes:
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard

All soil samples collected and analyzed were unsaturated.

Qualifiers:
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

Exceedance Summary:
10 - Result exceeds the USEPA-PA Default Nonresidential Volatilization to Indoor Air
10 - Result Exceeds the USEPA-PA Defaults Nonresidential PELs Volatilization to Indoor Air Screen

Table 15
Summary of Groundwater Analytical Results Screened for Protection of Indoor Air
April 2011
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

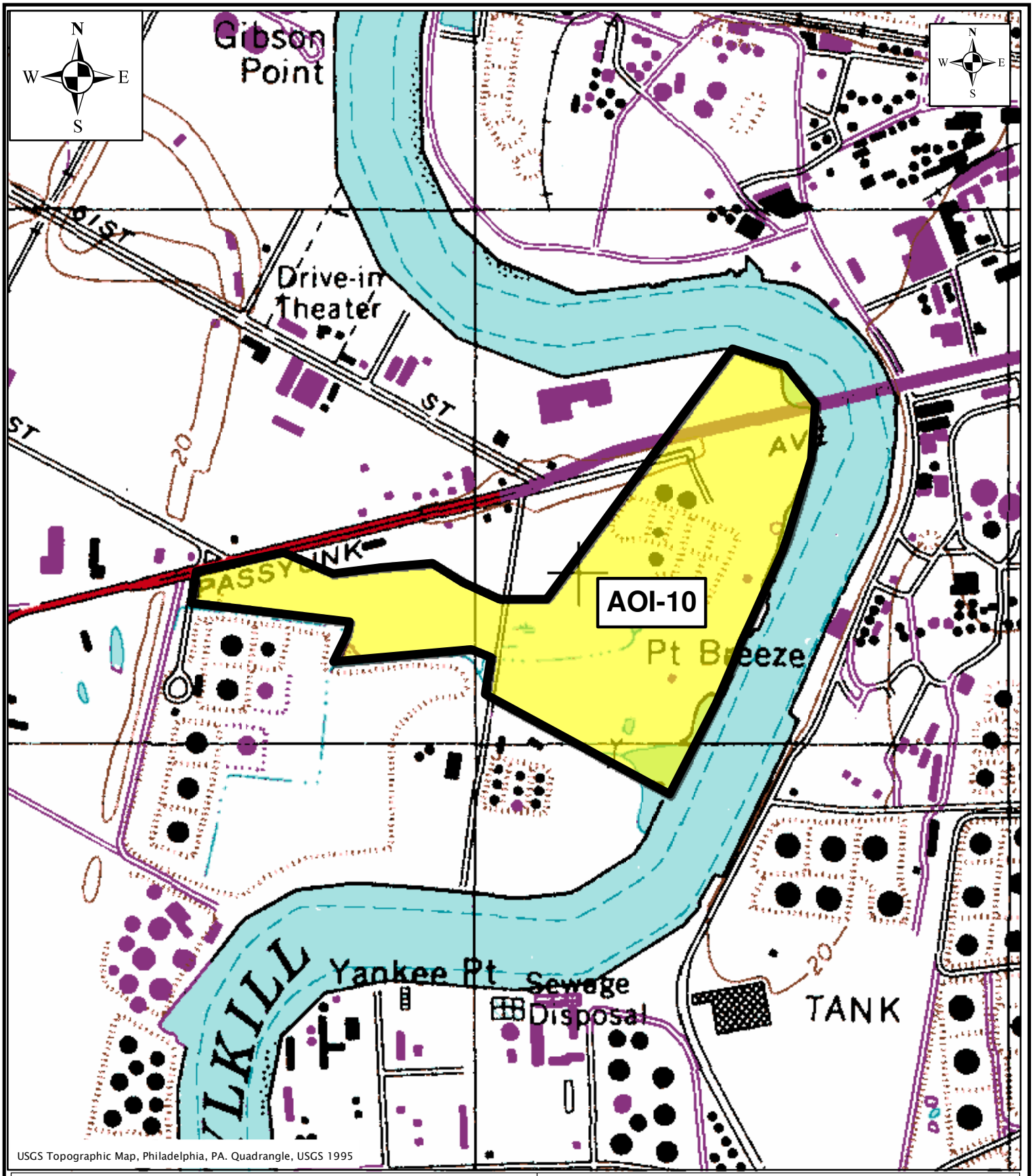
Chemical Name	CAS No	USEPA-PA Defaults NonResidential Volatilization to Indoor Air Screening Limit	Location	W-1				W-1D				W-2				W-25				W-26				W-27				W-29			
			Sample ID	W-1_04272011				W-1D_04262011				W-2_04262011				W-25_04262011				W-26_04262011				W-27_04262011				W-29_04262011			
			Sample Date	4/27/2011				4/26/2011				4/26/2011				4/26/2011				4/26/2011				4/26/2011				4/26/2011			
			Sample Matrix	Groundwater				Groundwater				Groundwater				Groundwater				Groundwater				Groundwater				Groundwater			
			Unit	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF	Result	Q	RL	DF
Volatile Organic Compounds																															
1,2,4-Trimethylbenzene	95-63-6	12000	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	1000	ug/l	ND	U	0.0095	1	ND	U	0.0095	1	ND	U	0.0095	1	ND	U	0.0094	1	ND	U	0.0095	1	ND	U	0.0095	1	ND	U	0.0094	1
1,2-Dichloroethane	107-06-2	4600	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	10000	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1
Benzene	71-43-2	5900	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1
Ethylbenzene	100-41-4	45000	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1
Isopropylbenzene (Cumene)	98-82-8	NS	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1
Tert-Butyl Methyl Ether	1634-04-4	640000	ug/l	2		0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	0.6	J	0.5	1	ND	U	0.5	1	0.6	J	0.5	1
Toluene	108-88-3	NS	ug/l	ND	U	0.5	1	0.8	J	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1
Xylenes (Total)	1330-20-7	NS	ug/l	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1	ND	U	0.5	1
Semi Volatile Organic Compounds																															
Chrysene	218-01-9	NS	ug/l	20		1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	0.9	1
Fluorene	86-73-7	NS	ug/l	13		1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	1	J	0.9	1
Naphthalene	91-20-3	NS	ug/l	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	0.9	1
Phenanthrene	85-01-8	NS	ug/l	13		1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	2	J	0.9	1
Pyrene	129-00-0	NS	ug/l	37		1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	1	1	ND	U	0.9	1
Metals																															
Lead (Dissolved)	7439-92-1	NS	ug/l	ND	U	0.052	1	ND	U	0.052	1	ND	U	0.052	1	ND	U	0.052	1	ND	U	0.052	1	0.11	J	0.052	1	ND	U	0.052	1

Notes:
DF - Dilution Factor
PADEP - Pennsylvania Department of Environmental Protection
ug/l - Micrograms per liter
MSC - PADEP's Medium Specific Concentration for Impact to Groundwater
RL - Reporting limit (limit of quantitation)
ND - Not detected

Qualifiers:
Q - Qualifier
U - Analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

Exceedance Summary:
10 - Result exceeds the PADEP Non-Residential Indoor Air Standard

FIGURES



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

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

Figure 1: Site Location Map
AOI-10 Site Characterization Report/
Remedial Investigation Report
Philadelphia Sunoco Philadelphia Refinery Pennsylvania

Job Number	Scale: 1" = 800'	Date
2574601	0 400 800 Feet	June 13, 2011

\\langan.com\data\DT\data6\2574601\ArcGIS\MapDocuments\AOI 10 SCR\Figure 1- Site Location Map - AOI10.mxd



N
W E
S

Legend

Area of Interest Boundary (AOI)

Notes:
1. Bings Maps aerial imagery provided by © 2010 Microsoft Corporation and its data suppliers and obtained under the licensing agreement with ESRI.

Figure 2 - Site Plan
AOI-10 Site Characterization/
Remedial Investigation Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

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

0 75 150 300
Feet

SCALE: 1" = 150'
DATE: June 2, 2011
DRN. BY: MH
CKD. BY: DW
JOB#: 2574601

Path: \\langan.com\data\DT\data6\2574601\ArcGIS\MapDocuments\AOI 10 SCR\Figure 2 - Site Plan_6-2-11.mxd



Legend

- BH-10-86 — Shallow Soil Boring and Sample Location (0-2 ft.)
- BH-10-83 — Deep Soil Boring With No Waste and Shallow Soil Sample Location (0-2 ft.)
- BH-10-52-WC — CAMU Soil Boring With Waste and Vertical Delineation Soil Samples
- SWS-1 — Surface Water Sample Location
- SED-1 — Sediment Sample Location
- W-32 — New Shallow Groundwater Monitoring Well with Shallow Soil Sample
- W-1D — New Intermediate Groundwater Monitoring Well with Shallow Soil Sample
- W-18 — Intermediate Monitoring Well Location
- W-1 — Shallow Monitoring Well Location
- W-7 — Damaged/Abandoned/Unable to Locate Monitoring Well Location
- Past Disposal Area (PDA) - Corrective Action Management Unit (CAMU)
- Area of Interest Boundary (AOI)

Notes:
1. Bings Maps aerial imagery provided by © 2010 Microsoft Corporation and its data suppliers and obtained under the licensing agreement with ESRI.
2. Past disposal area digitzed from ENSR Figure 9 - Deep Aquifer Piezometric Map dated April 17, 1992. PDA boundaries updated based on 2011 delineation borings.

Figure 3 - Completed Activities
AOI-10 Site Characterization/
Remedial Investigation Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

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

0 75 150 300 Feet

SCALE: 1" = 150'
DATE: May 5, 2011
DRN. BY: MH
CKD. BY: DW
JOB# 2574601

Path: \\langan.com\data\DT\data6\2574601\ArcGIS\MapDocuments\AOI 10 SCR\Figure 3 - Completed Activities Plan_rev5-27-11.mxd



KEY MAP N.T.S.

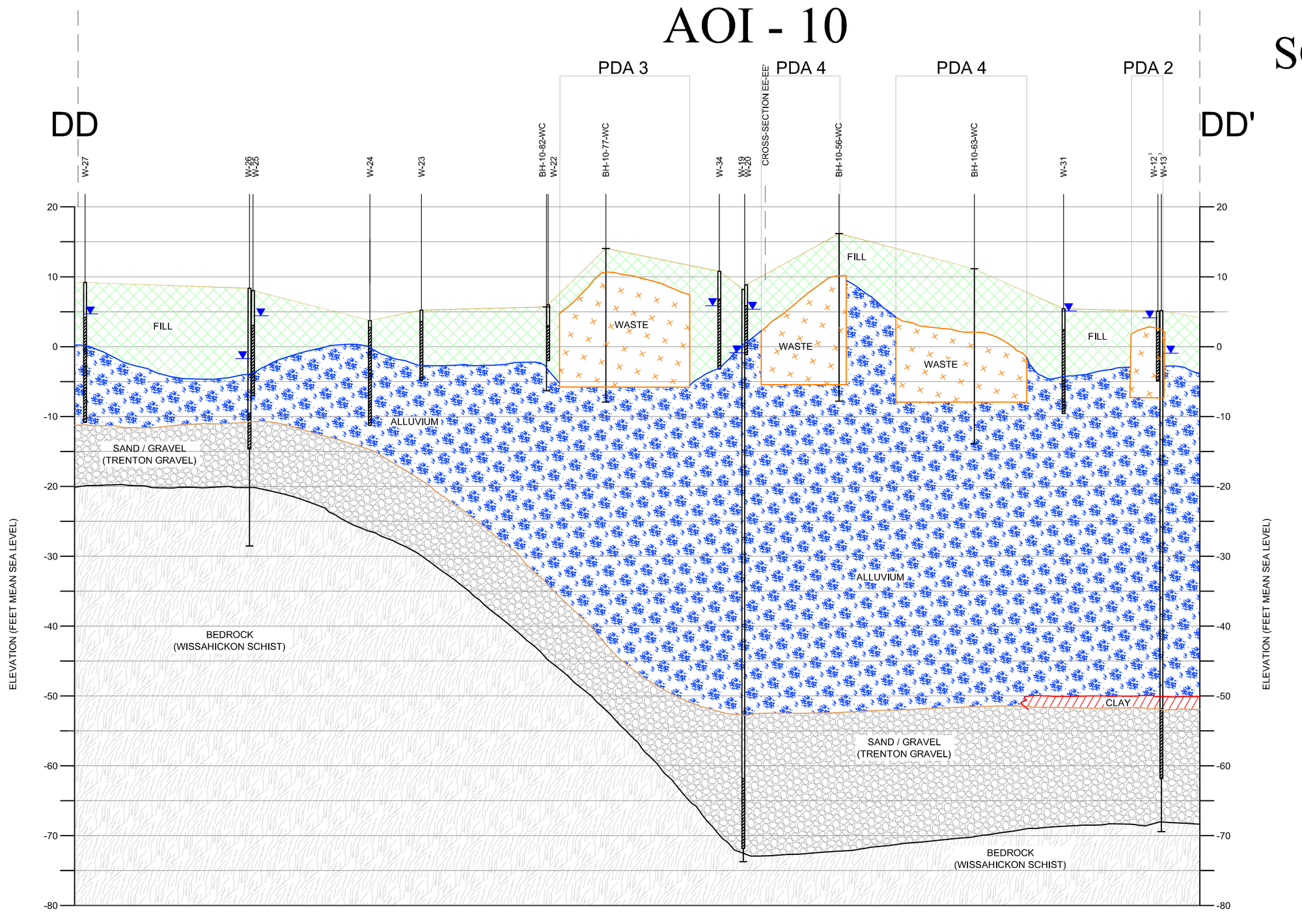
NOTES:

1. LITHOLOGY BASED ON INTERPOLATION FROM AVAILABLE NEW AND HISTORIC WELL / SOIL BORING LOGS.
2. GROUNDWATER ELEVATIONS COLLECTED IN APRIL 2011.
3. WELLS W-12 AND W-13 ARE NOT LOCATED WITHIN PDA2. THESE WELLS WERE PROJECTED ONTO CROSS-SECTION FOR LITHOLOGY PURPOSES.
4. PAST DISPOSAL AREAS (PDA) WERE APPROXIMATED FROM FIELD DELINEATION SOIL BORINGS AND ENSR'S FIGURE 9 DEEP AQUIFER PIEZOMETRIC MAP DATED APRIL 17, 1992.

LEGEND:

- FILL
- WASTE
- ALLUVIUM
- SAND / GRAVEL (TRENTON GRAVEL)
- CLAY
- BEDROCK (WISSAHICKON SCHIST)
- W-7 LOCATION ID
- WELL CASING/BOREHOLE
- WELL SCREEN
- BOTTOM OF BOREHOLE
- GROUNDWATER LEVEL
- SOIL BORING

AOI - 10



SCHUYLKILL RIVER

10 0 2 4 10
VERTICAL SCALE IN FEET

200 0 100 200
HORIZONTAL SCALE IN FEET

SUNOCO	Project: SUNOCO PHILADELPHIA REFINERY PHILADELPHIA COUNTY PENNSYLVANIA	Drawing Title: GEOLOGIC CROSS SECTION DD-DD'	Project No. 2574601 Date 6/1/2011 Scale 1" = 200' HOR. 1" = 10' VER. Drn. By JEM Last Revised X	Figure No. 4A Of

Filename: \\langan.com\data\DT\data6\2574601\Cadd Data - 2574601\Dwg\Geologic Cross-Sections\AOI 10\Cross-Section DD-DD'.dwg Date: 6/21/2011 Time: 16:25 User: tyates Style Table: Langan.stb Layout: 5A

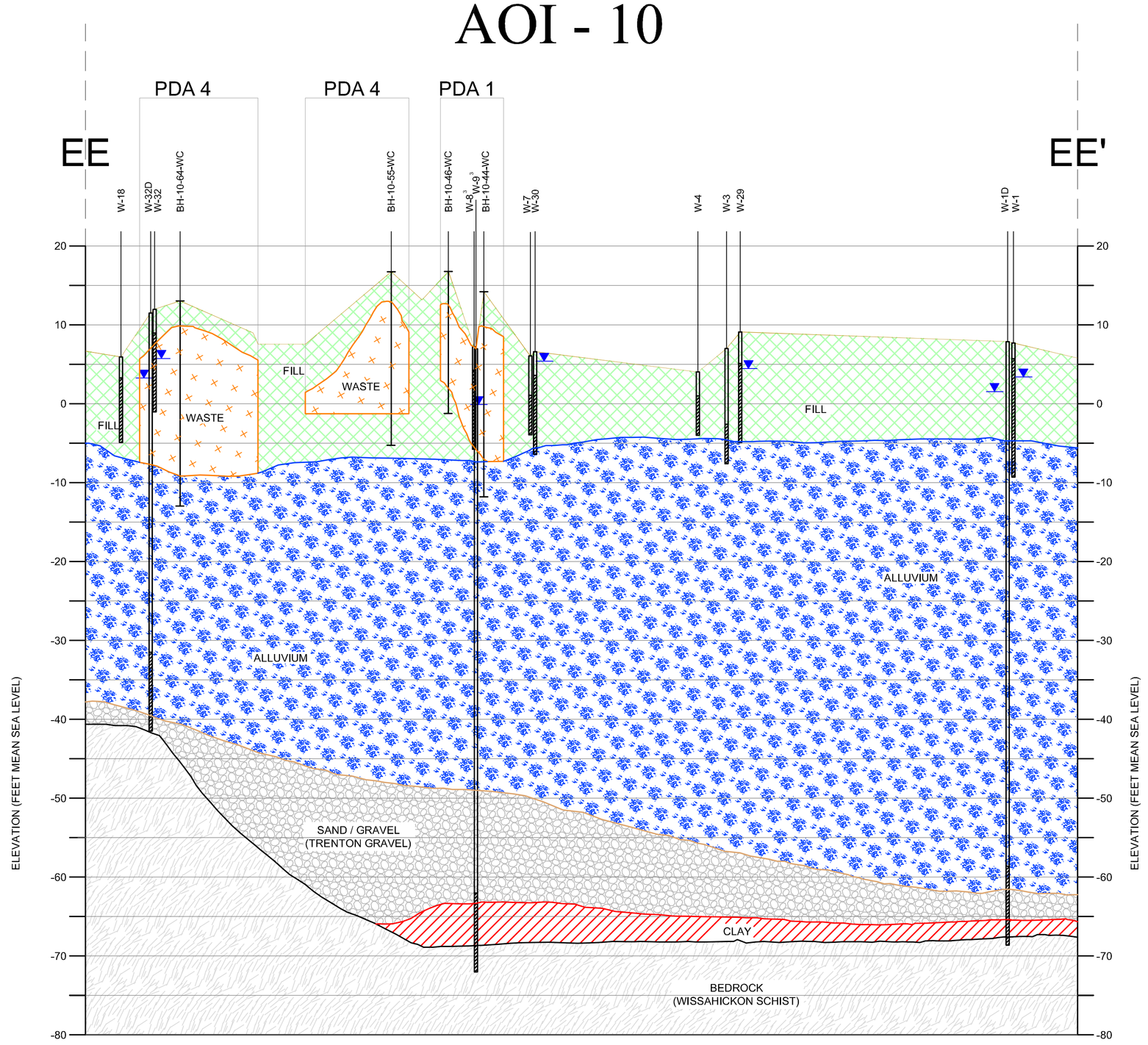


KEY MAP N.T.S.

NOTES:
1. LITHOLOGY BASED ON INTERPOLATION FROM AVAILABLE NEW AND HISTORIC WELL / SOIL BORING LOGS.
2. GROUNDWATER ELEVATIONS COLLECTED IN APRIL 2011.
3. WELLS W-8 AND W-8 ARE NOT LOCATED WITHIN PDA1. THESE WELLS WERE PROJECTED ONTO CROSS-SECTION FOR LITHOLOGY PURPOSES.
4. PAST DISPOSAL AREAS (PDA) WERE APPROXIMATED FROM FIELD DELINEATION SOIL BORINGS AND ENSR'S FIGURE 9 DEEP AQUIFER PIEZOMETRIC MAP DATED APRIL 17, 1992.

LEGEND:
- FILL
- WASTE
- ALLUVIUM
- SAND / GRAVEL (TRENTON GRAVEL)
- CLAY
- BEDROCK (WISSAHICKON SCHIST)
- W-7 LOCATION ID
- WELL CASING/BOREHOLE
- WELL SCREEN
- BOTTOM OF BOREHOLE
- GROUNDWATER LEVEL
- SOIL BORING

AOI - 10



SCHUYLKILL RIVER

10 0 2 4 10
VERTICAL SCALE IN FEET

200 0 100 200
HORIZONTAL SCALE IN FEET

SUNOCO	Project: SUNOCO PHILADELPHIA REFINERY PHILADELPHIA COUNTY PENNSYLVANIA	Drawing Title: GEOLOGIC CROSS SECTION EE-EE'	Project No. 2574601 Date 6/1/2011 Scale 1" = 200' HOR. 1" = 10' VER. Drn. By JEM Last Revised X
			Figure No. 4B Of

Filename: \\langan.com\data\DT\data6\2574601\Cadd Data - 2574601\Dwg\Geologic Cross-Sections\AOI 10\Cross-Section EE-EE".dwg Date: 6/21/2011 Time: 16:28 User: tyates Style Table: Langan.stb Layout: 5B



N

W E

S

Legend

- W-1 3.39 — Shallow Monitoring Well Location
- W-21 NA — Abandoned/Unable to Locate
- W-18 NA — Shallow Monitoring Well With LNAPL
- Shallow Groundwater Contours
- Inferred Shallow Groundwater Contours
- Area of Interest Boundary (AOI)

Notes:
1. Bings Maps aerial imagery provided by © 2010 Microsoft Corporation and its data suppliers and obtained under the licensing agreement with ESRI.

Figure 5 - Shallow Groundwater Elevation Contour Plan
AOI-10 Site Characterization/ Remedial Investigation Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

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

0 75 150 300 Feet

SCALE: 1" = 150'
DATE: June 2, 2011
DRN. BY: MH
CKD. BY: DW
JOB#: 2574601

Path: \\langan.com\data\DT\data\i\2574601\ArcGIS\MapDocuments\AOI 10 SCR\Figure 5 - Shallow GW Contours_6-2-11.mxd



N
W E
S

Legend

- W-19 -0.81 — Intermediate Monitoring Well Location
- Intermediate Groundwater Contours
- Inferred Intermediate Groundwater Contours
- Area of Interest Boundary (AOI)

Notes:
1. Bings Maps aerial imagery provided by © 2010 Microsoft Corporation and its data suppliers and obtained under the licensing agreement with ESRI.

Figure 6 - Intermediate Groundwater Elevation Contour Plan
AOI-10 Site Characterization/
Remedial Investigation Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

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

0 75 150 300
Feet

SCALE: 1" = 150'
DATE: June 2, 2011
DRN. BY: MH
CKD. BY: DW
JOB#: 2574601

Path: \\langan.com\data\DT-data\E\2574601\ArcGIS\MapDocuments\AOI 10 SCR\Figure 6 - Intermediate GW Contours_6-2-11.mxd



N
W E
S

Legend

- New Shallow Soil Boring Location with Exceedance of PADEP Non-Res Soil MSCs
- New Deep Soil Boring With No Waste and Shallow Soil Sample With Exceedance of PADEP Non-Res Soil MSCs
- New Shallow Soil Boring Location With No Exceedance of PADEP Non-Res Soil MSCs
- New Deep Soil Boring With No Waste and Shallow Soil Sample With No Exceedance of PADEP Non-Res Soil MSCs
- New Monitoring Well Location with Shallow Soil Sample Exceeding PADEP Non-Res Soil MSCs
- New Monitoring Well Location with Shallow Soil Sample Not Exceeding PADEP Non-Res Soil MSCs
- New Monitoring Well Location With No Shallow Soil Sample Collected
- Existing Monitoring Point
- Damaged/Abandoned/Unable to Locate
- Lead Exceedance of Site Specific Standard (1,708 mg/kg)
- Past Disposal Area (PDA) - Corrective Action Management Unit (CAMU)
- Area of Interest Boundary (AOI)

PADEP Non-Res Unsaturated Soil MSC

Benzene = 0.5 mg/kg
Benzo(A)Pyrene = 11 mg/kg
Lead = 450 mg/kg
Arsenic = 29 mg/kg
Manganese = 2,000 mg/kg
PCE = 0.5 mg/kg

Notes:
1. Bings Maps aerial imagery provided by © 2010 Microsoft Corporation and its data suppliers and obtained under the licensing agreement with ESRI.
2. Past disposal area digitzed from ENSR Figure 9 - Deep Aquifer Piezometric Map dated April 17, 1992. PDA boundaries updated based on 2011 delineation borings.
3. Soil samples collected in April 2011 by Aquaterra.

Figure 7 - Summary of Soil Sample Exceedances: Non CAMU Areas
AOI-10 Site Characterization/ Remedial Investigation Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

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

0 75 150 300 Feet

SCALE: 1" = 150'
DATE: June 2, 2011
DRN. BY: MH
CKD. BY: DW
JOB# 2574601

P:\antea\gis\gdb\projects\Sunoco\Philadelphia\Refinery\AOI 10\MXD\Figure 7 - Summary of Soil Sample Exceedances Non CAMU_6-17-11.mxd



	PADEP Non-Res Unsaturated Soil MSC (mg/kg)	PADEP Non-Res Saturated Soil MSC (mg/kg)	BH-10-55-WC		
			0-2'	5-8'	20-22'
SVOCs					
Benzo(A)Pyrene	11	4.6	0.82	ND	6
Napthalene	25	10	0.56	2.5	27
Metals					
Arsenic	29	2.9	17.1	12.7	12.3
Cobalt	140	14	7.77	6.24	17.9
Lead	450	45	953	316	304
Manganese	2000	200	479	617	369
Thallium	14	1.4	5.11	3.3	ND

	PADEP Non-Res Unsaturated Soil MSC (mg/kg)	PADEP Non-Res Saturated Soil MSC (mg/kg)	BH-10-56-WC		
			0-2'	10-12'	22-24'
VOCs					
Benzene	0.5	0.5	0.016	11	0.16
Methylene Chloride	0.5	0.5	ND	0.5	ND
PCE	0.5	0.5	0.002	0.52	ND
SVOCs					
Napthalene	25	10	0.45	7.1	34
Metals					
Arsenic	29	2.9	9.44	13.5	18
Cobalt	140	14	6.74	9.6	19.7
Lead	450	45	86.4	676	316
Manganese	2000	200	242	675	424
Mercury	10	1	0.153	1.88	0.906
Nickel	650	65	23.5	67.7	35.6
Thallium	14	1.4	3.51	6.02	ND

	PADEP Non-Res Unsaturated Soil MSC (mg/kg)	PADEP Non-Res Saturated Soil MSC (mg/kg)	BH-10-45-WC		
			0-2'	5-8'	18-20'
VOCs					
Benzene	0.5	0.5	0.019	0.89	1.2
SVOCs					
Napthalene	25	10	ND	27	9
Metals					
Arsenic	29	2.9	6.94	10.7	6.88
Lead	450	45	96.7	307	159
Manganese	2000	200	396	434	449
Thallium	14	1.4	ND	4.31	3.53

	PADEP Non-Res Unsaturated Soil MSC (mg/kg)	PADEP Non-Res Saturated Soil MSC (mg/kg)	BH-10-44-WC		
			0-2'	10-12'	24-26'
VOCs					
Benzene	0.5	0.5	0.033	8.1	0.098
Ethylbenzene	70	70	0.14	76	0.26
Toulene	100	100	0.3	140	0.8
SVOCs					
2-Methylnaphthalene	1600	160	2.1	1500	21
Benzo(A)Pyrene	11	4.6	0.18	ND	9
Dibenzofuran	260	26	ND	57	7.5
Napthalene	25	10	0.88	410	41
Metals					
Antimony	27	2.7	ND	4.02	ND
Arsenic	29	2.9	6.77	21.9	17.6
Cobalt	140	14	11.7	10.2	20.2
Lead	450	45	22.3	640	283
Manganese	2000	200	2040	937	460
Mercury	10	1	0.0693	1.07	0.752

	PADEP Non-Res Unsaturated Soil MSC (mg/kg)	PADEP Non-Res Saturated Soil MSC (mg/kg)	BH-10-77-WC			
			0-2'	6-7'	10-12'	20-22'
VOCs						
Benzene	0.5	0.5	0.002	0.12	2.4	ND
Metals						
Arsenic	29	2.9	12.2	2.14	10.9	29.8
Barium	8200	820	128	62.9	1020	62.9
Lead	450	45	225	131	208	259
Manganese	2000	200	214	33.5	399	259
Mercury	10	1	0.414	0.264	24.4	0.422

	PADEP Non-Res Unsaturated Soil MSC (mg/kg)	PADEP Non-Res Saturated Soil MSC (mg/kg)	BH-10-64-WC		
			0-2'	11-13'	24-26'
VOCs					
Benzene	0.5	0.5	0.15	19	0.03
1,2 Dichloroethane	0.5	0.5	ND	9.3	ND
SVOCs					
Benzo(A)Pyrene	11	4.6	120	2.8	ND
Dibenzo(A,H)Anthracene	11	16	73	0.64	ND
Metals					
Arsenic	29	2.9	10.1	11	7.7
Lead	450	45	229	330	17.4
Manganese	2000	200	413	153	407

	PADEP Non-Res Unsaturated Soil MSC (mg/kg)	PADEP Non-Res Saturated Soil MSC (mg/kg)	BH-10-46-WC		
			0-2'	5-8'	17-18'
VOCs					
Benzene	0.5	0.5	0.012	1.1	0.058
SVOCs					
Benzo(A)Pyrene	11	4.6	ND	7.3	0.21
Napthalene	25	10	ND	16	1.3
Metals					
Arsenic	29	2.9	8.36	6.14	57.3
Barium	8200	820	103	116	1180
Cobalt	140	14	11.8	1.01	13.3
Lead	450	45	48.5	79.6	1400
Manganese	2000	200	861	110	1030
Mercury	10	1	0.054	0.0629	0.0304
Nickel	650	65	27.3	9.31	221

	PADEP Non-Res Unsaturated Soil MSC (mg/kg)	PADEP Non-Res Saturated Soil MSC (mg/kg)	BH-10-63-WC		
			0-2'	12-14'	21-23'
VOCs					
Benzene	0.5	0.5	0.006	1.9	0.51
Metals					
Arsenic	29	2.9	6.21	12	8.88
Lead	450	45	25.2	161	115
Manganese	2000	200	302	707	387
Mercury	10	1	0.072	0.67	2.36
Nickel	650	65	14.4	35	67.4
Thallium	14	1.4	ND	1.84	ND

	PADEP Non-Res Unsaturated Soil MSC (mg/kg)	PADEP Non-Res Saturated Soil MSC (mg/kg)	BH-10-69-WC		
			0-2'	5-8'	15-16'
VOCs					
Benzene	0.5	0.5	0.004	0.9	0.12
SVOCs					
Benzo(A)Pyrene	11	4.6	ND	ND	11
Napthalene	25	10	0.055	7.3	52
Metals					
Arsenic	29	2.9	7.9	7.18	21.7
Barium	8200	820	80.8	157	308
Cobalt	140	14	10.9	1.28	22
Lead	450	45	21.2	98.2	417
Manganese	2000	200	804	32.1	533
Mercury	10	1	0.0447	0.101	1.03

	PADEP Non-Res Unsaturated Soil MSC (mg/kg)	PADEP Non-Res Saturated Soil MSC (mg/kg)	BH-10-70-WC		
			0-2'	5-8'	15-16'
Metals					
Arsenic	29	2.9	6.26	ND	3.96
Manganese	2000	200	798	2.23	405

	PADEP Non-Res Unsaturated Soil MSC (mg/kg)	PADEP Non-Res Saturated Soil MSC (mg/kg)	BH-10-65-WC		
			0-2'	6-8'	14-16'
VOCs					
Benzene	0.5	0.5	0.033	35	0.002
SVOCs					
2-Methylnaphthalene	1600	160	0.41	280	0.16
Benzo(A)Pyrene	11	4.6	ND	5.7	ND
Napthalene	25	10	ND	110	0.063
Metals					
Antimony	27	2.7	ND	4.55	ND
Arsenic	29	2.9	8.71	28.3	6.82
Cobalt	140	14	5.34	27.7	12
Lead	450	45	307	1500	291
Manganese	2000	200	382	639	352
Mercury	10	1	0.648	1.29	0.0844
Nickel	650	65	24.1	332	29.7
Thallium	14	1.4	ND	2.32	ND
Zinc	12000	1200	181	2550	91.9

N

W E

S

Legend

- New CAMU Soil Boring Location With Exceedances of PADEP Non-Res Soil MSCs
- 937 Exceeds PADEP Non-Res Soil MSC
- Past Disposal Area (PDA) - Corrective Action Management Unit (CAMU)
- Area of Interest Boundary (AOI)

	PADEP Non-Res Unsaturated Soil MSC (mg/kg)	PADEP Non-Res Saturated Soil MSC (mg/kg)
VOCs		
Benzene	0.5	0.5
1,2 Dichloroethane	0.5	0.5
Ethylbenzene	70	70
Methylene Chloride	0.5	0.5
PCE	0.5	0.5
Toulene	100	100
SVOCs		
2-Methylnaphthalene	1600	160
Benzo(A)Pyrene	11	4.6
Dibenzofuran	260	26
Dibenzo(A,H)Anthracene	11	16
Napthalene	25	10
Metals		
Antimony	27	2.7
Arsenic	29	2.9
Barium	8200	820
Cobalt	140	14
Lead	450	45
Manganese	2000	200
Mercury	10	1
Nickel	650	65
Thallium	14	1.4
Zinc	12000	1200

Notes:
1. Bings Maps aerial imagery provided by © 2010 Microsoft Corporation and its data suppliers and obtained under the licensing agreement with ESRI.
2. Past disposal area digitzed from ENSR Figure 9 - Deep Aquifer Piezometric Map dated April 17, 1992. PDA boundaries updated based on 2011 delineation borings.
3. Soil samples collected in April 2011 by Aquaterra.

Figure 8 - Summary of Soil Sample Exceedances: CAMU Area
AOI-10 Site Characterization/ Remedial Investigation Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

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

0 75 150 300
Feet

SCALE: 1" = 150'
DATE: June 2, 2011
DRN. BY: MH
CKD. BY: DW
JOB#: 2574601

P:\mrdangan.com\data\DT\data\2574601\ArcGIS\MapDocuments\AOI 10 SCR\Figure 8 - Summary of Soil Sample Exceedances CAMU_6-22-11.mxd

N

W E

S

SS-1
SS-2
SS-3
SS-4
SS-5
SS-6
SS-7
SS-8
SS-9
SS-10

SCHUYLKILL RIVER

PDA 3
PDA 4
PDA 1
PDA 4
PDA 2
PDA 2

AOI -10

Legend

- Post Excavation Soil Sample Location With No Exceedances of PADEP Unsaturated Soil MSCs
- Past Disposal Area (PDA) - Corrective Action Management Unit (CAMU)
- Area of Interest Boundary (AOI)

Notes:

1. Bings Maps aerial imagery provided by © 2010 Microsoft Corporation and its data suppliers and obtained under the licensing agreement with ESRI.
2. Past disposal area digitzed from ENSR Figure 9 - Deep Aquifer Piezometric Map dated April 17, 1992. PDA boundaries updated based on 2011 delineation borings.
3. Soil samples were collected by Stantec in May 2010.
4. Post excavation soil samples were collected from unsaturated soil.

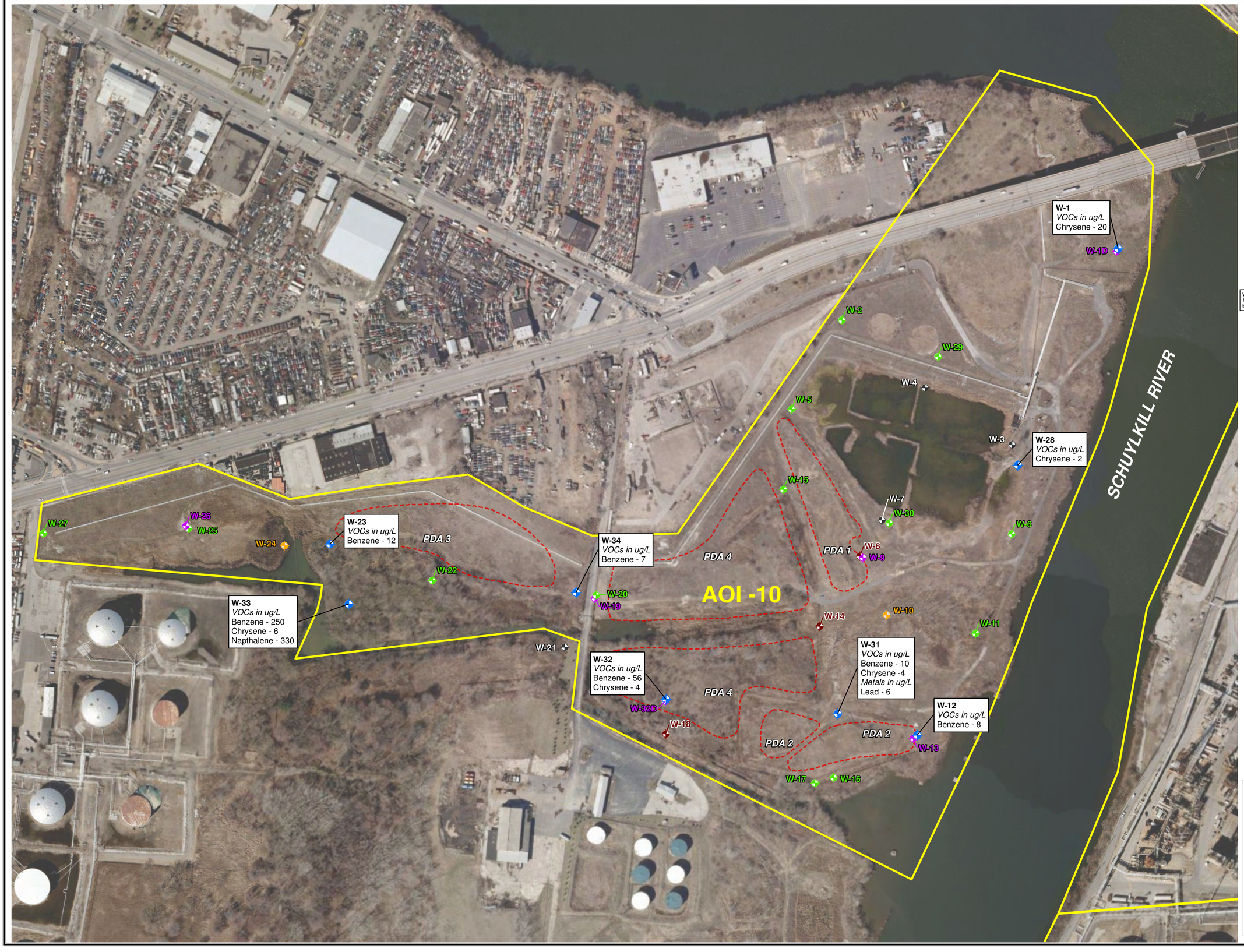
Figure 9 - VGO Release Area Post Excavation Soil Sample Results
AOI-10 Site Characterization/ Remedial Investigation Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

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

0 75 150 300
Feet

SCALE: 1" = 150'
DATE: May 5, 2011
DRN. BY: MH
CKD. BY: DW
JOB#: 2574601

N:\langan.com\data\DT\data6\2574601\ArcGIS\MapDocuments\AOI 10 SCR\Figure 9 - VGO Release Area Post Ex Soil Samples_6-13-11.mxd



N
W E
S

Legend

- W-1 VOCs in ug/L Benzene - 20 — Shallow Monitoring Well with Exceedance of PADEP Non-Res Groundwater MSCs
- W-8 — Shallow Monitoring Well with LNAPL Occurence
- W-11 — Shallow Monitoring Well with No Exceedance of PADEP Non-Res Groundwater MSCs
- W-1D — Intermediate Monitoring Well with No Exceedance of PADEP Non-Res Groundwater MSCs
- W-6 — Monitoring Point Not Sampled
- W-21 — Abandoned/Unable to Locate
- Past Disposal Area (PDA) - Corrective Action Management Unit (CAMU)
- Area of Interest Boundary (AOI)

PADEP Non-Res Used Aquifer MSC for Groundwater

Benzene = 5 ug/L
Chrysene = 1.9 ug/L
Naphthalene = 100 ug/L
Lead = 5 ug/L

Notes:
1. Bings Maps aerial imagery provided by © 2010 Microsoft Corporation and its data suppliers and obtained under the licensing agreement with ESRI.
2. Past disposal area digitzed from ENSR Figure 9 - Deep Aquifer Piezometric Map dated April 17, 1992. PDA boundaries updated based on 2011 delineation boring.
3. Groundwater samples collected in April 2011 by Aquaterra.

Figure 10 - Summary of Groundwater Sample Exceedances
AOI-10 Site Characterization/ Remedial Investigation Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

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

0 75 150 300 Feet

SCALE: 1" = 150'
DATE: June 2, 2011
DRN. BY: MH
CKD. BY: DW
JOB#: 2574601

Path: \\langan.com\data\DT\data6\2574601\ArcGIS\MapDocuments\AOI 10 SCR\Figure 10 - Summary of GW Sample Exceedances_6-22-11.mxd

Chemical Name	CAS No	SEL [or equivalent] Ecological Screening Criteria (mg/kg)		LEL [or equivalent] Ecological Screening Criteria (mg/kg)		PADEP's Residential Soil MSC: 0-15 ft bgs	SED-1 (results in mg/kg)
SVOCs							
Anthracene	120-12-7	0.37	a	0.22	c	35.00	**0.66**
Benzo(G,H,I)Perylene	191-24-2	0.32	a	0.17	c	18.00	**0.64**
Chrysene	218-01-9	0.46	a	0.34	c	23.00	**0.89**
Phenanthrene	85-01-8	0.16	a	0.56	c	1000.00	**2.3**
Pyrene	129-00-0	0.85	a	0.49	c	220.00	**1.2**
Metals							
Arsenic	7440-38-2	33	b	6.00	c	2.90	**24**
Cadmium	7440-43-9	10	b	0.60	c	3.80	**2.22**
Chromium, Total	7440-47-3	110	b	26.00	c	NS	**89.7**
Copper	7440-50-8	110	b	16.00	c	4300.00	**573**
Iron	7439-89-6	40000	b	20000.00	c	150000.00	**44500**
Lead	7439-92-1	250	b	31.00	c	45.00	**3610**
Manganese	7439-96-5	1100	b	460.00	c	200.00	**461**
Mercury	7439-97-6	2	a	0.20	c	1.00	**3.59**
Nickel	7440-02-0	75	b	16.00	c	65.00	**45.6**
Selenium	7782-49-2	NS		NS		5.00	5.3
Silver	7440-22-4	NS		1.00	d	10.00	**2.96**
Zinc	7440-66-6	820	b	120.00	c	1200.00	**503**
General Chemistry							
Total Organic Carbon	TOC	100000	b	10000	c	NS	**302000**

Chemical Name	CAS No	SEL [or equivalent] Ecological Screening Criteria (mg/kg)		LEL [or equivalent] Ecological Screening Criteria (mg/kg)		PADEP's Residential Soil MSC: 0-15 ft bgs	SED-3 (results in mg/kg)
SVOCs							
Benzo(A)Anthracene	56-55-3	0.80364	a	0.32	c	2.50	**0.6**
Benzo(G,H,I)Perylene	191-24-2	0.17376	a	0.17	c	18.00	**0.19**
Chrysene	218-01-9	0.24978	a	0.34	c	23.00	**1.1**
Phenanthrene	85-01-8	0.08688	a	0.56	c	1000.00	0.43
Pyrene	129-00-0	0.46155	a	0.49	c	220.00	**1.6**
Metals							
Arsenic	7440-38-2	33	b	6.00	c	2.90	**7.48**
Cadmium	7440-43-9	10	b	0.60	c	3.80	**1.58**
Chromium, Total	7440-47-3	110	b	26.00	c	NS	**45.2**
Cobalt	7440-48-4	NS		50.00	e	5.00	8.29
Copper	7440-50-8	110	b	16.00	c	4300.00	**111**
Lead	7439-92-1	250	b	31.00	c	45.00	**328**
Manganese	7439-96-5	1100	b	460.00	c	200.00	236
Mercury	7439-97-6	2	a	0.20	c	1.00	**0.604**
Nickel	7440-02-0	75	b	16.00	c	65.00	**31.3**
Zinc	7440-66-6	820	b	120.00	c	1200.00	**503**
General Chemistry							
Total Organic Carbon	TOC	100000	b	10000	c	NS	**55900**

Chemical Name	CAS No	SEL [or equivalent] Ecological Screening Criteria (mg/kg)		LEL [or equivalent] Ecological Screening Criteria (mg/kg)		PADEP's Residential Soil MSC: 0-15 ft bgs	SED-4 (results in mg/kg)
SVOCs							
Benzo(A)Anthracene	56-55-3	0.80364	a	0.32	c	2.50	**0.38**
Benzo(G,H,I)Perylene	191-24-2	0.17376	a	0.17	c	18.00	**0.21**
Chrysene	218-01-9	0.24978	a	0.34	c	23.00	**0.44**
Naphthalene	91-20-3	NS		0.16	d	10.00	**0.53**
Phenanthrene	85-01-8	0.08688	a	0.56	c	1000.00	0.53
Pyrene	129-00-0	0.46155	a	0.49	c	220.00	**0.63**
Metals							
Arsenic	7440-38-2	33	b	6.00	c	2.90	**21.9**
Cadmium	7440-43-9	10	b	0.60	c	3.80	**1.26**
Chromium, Total	7440-47-3	110	b	26.00	c	NS	**64.7**
Cobalt	7440-48-4	NS		50.00	e	5.00	7.98
Copper	7440-50-8	110	b	16.00	c	4300.00	**74.4**
Lead	7439-92-1	250	b	31.00	c	45.00	**306**
Manganese	7439-96-5	1100	b	460.00	c	200.00	375
Mercury	7439-97-6	2	a	0.20	c	1.00	**0.288**
Nickel	7440-02-0	75	b	16.00	c	65.00	**85.6**
Zinc	7440-66-6	820	b	120.00	c	1200.00	**1710**
General Chemistry							
Total Organic Carbon	TOC	100000	b	10000	c	NS	**47800**

Chemical Name	CAS No	SEL [or equivalent] Ecological Screening Criteria (mg/kg)		LEL [or equivalent] Ecological Screening Criteria (mg/kg)		PADEP's Residential Soil MSC: 0-15 ft bgs	SED-2 (results in mg/kg)
Metals							
Arsenic	7440-38-2	33	b	6.00	c	2.90	**91.7**
Barium	7440-39-3	NS		NS		820.00	832
Cadmium	7440-43-9	10	b	0.60	c	3.80	**2.03**
Chromium, Total	7440-47-3	110	b	26.00	c	NS	**186**
Cobalt	7440-48-4	NS		50.00	e	5.00	14.2
Copper	7440-50-8	110	b	16.00	c	4300.00	**425**
Iron	7439-89-6	40000	b	20000.00	c	150000.00	**21300**
Lead	7439-92-1	250	b	31.00	c	45.00	**897**
Manganese	7439-96-5	1100	b	460.00	c	200.00	**1140**
Nickel	7440-02-0	75	b	16.00	c	65.00	**207**
Silver	7440-22-4	NS		1.00	d	10.00	**2.01**
Zinc	7440-66-6	820	b	120.00	c	1200.00	**738**
General Chemistry							
Total Organic Carbon	TOC	100000	b	10000	c	NS	**16100**

Chemical Name	CAS No	SEL [or equivalent] Ecological Screening Criteria (mg/kg)		LEL [or equivalent] Ecological Screening Criteria (mg/kg)		PADEP's Residential Soil MSC: 0-15 ft bgs	SED-5 (results in mg/kg)
SVOCs							
Benzo(G,H,I)Perylene	191-24-2	0.17376	a	0.17	c	18.00	**0.18**
Chrysene	218-01-9	0.24978	a	0.34	c	23.00	**0.35**
Naphthalene	91-20-3	NS		0.16	d	10.00	**0.68**
Phenanthrene	85-01-8	0.08688	a	0.56	c	1000.00	0.46
Metals							
Arsenic	7440-38-2	33	b	6.00	c	2.90	**14.6**
Cadmium	7440-43-9	10	b	0.60	c	3.80	**1.2**
Chromium, Total	7440-47-3	110	b	26.00	c	NS	**66.4**
Cobalt	7440-48-4	NS		50.00	e	5.00	11.5
Copper	7440-50-8	110	b	16.00	c	4300.00	**109**
Iron	7439-89-6	40000	b	20000.00	c	150000.00	**21700**
Lead	7439-92-1	250	b	31.00	c	45.00	**319**
Manganese	7439-96-5	1100	b	460.00	c	200.00	**508**
Mercury	7439-97-6	2	a	0.20	c	1.00	**0.524**
Nickel	7440-02-0	75	b	16.00	c	65.00	**44.1**
Silver	7440-22-4	NS		1.00	d	10.00	**1.11**
Zinc	7440-66-6	820	b	120.00	c	1200.00	**339**
General Chemistry							
Total Organic Carbon	TOC	100000	b	10000	c	NS	**59900**

N

W E

S

Legend

- SWS-1 ▲ Surface Water Sample Locations With No Exceedances of the PA State Code Title 25, Chapter 93 Water Quality Standards
- SED-1 • Sediment Sample Locations With Exceedances of Screening Criteria
- 15 — Result is Greater Than the SEL Criteria
- **15** — Result is Greater Than the LEL Criteria
- 15 — Result is Greater Than the PADEP Residential Soil MSC for Surface Soils between 0 and 15 ft. bgs.
- Past Disposal Area (PDA) - Corrective Action Management Unit (CAMU)
- Area of Interest Boundary (AOI)

DF - Dilution Factor
LEL - Low Ecological Level
MDL - Laboratory Method Detection Limit
MSC - Medium Specific Concentration
NS - No standard currently available.
Q - Lab Qualifier if data was not validated)
RL - Laboratory Reporting Detection Limit
SEL - Severe Ecological Level

Notes:
1. Bings Maps aerial imagery provided by © 2010 Microsoft Corporation and its data suppliers and obtained under the licensing agreement with ESRI.
2. Past disposal area digitzed from ENSR Figure 9 - Deep Aquifer Piezometric Map dated April 17, 1992. PDA boundaries updated based on 2011 delineation borings.
3. Sediment and surface water samples collected by Aquaterra and Langan on April 7, 2011.
4. The hierarchy for selecting the SEL:
   a. Calculated Site Specific SEL using TOC for designated reach
   b. Ontario Sediment SEL
   The hierarchy for selecting the LEL:
   c. Ontario Sediment LEL
   d. NOAA ERL Sediment Benchmark (if no Ontario Sediment LEL is available)
   e. SD EPA R5 Sediment Benchmark (if no NOAA ERL is available)

Figure 11 - Summary of Sediment and Surface Water Exceedances
AOI-10 Site Characterization/ Remedial Investigation Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

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

0 75 150 300 Feet

SCALE: 1" = 150'
DATE: June 2, 2011
DRN. BY: MH
CKD. BY: DW
JOB#: 2574601

Path: \\langan.com\data\DT\data\2574601\ArcGIS\MapDocuments\AOI 10 SCR\Figure 11 - Summary of SW and SED Exceedances_6-14-11.mxd



N
W E
S

Legend

- W-18 0.01' — Shallow Monitoring Well with Apparent LNAPL Thickness (ft.)
- W-24 — Monitoring Wells With No LNAPL
- W-21 — Abandoned/Unable to Locate
- Past Disposal Area (PDA) - Corrective Action Management Unit (CAMU)
- Area of Interest Boundary (AOI)

Light Non-Aqueous Phase Liquids (LNAPL) Types

- Residual Oil (Extremely Weathered)
- Middle Distillate/Residual Oil (Extremely Weathered)

Notes:
1. Bings Maps aerial imagery provided by © 2010 Microsoft Corporation and its data suppliers and obtained under the licensing agreement with ESRI.
2. Past disposal area digitzed from ENSR Figure 9 - Deep Aquifer Piezometric Map dated April 17, 1992. PDA boundaries updated based on 2011 delineation borings.

Figure 12 - Apparent LNAPL Thickness And Type
AOI-10 Site Characterization/
Remedial Investigation Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

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

0 75 150 300 Feet

SCALE: 1" = 150'
DATE: June 2, 2011
DRN. BY: MH
CKD. BY: DW
JOB#: 2574601

Path: \\langan.com\data\DT\data6\2574601\ArcGIS\MapDocuments\AOI 10 SCR\Figure 12 - Apparent LNAPL Thickness and Type, 6-6-11.mxd

APPENDIX A

Current and Historic Use Figure



N
W E
S

Legend

- Current Uses
- Historic Uses
- Past Disposal Area (PDA) - Corrective Action Management Unit (CAMU)
- Area of Interest Boundary (AOI)

Notes:
1. Bings Maps aerial imagery provided by © 2010 Microsoft Corporation and its data suppliers and obtained under the licensing agreement with ESRI.
2. Past disposal area digitzed from ENSR Figure 9 - Deep Aquifer Piezometric Map dated April 17, 1992. PDA boundaries updated based on 2011 delineation borings.

Figure A-1 - Historic Use/Current Use
AOI-10 Site Characterization/
Remedial Investigation Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

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

0 75 150 300 Feet

SCALE: 1" = 150'
DATE: May 5, 2011
DRN. BY: MH
CKD. BY: DW
JOB#: 2574601

Path: \\langan.com\data\DT\data6\2574601\ArcGIS\MapDocuments\AOI 10 SCR\Appendix A-1 - Historic Use and Current Use_6-13-11.mxd

APPENDIX B

Notice of Intent to Remediate and Report Notifications

NIR AND ASSOCIATED NOTICES



Sunoco Inc.
3144 Passyunk Avenue
Philadelphia PA 19145-5299
215 339 2000

October 12, 2006

Mr. Robert Day-Lewis
Pennsylvania DEP
2 East Main Street
Norristown, PA 19401

Mr. Steve O'Neil
Pennsylvania DEP
2 East Main Street
Norristown, PA 19401

Re: Sunoco Inc. (R&M) Philadelphia Refinery
Philadelphia, Philadelphia County

Dear Mr. Day-Lewis and Mr. O'Neil:

In accordance with the Land Recycling and Environmental Remediation Standards Act (Act 2), enclosed are two copies of a Notice of Intent to Remediate (NIR) for the Sunoco Inc. (R&M) Philadelphia Refinery. This NIR covers remediation being done as part of the 2003 Consent Order and Agreement (CO&A) at Point Breeze, Girard Point and Schuylkill River Tank Farm. Remediation at Belmont Terminal, which is part of the CO&A, is not part of this NIR since this site is not subject to RCRA Corrective Action. Sunoco is considering submitting a separate NIR for this area under the Act 2 program only.

This NIR is being submitted with the intent to enter the Sunoco Philadelphia Refinery into the One Cleanup Program with PaDEP and the USEPA. All remediation work at the Philadelphia refinery will be completed under the 2003 Consent Order & Agreement (CO&A), however, RCRA Corrective Action measures will be addressed concurrently with work performed under the CO&A and within the Act 2 program.

Please call me at 610-859-1881 or email me at jroppenheim@sunocoinc.com with any questions or comments.

Best Regards,

James Oppenheim, PE
Sr. Environmental Consultant

Cc: Sunoco Legal Dept.
Philadelphia Refinery Environmental Central File
David Burke, PADEP
Walter Payne, PADEP
Hon Lee, USEPA Region III
Colleen Costello, Langan

Will remediation be to a site-specific standard ☒ or as a special industrial area ☐? If so, the municipality or municipalities must be provided 30-day comment period.
Remediator/Property Owner/Consultant. For each of these recipients of the approval of the final report, complete form below.

Remediator
Contact Person: James R. Oppenheim
Relationship to site (e.g. owner, remediator, participating in cleanup, consultant): Remediation Project Manager
Phone Number: (610) 859-1881
Company Name: Sunoco, Inc. (R&M)
Address (street, city, state, zip): 100 Green St., Marcus Hook, PA 19061
Email Address: jroppenheim@sunocoinc.com
Property Owner
Contact Person: Scott Baker
Relationship to site (e.g. owner, remediator, participating in cleanup, consultant): Environmental Manager
Phone Number: (215) 339-2074
Company Name: Sunoco, Inc. (R&M)
Address (street, city, state, zip): 3144 Passyunk Ave. Philadelphia, PA 19145
Email Address: sabaker@sunocoinc.com
Consultant
Contact Person: Colleen Costello
Relationship to site (e.g. owner, remediator, participating in cleanup, consultant): Consultant
Phone Number: (215) 864-0640
Company Name: Langan Engineering and Environmental Services
Address (street, city, state, zip): 30 South 17th St., Suite 1500, Philadelphia, PA 19103
Email Address: ccostello@langan.com

Preparer of Notice of Intent to Remediate:

Name: James Oppenheim

Title: Project Manager

Address: 100 Green Street
Marcus Hook, PA 19061

Telephone: (610) 859-1881

Email Address: jroppenheim@sunocoinc.com

Email Image File of Site Map showing property lines and general area of site(s) to be remediated to: (landrecycling@state.pa.us)

Sunoco Inc.
3144 Passyunk Avenue
Philadelphia PA 19145-5299
215 339 2000

October 12, 2006

Manager
Philadelphia Department of Public Health
Environmental Health Services
321 University Avenue
Philadelphia, PA 19104

Re: Sunoco, Inc. (R&M) Philadelphia Refinery
Philadelphia, Philadelphia County

Dear Sir/Madam:

The Land Recycling and Environmental Remediation Standards Act (Act 2) requires that a Notice of Intent to Remediate (NIR) be provided to the municipality in which the site is located when a site is being remediated to a site-specific Standard. The municipality is afforded a 30-day comment period. In accordance with this provision of the Act, Sunoco, Inc. (R&M) is formally notifying you of its intent to remediate the subject site under Act 2. A copy of the NIR, which will be sent to the Pennsylvania Department of Environmental Protection (PaDEP), is enclosed. This notice will also be published in the Pennsylvania Bulletin, and a summary of the notice appeared in the Philadelphia Daily News on October 16, 2006.

Publication of this notice in the Philadelphia Daily News initiates the 30-day public and municipal comment period. During the next thirty days, your municipality may request to become involved in the development of the remediation plans for the site. If the municipality wishes to become involved in this project, please send your comments to Sunoco to my attention.

Please call me at (610) 859-1881 if you have any questions concerning the proposed remediation.

Best Regards,

James R. Oppenheim, P.E.
Senior Environmental Consultant

Cc: Sunoco Legal Dept.
Philadelphia Refinery Environmental Central File
Steve O'Neil, PaDEP
Colleen Costello, Langan

Will remediation be to a site-specific standard ☒ or as a special industrial area ☐? If so, the municipality or municipalities must be provided 30-day comment period.
Remediator/Property Owner/Consultant. For each of these recipients of the approval of the final report, complete form below.

Remediator
Contact Person: James R. Oppenheim
Relationship to site (e.g. owner, remediator, participating in cleanup, consultant): Remediation Project Manager
Phone Number: (610) 859-1881
Company Name: Sunoco, Inc. (R&M)
Address (street, city, state, zip): 100 Green St., Marcus Hook, PA 19061
Email Address: jroppenheim@sunocoinc.com
Property Owner
Contact Person: Scott Baker
Relationship to site (e.g. owner, remediator, participating in cleanup, consultant): Environmental Manager
Phone Number: (215) 339-2074
Company Name: Sunoco, Inc. (R&M)
Address (street, city, state, zip): 3144 Passyunk Ave. Philadelphia, PA 19145
Email Address: sabaker@sunocoinc.com
Consultant
Contact Person: Colleen Costello
Relationship to site (e.g. owner, remediator, participating in cleanup, consultant): Consultant
Phone Number: (215) 864-0640
Company Name: Langan Engineering and Environmental Services
Address (street, city, state, zip): 30 South 17th St., Suite 1500, Philadelphia, PA 19103
Email Address: ccostello@langan.com

Preparer of Notice of Intent to Remediate:

Name: James Oppenheim
Title: Project Manager
Address: 100 Green Street
Marcus Hook, PA 19061
Telephone: (610) 859-1881
Email Address: jroppenheim@sunocoinc.com

Email Image File of Site Map showing property lines and general area of site(s) to be remediated to: (landrecycling@state.pa.us)

Proof of Publication in The Philadelphia Daily News
Under Act. No 587, Approved May 16, 1929

STATE OF PENNSYLVANIA
COUNTY OF PHILADELPHIA

Anna Dickerson being duly sworn, deposes and says that **The Philadelphia Daily News** is a newspaper published daily, except Sunday, at Philadelphia, Pennsylvania, and was established in said city in 1925, since which date said newspaper has been regularly issued in said County, and that a copy of the printed notice of publication is attached hereto exactly as the same was printed and published in the regular editions and issues of the said newspaper on the following dates:

October 16, 2006

Affiant further deposes and says that he is an employee of the publisher of said newspaper and has been authorized to verify the foregoing statement and that he is not interested in the subject matter of the aforesaid notice of publication, and that all allegations in the foregoing statement as to time, place and character of publication are true.

Anna Dickerson

Sworn to and subscribed before me this 16th day of October 2006

Mary Anne Logan
Notary Public

My Commission Expires:

NOTARIAL SEAL
Mary Anne Logan, Notary Public
City of Philadelphia, Phila. County
My Commission Expires March 30, 2009

Copy of Notice of Publication

Newspaper Notice of Intent to Remediate to an Environmental Standard. (Sections 302(e)(1)(ii), 303(h)(1)(ii), 304(n)(1)(i), and 305(c)(1))

Pursuant to the Land Recycling and Environmental Remediation Standards Act (Act), the act of May 19, 1995, P.L. 4, No. 1995-2, notice is hereby given that Sunoco Inc.(R&M) has submitted to the Pennsylvania Department of Environmental Protection a Notice of Intent to Remediate a site located at 3144 Passyunk Ave., Philadelphia, Philadelphia County, Pennsylvania. This Notice of Intent to Remediate states that the site is a petroleum refinery. It has been determined that petroleum compounds have impacted soil and groundwater at the site. Sunoco, Inc. (R&M) has indicated that proposed remediation measures will include source reduction and engineered boundary controls. The proposed future use of the property is industrial for continued operation as a petroleum refinery.

Sunoco Inc. (R&M) plans to use the site-specific remediation standard at the site. The Act provides for a 30-day public comment period for site-specific standard remediation. The 30-day comment period is initiated with the publication of this notice. Until November 16, 2006, the City of Philadelphia may submit a request to Sunoco Inc. (R&M) to be involved in the development of the remediation and reuse plans for the site. The City of Philadelphia may also submit a request to Sunoco Inc. (R&M) during this 30-day comment period to develop and implement a public involvement plan. Copies of these requests and of any comments should also be submitted to the Department of Environmental Protection at 2 East Main Street, Norristown, PA 19401 to the attention of Mr. Walter Payne. All correspondence with Sunoco Inc. (R&M) should be addressed to the Public Relations Dept., Sunoco Inc. (R&M) at 3144 Passyunk Ave, Philadelphia, PA, 19145.

LEGAL NOTICES

Newspaper Notice of Intent to Remediate
to an Environmental Standard.
(Sections 302(e)(1)(ii), 303(h)(1)(ii),
304(n)(1)(i), and 305(c)(1))

Pursuant to the Land Recycling and Environmental Remediation Standards Act (Act), the act of May 19, 1995, P.L. 4, No. 1995-2., notice is hereby given that Sunoco Inc.(R&M) has submitted to the Pennsylvania Department of Environmental Protection a Notice of Intent to Remediate a site located at 3144 Passyunk Ave., Philadelphia, Philadelphia County, Pennsylvania. This Notice of Intent to Remediate states that the site is a petroleum refinery. It has been determined that petroleum compounds have impacted soil and groundwater at the site. Sunoco Inc. (R&M) has indicated that proposed remediation measures will include source reduction and engineered boundary controls. The proposed future use of the property is industrial for continued operation as a petroleum refinery.

Sunoco Inc. (R&M) plans to use the site-specific remediation standard at the site. The Act provides for a 30-day public comment period for site-specific standard remediation. The 30-day comment period is initiated with the publication of this notice. Until November 16, 2006, the City of Philadelphia may submit a request to Sunoco Inc. (R&M) to be involved in the development of the remediation and reuse plans for the site. The City of Philadelphia may also submit a request to Sunoco Inc. (R&M) during this 30-day comment period to develop and implement a public involvement plan. Copies of these requests and of any comments should also be submitted to the Department of Environmental Protection at 2 East Main Street, Norristown, PA 19401 to the attention of Mr. Walter Payne. All correspondence with Sunoco Inc. (R&M) should be addressed to the Public Relations Dept., Sunoco Inc. (R&M) at 3144 Passyunk Ave, Philadelphia, PA, 19145.

Appeared in: ***Philadelphia Inquirer & Philadelphia Daily News*** on Monday, 10/16/2006

Back

SCR/RIR NOTICES

LANGAN
ENGINEERING & ENVIRONMENTAL SERVICES

David T. Gockel, P.E., P.P.
George P. Kelley, P.E.
George E. Derrick, P.E.
Michael A. Semeraro, Jr., P.E.
Nicholas De Rose, P.G.
Andrew J. Ciancia, P.E.
George E. Leventis, P.E.
Rudolph P. Frizzi, P.E., G.E.
Ronald A. Fuerst, C.L.A.
Colleen Costello, P.G.
Cristina M. González, P.E.
Gerald J. Zambrella, C.E.M.
Gregory M. Elko, P.E.
Steven Ueland, P.E.

Caryn L. Barnes
Gerard M. Coscia, P.E.
Jason S. Engelhardt, P.E.
Edward H. Geibert, M.S.
Christopher M. Hager, P.E.
John J. McElroy, Jr., Ph.D., P.E.
Michael D. Szura, C.L.A., A.S.L.A.
Stewart H. Abrams, P.E.
Brian M. Conlon, P.E.
Jeffrey A. Smith, P.G.

June 1, 2011

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Manager
Philadelphia Department of Public Health
Environmental Health Services
321 University Avenue
Philadelphia, Pennsylvania 19104

RE: Notice of Submittal of Site Characterization/ Remedial Investigation Report
Area of Interest (AOI) 10
Sunoco, Inc. (R&M) Philadelphia Refinery
Philadelphia, Philadelphia County, Pennsylvania
Langan Project No.: 2574601

Dear Sir/Madam:

Notice is hereby given that Sunoco, Inc. (R&M) (Sunoco) is in the process of submitting a Site Characterization/Remedial Investigation Report to the Pennsylvania Department of Environmental Protection for AOI 10 located at the Sunoco Philadelphia Refinery, Philadelphia, Philadelphia County, Pennsylvania. The report indicates that the remediation planned will attain compliance with a combination of site-specific and the statewide health cleanup standards.

This notice is made under the provision of the Land Recycling and Environmental Standards Act, the Act of May 19, 1995, P.L. #4, No. 2.

Sincerely,
Langan Engineering and Environmental Services, Inc.

Colleen Costello

Colleen Costello, P.G.
Senior Principal

cc: Jim Oppenheim, Sunoco
Kevin Dunleavy, Sunoco

\\langan.com\data\DT\data6\2574601\Office Data\Reports\Site Characterization Reports\AOI 10\Appendices\Appendix A - NIR and Public Notices\RIR Municipal Notice_060111.doc

7010 3090 0001 1803 7868



U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com®

OFFICIAL USE

Postage	$ .44
Certified Fee	2.85
Return Receipt Fee (Endorsement Required)	2.30
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$ 5.59

Postmark Here
DOYLESTOWN PA 18901
JUN 1 2011
USPS

Cindy - Sunoco ACT 10

Sent To: Manager
Philadelphia Dept. of Public Health
Street, Apt. No. or PO Box No.: Environmental Health Services
City, State, ZIP+4: 321 University Avenue
Philadelphia, Pennsylvania 19104

PS Form 3800, August 2006 — See Reverse for Instructions

SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Dawn Holloway
☑ Agent
☐ Addressee

B. Received by (*Printed Name*)

C. Date of Delivery 6/3/11

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☑ No

Proof of Publication in The Philadelphia Daily News
Under Act. No 587, Approved May 16, 1929

STATE OF PENNSYLVANIA
COUNTY OF PHILADELPHIA

Anna Dickerson being duly sworn, deposes and says that **The Philadelphia Daily News** is a newspaper published daily, except Sunday, at Philadelphia, Pennsylvania, and was established in said city in 1925, since which date said newspaper has been regularly issued in said County, and that a copy of the printed notice of publication is attached hereto exactly as the same was printed and published in the regular editions and issues of the said newspaper on the following dates:

June 13, 2011

Affiant further deposes and says that she is an employee of the publisher of said newspaper and has been authorized to verify the foregoing statement and that she is not interested in the subject matter of the aforesaid notice of publication, and that all allegations in the foregoing statement as to time, place and character of publication are true.

Anna Dickerson

Sworn to and subscribed before me this 13th day of June, 2011

Mary Anne Logan
Notary Public

My Commission Expires:

NOTARIAL SEAL
Mary Anne Logan, Notary Public
City of Philadelphia, Phila. County
My Commission Expires March 30, 2013

Copy of Notice of Publication

Notification of Receipt of Site Characterization/ Remedial Investigation Report

Notice is hereby given that Sunoco Inc. (R&M) (Sunoco) is in the process of submitting a Site Characterization/ Remedial Investigation Report to the Pennsylvania Department of Environmental Protection (PADEP), Southeast Regional Office for Area of Interest (AOI 10) located at the Sunoco Philadelphia Refinery, Philadelphia, Pennsylvania. Sunoco has indicated in the report that site characterization activities have been completed at AOI 10 in accordance with the Land Recycling and Environmental Remediation Standards Act and the 2004 Memorandum of Agreement between the PADEP and U.S. Environmental Protection Agency (EPA) (a.k.a., the PA One Cleanup Program). This notice is made under the provision of the Land Recycling and Environmental Remediation Standards Act, the Act of May 19, 1995, P.L. #4, No. 2.

APPENDIX C

Soil Boring Logs and Monitoring Well

Construction Summaries

MONITORING WELL LOG: W-1D

PROJECT:	**Sunoco-Philadelphia Refinery**	DRILLING CO.:	**Parratt Wolff**
SITE LOCATION:	**AOI-10**	DRILLING METHOD:	**Hollow Stem Auger**
JOB NO.:		SAMPLING METHOD:	**4' Acetate Sleeves & SS**
LOGGED BY:	**Tiffani Doerr**	SCREEN/RISER DIAMETER:	**4-inch**
DATES DRILLED:	**4/5/11-4/6/11**	WELLBORE DIAMETER:	**6.25"**
TOTAL DEPTH:	**76.5'**	ELEVATION:	**NA**

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0	0.0		1' topsoil beneath grass.	Core samples from surface to depth using acetate sleeves; no utility clearance.		
	0.0		FILL: medium brown and orange fine sand w/clay; whole brick 1.5'-2'. No odors.	0'-2' Sample submitted to laboratory for analysis		
	0.0		(BC=47/2'-4-8-16-24) Same as above to 5.5'. Fill: Dark gray/black cinders and sand, very little fines, with some brick and concrete pieces. Odors.			
-5	0.0					
	0.0					
	0.0					
	0.0		(BC=5-6-3-3-3-3-3-2) Fill: saturated cinders, sand, loose, petroleum globules on water. Sheen. Odors.			
	0.0					
-10	0.0				Grout slurry (0'-57.5')	
	0.0					
	0.0		(BC=2-3-2-1-2-1-1-1) 6" Recovery: m-c light brown SAND.			
	0.0					
	0.0					
-15	0.0					
	0.0		(BC=2-2-2-2-2-3-2-2) 16'-17' mix of loose saturated sands and light gray clay. 17'-20' light gray CLAY; trace round gravel near 17', rest clay has 5% organics (grasses).			
	0.0					
	0.0					
-20	0.0		(BC=WOH/1'-2-0-2-2-2-2) Same w/ ~15% organic material.			
	0.0					
	0.0					

MONITORING WELL LOG: W-1D

Aquaterra Technologies, Inc.

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
	0.0					
	0.0		(BC=WOH/2'-1-1-1-1) Same: sl micaceous, no odors.			
-25	0.0					
	0.0					
	0.0					
	0.0		(BC=WOH/2') Split Spoon: Same: light gray clay, sl micaceous some organics.			
-30	0.0		(BC=WOH/2'-3-2-2-3) Same: trace round gravel, 10% organics; trace layers of very fine light gray sands.			
	0.0					
			(BC=WOH/2'-1-1-1-1) Same: no gravel, trace organics, trace fine sands.			
-35	0.0					
	0.0					
			(BC=WOH/2') Same as above.			
-40	0.0		(BC=WOH/3'2-2) Same as above.			
	0.0					
			(BC=WOH/2'-3-3-3-3) Same as above.			
-45	0.0					
	0.0					
			(BC=WOH-3-3-5) Split Spoon: same as above.			

MONITORING WELL LOG: W-1D

Aquaterra Technologies, Inc.

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
-50	0.0		(BC=WOH/1'-3-3-4-2-3-3) Fine sand to 52', clay with organics to 54'.			
	0.0					
			(BC=WOH/1'3-4-6-7-4-4) Gray clay with fine sands.			
-55	0.0					
	0.0					
			(BC=3-3-3-3) Split Spoon: Med gray clay with few very fine thin sand layers. 2" coarse gray sand at 60'.		Bentonite (57.5'-62.5')	
-60	0.0		(BC=1-1-3-3-3-3-3-4) Top 6" coarse gray sand; rest gray clay, no sands, browning near bottom, not micaceous.			
	0.0					
					Sand (62.5'-66.5')	
			(BC=WOH/1.5'-8-8-5-6-5) To 66' coarse sand; to 68' dark gray-brn silty clay with few black organic layers.			
-65						
			(BC=WOH-7-14-18) Dark gray alternating silty clay and med sand. @69.5' coarse SAND and GRAVEL mixed (gravel f-m well rounded, multi-colored).			
-70	0.0		(BC=12-25-12-17-75/0.7') Red-brown f-c mixed SAND and GRAVEL: Coarse gravel in tip of sleeve (red, black & gray sandstones).		Screen (66.5'-76.5')	
	0.0					
			Auger to 74' through gravels.			
			(BC=4-3-5-15-35-75/1") Stiff dark gray CLAY with trace fine round gravel. Bottom few inches are black/white mica - weathered SCHIST.			
-75	0.0					
	0.0					

MONITORING WELL LOG: W-28

PROJECT:	**Sunoco - Philadelphia Refinery**	DRILLING CO.:	**Parratt Wolff, Inc.**
SITE LOCATION:	**AOI-10**	DRILLING METHOD:	**Hollow Stem Auger**
JOB NO.:		SAMPLING METHOD:	**Acetate Sleeves**
LOGGED BY:	**Tiffani Doerr**	SCREEN/RISER DIAMETER:	**4"**
DATES DRILLED:	**4/18/11**	WELLBORE DIAMETER:	**8"**
TOTAL DEPTH:	**14'**	ELEVATION:	

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0			[0-4'] (BC=4-4-7-8-3-4-3-3) 1' Recovery - Gravel, f/c sand and gravel, tan/gray, wet, some wood material	Sample taken 0-2' for laboratory analysis	Grout 0-2' 4" PVC - Stick Up 2' 4" PVC - Riser 0-4' Bentonite 2-3'	
	2.3					
	8.4		[4-8'] (BC=1-1-1-7-1-1-2-2) 1' Recovery - Black fine sand w/ some clay, wet, strong odor			
-5					Sand 3-14'	
	26.6					
	349					
	968		[8-10'] (BC=WOH-WOH-10-4) Black f/c sand w/ some gray clay, wet, strong odor, visible sheen/product		4" PVC - Screen 4-14'	
	363					
-10	372		[10-14'] (BC=WOH/4') Little (4") Recovery - Gray fine sandy clay, wet, strong odor			
				Well Complete to 14'		

MONITORING WELL LOG: W-29

PROJECT:	**Sunoco - Philadelphia Refinery**	DRILLING CO.:	**Parratt Wolff, Inc.**
SITE LOCATION:	**AOI-10**	DRILLING METHOD:	**Hollow Stem Auger**
JOB NO.:		SAMPLING METHOD:	**Acetate Sleeves**
LOGGED BY:	**Tiffani Doerr**	SCREEN/RISER DIAMETER:	**4"**
DATES DRILLED:	**4/18/11**	WELLBORE DIAMETER:	**8"**
TOTAL DEPTH:	**14'**	ELEVATION:	

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0			[0-4'] (BC=5-16-16-9-10-7-7-5) Full Recovery - 0-2' - Grass, black/dk. brown sandy silt and gravels, dry, no odors	Sample taken 0-2' for laboratory analysis	Grout 0-2' 4" PVC - Stick Up 2' 4" PVC - Riser 0-4' Bentonite 2-3'	
	0.0					
	0.0		[4-8'] (BC=6-11-7-5-7-6-10-6) 3' Recovery - Top 2' - Same as above, black sand/silt w/ brick and cinders, dry, no odor; Bottom 1' - Wet, black gravel w/ f/c sand, slight odor		Sand 3-14'	
-5						
	0.0					
	0.2					
	15.9		[8-10'] (BC=1-2-4-4) 6" Recovery - Same as above		4" PVC - Screen 4-14'	
-10	7.5		[10-14'] (BC=2-2-5-3-3-2-2-2) No Recovery			
				Well Complete to 14'		

MONITORING WELL LOG: W-30

PROJECT:	**Sunoco - Philadelphia Refinery**	DRILLING CO.:	**Parratt Wolff, Inc.**
SITE LOCATION:	**AOI-10**	DRILLING METHOD:	**Hollow Stem Auger**
JOB NO.:		SAMPLING METHOD:	**Acetate Sleeves**
LOGGED BY:	**Tiffani Doerr**	SCREEN/RISER DIAMETER:	**4"**
DATES DRILLED:	**4/15/11**	WELLBORE DIAMETER:	**8"**
TOTAL DEPTH:	**13'**	ELEVATION:	

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0			[0-4'] (BC=1-5-6-6-7-7-5-2) 3' Recovery - Slightly moist fine sand, alternating layes of black/medium brown and tan, 2" of soil at top (grass,roots, orange/brown)	Sample taken 0-2' for laboratory analysis	Grout 0-1' 4" PVC - Stick Up 2' Bentonite 1-2' 4" PVC - Riser 0-3'	
	1.3					
	1.2					
	1.3		[4-8'] (BC=3-2-2-4-4-4-4-2) 3' Recovery - Same as above to 6'; 6'-8' - Wet, black fine sand, very slight odor			
-5	1.0				Sand 2-13'	
	0.9					
	0.9					
	1.1		[8-10'] (BC=2-3-3-3) Top 1' - Wet, brown/black f/c sand and f/c gravel; 9-10' - Wet sand and f. gravel fill - small brown round "nuggets" and pumice-like material, slight sheen, loose		4" PVC - Screen 3-13'	
	1.8					
-10			[10-14'] 2' Recovery - Same as above to 13' mixed w/ gray clay; 13-14' - Gray clay			
	2.5					
				Well Complete to 13'		
	1.5					

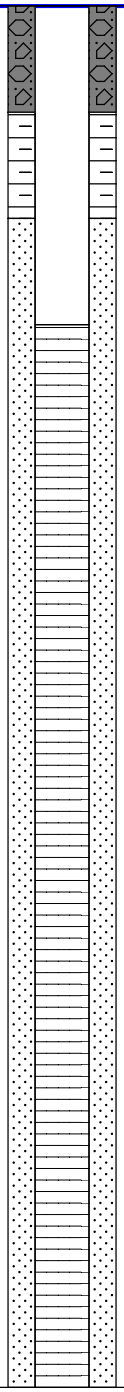
MONITORING WELL LOG: W-31

PROJECT:	**Sunoco - Philadelphia Refinery**	DRILLING CO.:	**Parratt Wolff, Inc.**
SITE LOCATION:	**AOI-10**	DRILLING METHOD:	**Hollow Stem Auger**
JOB NO.:		SAMPLING METHOD:	**Acetate Sleeves**
LOGGED BY:	**Tiffani Doerr**	SCREEN/RISER DIAMETER:	**4"**
DATES DRILLED:	**4/15/11**	WELLBORE DIAMETER:	**8"**
TOTAL DEPTH:	**15'**	ELEVATION:	

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0	1.3		[0-4'] (BC=10-9-14-6-4-4-4-4) - 2.5' Recovery (fill) - Top 12" - Med. brown coarse sand w/ gravel, few clays, moist, sl. odors; 1-4' - Black, strong odors, fine sand and silt like material	Sample taken 0-2' for laboratory analysis	Grout 0-1' 4" PVC - Stick Up 2' Bentonite 1-2' 4" PVC - Riser 0-3'	
	1.0					
	16.1		[4-8'] (BC=1-1-2-1-1-3-4-3) - 2' Recovery - Top 1' - Wet, black sand w/ fine gravel; Bottom 1' - Black, v. moist fine sand and silt			
-5					Sand 2-15'	
	100					
	103		[8-10'] (BC=2-1-WOH-WOH) - Top 1' - Fill, black clayey sand w/ few fine round gravel & large gravel, slag; Bottom 1' - Lt. brown-gray clay (native)		4" PVC - Screen 3-15'	
	88.6					
-10	35.7		[10-14'] (BC=WOH-WOH-WOH-WOH-2-2-4-4) - 8" Recovery - Same as above			
	54.4			Well Complete to 15'		
-15						

MONITORING WELL LOG: W-32

PROJECT:	**Sunoco - Philadelphia Refinery**	DRILLING CO.:	**Parratt Wolff, Inc.**
SITE LOCATION:	**AOI-10**	DRILLING METHOD:	**Hollow Stem Auger**
JOB NO.:		SAMPLING METHOD:	**Acetate Sleeves**
LOGGED BY:	**Tiffani Doerr**	SCREEN/RISER DIAMETER:	**4"**
DATES DRILLED:	**4/18/11**	WELLBORE DIAMETER:	**8"**
TOTAL DEPTH:	**13'**	ELEVATION:	

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0					Grout 0-1' 4" PVC - Stick Up 2' Bentonite 1-2' 4" PVC - Riser 0-3'	
-5			Well installed directly next to W-32D (see W-32D log for lithology), Sample collected from 0-2' @ W-32D		Sand 2-13' 4" PVC - Screen 3-13'	
-10				Well Complete to 13'		

MONITORING WELL LOG: W-32D

PROJECT:	**Sunoco-Philadelphia Refinery**	DRILLING CO.:	**Parratt Wolff**
SITE LOCATION:	**AOI-10**	DRILLING METHOD:	**Hollow Stem Auger**
JOB NO.:		SAMPLING METHOD:	**4' Acetate Sleeves & SS**
LOGGED BY:	**Tiffani Doerr**	SCREEN/RISER DIAMETER:	**4-inch**
DATES DRILLED:	**4/7/11-4/8/11**	WELLBORE DIAMETER:	**6.25"**
TOTAL DEPTH:	**53'**	ELEVATION:	**NA**

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0	0.0		8" topsoil - wooded area (BC=1-13-12-13-14-6-5-6) FILL: medium brown sl moist sand w/ little clay and gravel and slag material.	Core samples from surface to depth using acetate sleeves; no utility clearance.		
	0.0		(BC=3-4-3-3-2-3-2-2) Fill: Med brown sl moist clayey sandy soil w/lg piece of asphalt in tip	0'-2' Sample submitted to laboratory for analysis		
-5	0.3					
	34		(BC=5-11-6-7) Split Spoon: WASTE: (8'-9') Wet, loose, black sandy oily sludge material (not platy). (9'-10') Wood, dk gray/blk clayey sand w/rock frags, oily/wet at 10'.			
-10	71.7		(BC=3-5-6-2-2-2-2-5) (10'-14') Brick frags and black oily slag material.		Grout slurry (0'-47')	
	39.5					
-15			(BC=1-1-2-2-3-4-3-3) Clayey sand w/round gravel; pottery piece, oily.			
	83.6					
	27.6		(BC=5-11-10-4) Split spoon: Same as above.			
-20	104		(BC=4-2-2-3-3-3-5-5) Top 2" same. Rest: dark gray CLAY 5% organics, moist.			
	267					

MONITORING WELL LOG: W-32D

Aquaterra Technologies, Inc.

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
-25	11.4		(BC=2-2-2-WOH-2-2-3-2) Same clay with 10% organics (grasses), wet.			
	5.4					
	6.7		(BC=WOH-WOH-2-2) Split spoon: Same w/loose graveley clay at 28-28.5'.			
-30	4.9		(BC=WOH/2'-1-2-4-3) Same: tight clay, gray/brown organic material, moist.			
	3.9					
	2.8		(BC=2-3-WOH/1'-3-4-3-3) Same as above to 36' - then soft brown clay w/organics.			
-35	4.9					
	5.7		(BC=2-4-3-3) Split spoon. Same as above.			
	5.6				Bentonite (37'-40')	
-40	2.5		(BC=3-3-2-1-2-4-2-3) Same as above to 42', then gray clay, tight, sl micaceous, trace fine sand.		Sand (40'-53')	
	4.6					
	4.4		(BC=3-2-3-2-4-2-3-3) No recovery.			
-45					Screen (43'-53')	
			(BC=2-1-2-1) Split spoon: Gray clay, wet, loose w/trace fine sand.			
	2.1					

MONITORING WELL LOG: W-32D

Aquaterra Technologies, Inc.

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
-50	1.8		(BC=WOH/2'-WOH-3-3-3) Same to 52', from 52'-54' has 30% brown organic material. Spin augers to 54' (where last spoon ended) - @54' felt and heard sound of gravel in teeth of auger. High pressure gas/water emerging from well. Sand and sm gravel coming up with water, then mica flakes (black and white) up to 1cm coming up with water.			
	2.0					
	1.6					
-55						

Spin augers to 54' (where last spoon ended) - @54' felt and heard sound of gravel in teeth of auger. Immediately upon hitting gravel, water came up from hole at high pressure - exiting augers from bolt holes in side and shooting ~20' in either direction. Stop work. By end of day, water lessened but gas still at high pressure. After 2 days gas seemed to stop - (4/11/11) drive head was removed from augers - however, when drillers pulled slightly on the rods which were left down the hole, water initially shot up to top of mast and continued as artesian (1'-3' above top of augers) (must have plugged itself up over weekend). On 4/12/11 water only ~6" above top of augers and not constant. On 4-13-11: readings at well head: Methane 23.5%, CO2 2.7%, O2 14.2%, LEL 100%, H2S 0.0, PID 0.0ppm. On 4/14/11 and 4/15/11: water no longer coming up out of augers, but can be heard gurgling down the hole and obvious gas still emerging from borehole. On 4/18/11: LEL low outside well head - augers are pulled and well casing set - no cap put on well to allow for venting of vapors (vapors can still be seen emerging from casing during sampling on 4/27/11.

MONITORING WELL LOG: W-33

PROJECT:	**Sunoco - Philadelphia Refinery**	DRILLING CO.:	**Parratt Wolff, Inc.**
SITE LOCATION:	**AOI-10**	DRILLING METHOD:	**Hollow Stem Auger**
JOB NO.:		SAMPLING METHOD:	**Acetate Sleeves**
LOGGED BY:	**Shaun Sykes**	SCREEN/RISER DIAMETER:	**4"**
DATES DRILLED:	**4/20/11**	WELLBORE DIAMETER:	**8"**
TOTAL DEPTH:	**16'**	ELEVATION:	

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0			[0-4'] (BC=WOH-2-13-10-15-5-4-3) Grass/moss, brown sandy silt, gravel, brick fill, moist	Sample taken 0-2' for laboratory analysis	Grout 0-4' 4" PVC - Stick Up 2' Bentonite 4-5' 4" PVC - Riser 0-6'	
	0.0					
-5			[4-8'] (BC=WOH-3-3-1-3-3-8-4) Little Recovery - Brown, moist/loose f/c sand, little silt/clay		Sand 5-16'	
	0.0					
	1.2		[8-10'] (BC=5-6-36-14) 1' Recovery - Fill, wood and brick, some brown sandy/silty clay, moist/wet		4" PVC - Screen 6-16'	
-10			[10-14'] (BC=2-5-5-3-1-4-5-13) 1' Recovery - Same as above with some sandy gray clay, wet			
	2.3					
			[14-18'] (BC=WOH-2-12-12-47-21-14-12) 3' Recovery - Black, wet, f/c sand/gravel and clay			
-15	27.2			Well Complete to 16'		
	12.4					

MONITORING WELL LOG: W-34/BH-10-74

PROJECT:	**Sunoco - Philadelphia Refinery**	DRILLING CO.:	**Parratt Wolff, Inc.**
SITE LOCATION:	**AOI-10**	DRILLING METHOD:	**Hollow Stem Auger**
JOB NO.:		SAMPLING METHOD:	**Acetate Sleeves**
LOGGED BY:	**Shaun Sykes**	SCREEN/RISER DIAMETER:	**4"**
DATES DRILLED:	**4/20/11**	WELLBORE DIAMETER:	**8"**
TOTAL DEPTH:	**15'**	ELEVATION:	

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0			[0-4'] (BC=6-8-11-7-7-7-5-4) Full Recovery - Grass, brown/dk. brown sandy silt, little gravel, dry	Sample taken 0-2' for laboratory analysis	Grout 0-2' 4" PVC - Stick Up 2' Bentonite 2-3' 4" PVC - Riser 0-4'	
	0.0					
	0.0					
	0.0		[4-8'] (BC=5-3-3-3-5-9-20-10) Litte (4") Recovery - Wet, dk. brown sandy silt and gravel			
-5					Sand 3-15'	
	0.0					
			[8-10'] (BC=13-10-10-5) No Recovery - wet gravel		4" PVC - Screen 4-14'	
-10	6.2		[10-14'] (BC=4-5-14-22-30-9) Full Recovery - Dk. brown/black f/c sand and gravel w/ wood, wet			
	4.3			Well Complete to 14'		

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-36**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/5/11**

DRILLING CO.: -
DRILLING METHOD **Hand Auger**
SAMPLING METHOD **Grab**
TOTAL DEPTH: **2'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0		0.0	Grass, dark brown sandy silt w/ oranic matter, few mixed gravels, sl. moist, no odor		
	Sample taken 0-2' for laboratory analysis	0.0	Mixed sand and gravels, trace dark brown silt, wet @ 2', no odor		

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-37**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/5/11**

DRILLING CO.: -
DRILLING METHOD **Hand Auger**
SAMPLING METHOD **Grab**
TOTAL DEPTH: **2'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0		0.0	Grass, dark brown sandy silt w/ oranic matter, sl. moist, no odor, increase sand and gravels @ 1'		
	Sample taken 0-2' for laboratory analysis	0.0	Mixed gravels, trace dark brown/black silt and sand, wet @ 1.5', no odor		

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-38**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/5/11**

DRILLING CO.: -
DRILLING METHOD **Hand Auger**
SAMPLING METHOD **Grab**
TOTAL DEPTH: **2'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0		0.0	Grass, dark brown sandy silt w/ organic matter to 0.5', coarse sand and mixed gravels, dry, no odor		
	Sample taken 0-2' for laboratory analysis	0.0	Coarse sand and mixed gravels, trace dk. brown silt, dry, no odor		

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-39**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/5/11**

DRILLING CO.: -
DRILLING METHOD **Hand Auger**
SAMPLING METHOD **Grab**
TOTAL DEPTH: **2'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0		0.0	Grass, dark brown sandy silt w/ organic matter and mixed gravels, wet @ 1', no odor		
	Sample taken 0-2' for laboratory analysis	386	Black gravels and sand, trace black silt, strong odor, sheen on soil, wet, silt/clay @ 1.5'		

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-40**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/5/11**

DRILLING CO.: -
DRILLING METHOD **Hand Auger**
SAMPLING METHOD **Grab**
TOTAL DEPTH: **2'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0		0.0	Grass, brown sandy silt w/ organic matter, dry, no odor		
	Sample taken 0-2' for laboratory analysis	0.0	Brown sandy silt, dry, no odor, trace clay		

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-41**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/5/11**

DRILLING CO.: -
DRILLING METHOD **Hand Auger**
SAMPLING METHOD **Grab**
TOTAL DEPTH: **2'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0			Grass, brown sandy silt w/ organic matter, dry, no odor		
		0.0			
	Sample taken 0-2' for laboratory analysis		Tan/brown sandy silt, dry, no odor, some mixed gravels		
		0.0			

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-42**

PROJECT:	**Sunoco - Philadelphia Refinery**	DRILLING CO.:	-
SITE LOCATION:	**AOI-10**	DRILLING METHOD	**Hand Auger**
JOB NO.:		SAMPLING METHOD	**Grab**
LOGGED BY:	**Shaun Sykes**	TOTAL DEPTH:	**2'**
DATES DRILLED:	**4/19/11**		

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0		0.0	Grass, brown silt to tan silt and gravels, moist		
	Sample taken 0-2' for laboratory analysis	0.0	Dark brown/black sandy silt and gravels, wet @ 2'		

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-43**

Page 1 of 1

PROJECT:	**Sunoco - Philadelphia Refinery**	DRILLING CO.:	-
SITE LOCATION:	**AOI-10**	DRILLING METHOD	**Hollow Stem Auger**
JOB NO.:		SAMPLING METHOD	**Acetate Sleeves**
LOGGED BY:	**Shaun Sykes**	TOTAL DEPTH:	**16'**
DATES DRILLED:	**4/14/11**		

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0	Sample taken 0-2' for laboratory analysis	0.0	[0-4'] (BC=WOH-6-7-4-2-3-6-5) 2' Recovery - Top 1' - Grass, brown sandy silt, gravel, dry, no odor; Bottom 1' - Dk. brown/black sandy clay, moist, odor, some gravels		
-5		117	[4-8'] (BC=8-6-9-7-3-2-5-3) 2' Recovery - Top 1' - Same as above; Bottom 1' - Black fine sand, little clay, wet, strong odor		
		95.7			
		119	[8-12'] (BC=5-3-3-2-3-1-2-4) No Recovery		
-10					
			[12-16'] (BC=WOH-WOH-2-3-3-3-3-3) 6" Recovery - Gray clay, little sand, moist (native)		
		23.6			
-15					Boring complete to 16' (no waste material observed)

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-44-WC**

PROJECT:	**Sunoco - Philadelphia Refinery**	DRILLING CO.:	-
SITE LOCATION:	**AOI-10**	DRILLING METHOD	**Hollow Stem Auger**
JOB NO.:		SAMPLING METHOD	**Acetate Sleeves**
LOGGED BY:	**Shaun Sykes**	TOTAL DEPTH:	**26'**
DATES DRILLED:	**4/12/11**		

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0	Sample taken 0-2' for laboratory analysis	0.0 1.2 2.1	[0-4'] (BC=4-5-6-6-8-18-25-16) Full Recovery - Grass, orange/brown silty clay to 3', moist; 4" - yellow/tan sand; 8"-gray sand and gravel, moist		
-5		2.9 52.1	[4-8'] (BC=9-15-16-32-26-18-4-2) 2' Recovery - Same as above - gray gravels, little sand, visible brown product (SPH) in gravel, strong odor		
-10	Sample taken 10-12' for laboratory analysis	136 242	[8-10'] (BC=1-1-1-1) Full Recovery - Black silty clay, visible product, moist/wet, strong odor, loose [10-14'] (BC=WOH-1-2-3-4-15-23-24) Full Recovery - Top 2' - Same as above; Bottom 2' - White, dry, waxy material		
-15		516	[14-18'] (BC=WOH-WOH-WOH-WOH-WOH-WOH-5-4) Same as above, waxy resin and woody material, strong odor		
-20		445	[18-22'] (BC=8-7-18-16-24-12-4-8) Full Recovery - Waxy resin, strong odor		
-25	Sample taken 24-26' for laboratory analysis	37.6	[22-26'] (BC=4-6-4-4-4-2-2-4) Full Recovery - Dark gray sandy clay, moist (native), slight odor		Boring complete to 26'

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-45-WC**

PROJECT:	**Sunoco - Philadelphia Refinery**	DRILLING CO.:	-
SITE LOCATION:	**AOI-10**	DRILLING METHOD	**Hollow Stem Auger**
JOB NO.:		SAMPLING METHOD	**Acetate Sleeves**
LOGGED BY:	**Shaun Sykes**	TOTAL DEPTH:	**22'**
DATES DRILLED:	**4/12/11**		

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0	Sample taken 0-2' for laboratory analysis	2.4	[0-4'] (BC=WOH-3-4-4-2-2-7-8) Top 2' - Grass, brown stiff silt, some clay, little sand, moist; Bottom 2' - Gray/dk. gray medium sands, odor, moist		
-5	Sample taken 5-8' for laboratory analysis	33.0	[4-8'] (BC=1-1-1-2-4-4-5-8) 2' Recovery - Top 1' - Black silt, clay, strong odor, moist; Bottom 1' - white/waxy resin [8-10'] (BC=7-9-10-12) Full Recovery - Wood material, brick, black/dark brown silt; Bottom 2" - white/waxy resin, some tar, black/oily		
-10			[10-14'] (BC=WOH-WOH-30-30/13) Wood, drilled to 14'		
-15			[14-18'] (BC=WOH-2-1-4-6-6-5-7) 6" Recovery - Dark brown/black wet sandy silt, little clay		
-20	Sample taken 18-20' for laboratory analysis		[18-22'] (BC=WOH-2-2-2-2-3-3-5) 6" Recovery - Dark gray clay and sand, moist/wet (native)		Boring complete to 22'

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-46-WC**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/12/11**

DRILLING CO.: -
DRILLING METHOD **Hollow Stem Auger**
SAMPLING METHOD **Acetate Sleeves**
TOTAL DEPTH: **18'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0	Sample taken 0-2' for laboratory analysis	0.0	[0-4'] (BC=WOH-3-6-5-4-5-7-6) 2' Recovery - Top 1' - Grass, brown, moist/stiff silt and clay, some gravels; Bottom 1' - Brown/black sand and clay, some gravels, moist		
-5	Sample taken 5-8' for laboratory analysis	0.0 4.8 10.7 12.2	[4-8'] (BC= 2-3-3-14-23-10) 2' Recovery - Top 1' - Same as above; Bottom 1' - Black sludge/waxy/oily material, some sand/clay, stiff, moist, slight odor		
-10		2.9 2.2 8.6 10.2 8.4	[8-10'] (BC=2-5-7-11) Full Recovery - Black clay, moist, odor, stiff [10-14'] (BC=WOH-3-5-6-6-8-8-7) 3' Recovery - Black clay, crumbles in intervals, moist, odor (SAA)		
-15	Sample taken 17-18' for laboratory analysis	11.9 7.8 14.3 2.6	[14-18'] (BC=2-5-7-7-9-7-15-18) Full Recovery - Top 2' - Wet, same as above; Bottom 2' - gray/dk. gray sand (native) and gravel, sl. odor, moist		Boring complete to 18'

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-47**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/19/11**

DRILLING CO.: -
DRILLING METHOD **Hand Auger**
SAMPLING METHOD **Grab**
TOTAL DEPTH: **2'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0		0.0	Wet, grass/moss, brown sandy silt and gravel		
	Sample taken 0-2' for laboratory analysis	0.0	Same as above, change to black @ 2', some brick fill		

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-48**

PROJECT:	**Sunoco - Philadelphia Refinery**	DRILLING CO.:	-
SITE LOCATION:	**AOI-10**	DRILLING METHOD	**Hollow Stem Auger**
JOB NO.:		SAMPLING METHOD	**Acetate Sleeve**
LOGGED BY:	**Shaun Sykes**	TOTAL DEPTH:	**12'**
DATES DRILLED:	**4/14/11**		

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0	Sample taken 0-2' for laboratory analysis	14.4	[0-4'] (BC=5-7-15-9-5-10-12-8) 3' Recovery - 1' - Grass, brown sandy silt and gravel, moist; 1' - Brick frags, fill, tan sand and gravel; 1' - Black sand and gravel, some silt, dry, slightly micaceous		
		9.7			
		8.6	[4-8'] (BC=5-3-3-4-4-4-10-6) 3' Recovery - Dark gray/black fine sand w/ clay, wet, slightly micaceous		
-5		6.3			
		4.7			
		8.1	[8-12'] (BC=3-3-1-2-1-1-2-3) Full Recovery - 2' - Same as above, strong odor, moist; 2' - Dark gray clay w/ some sand, moist, organics at bottom, slightly micaceous		
		16.8			
-10		17.1			
		19.6			Boring complete to 12' (no waste material observed)

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-49**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/19/11**

DRILLING CO.: -
DRILLING METHOD **Hand Auger**
SAMPLING METHOD **Grab**
TOTAL DEPTH: **2'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0		0.0	Grass, brown silt to gray/tan sand and gravels, dry		
	Sample taken 0-2' for laboratory analysis	0.0	Same as above, change to black/dk. brown sandy silt and gravels, wet @ 1.5'		

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-50**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/19/11**

DRILLING CO.: -
DRILLING METHOD **Hand Auger**
SAMPLING METHOD **Grab**
TOTAL DEPTH: **2'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0		0.0	Grass, brick/glass/cinders, fill, brown sandy silt and gravel, dry		
	Sample taken 0-2' for laboratory analysis	0.0	Dark brown sandy silt and gravel, fill material - brick, cinders, dry		

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-51**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/14/11**

DRILLING CO.: -
DRILLING METHOD **Hollow Stem Auger**
SAMPLING METHOD **Acetate Sleeve**
TOTAL DEPTH: **20'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0	Sample taken 0-2' for laboratory analysis	0.0	[0-4'] (BC=WOH-6-10-9-3-5-8-11) Full Recovery - 2' - Grass, dk. brown/brown sandy silt and gravel; 2' - Gray f/c sand and gravel, some dense balck silt/clay, moist, some brick frags/fill material		
		4.4	[4-8'] (BC=5-9-3-3-2-5-6-7) No Recovery		
-5		9.8	[8-12'] (BC=1-3-22-50-31-5-3-3) 2' Recovery - Tan/brown sandy silt and gravel, wet/moist, some/little sandy clay at bottom 2"		
-10		8.2	[12-16'] (BC=2-3-3-5-4-2-3-3) 2' Recovery - Black/dk. gray f/c sand and gravel w/ clay, slight odor		
		16.7			
-15		21.5	[16-20'] (BC=8-7-29-5-7-7-4-3) Full Recovery - 2' - Same as above w/ some brick frags, wet; 2' - Dk. gray/black fine sandy clay, sl. micaceous, moist		
		10.9			
		9.2			
-20		2.2			Boring complete to 20' (no waste material observed)

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-52**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/14/11**

DRILLING CO.: -
DRILLING METHOD **Hollow Stem Auger**
SAMPLING METHOD **Acetate Sleeve**
TOTAL DEPTH: **16'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0			[0-2'] (BC=3-2-6-6) Full Recovery - Grass, brown/tan sand and silt, moist, some brick fill		
	Sample taken 0-2' for laboratory analysis	0.0			
		0.0	[2-4'] (BC=6-16-14-16) Full Recovery - Brown/gray dense sandy silt and gravels, some brick/plastic fill material, sl. moist		
		0.0			
		0.0	[4-8'] (BC=3-9-2-14-5-5-9-11) Full Recovery - Top 2' - Same as above w/ wood 5-6', fill, brown, some brick; Bottom 2' - Brown/dk. brown sandy clay w/ gravel, micaceous		
-5					
		4.3			
		3.5			
		1.9	[8-12'] (BC=35-16-14-15-11-13-17-13) 2' Recovery - Top 1' - Same as above; Bttom 1' - Dk. brown/black f/c sand and gravel, some clay, bits of fabric material and brick fill, wet		
-10		2.4			
		27.3	[12-16'] (BC=16-4-4-5-3-3-3-3) 1' Recovery - Dk. gray/black clay, trace f. sand, sl. micaceous, moist		
		6.2			
-15		4.3			Boring complete to 16' (no waste material observed)

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-53**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/22/11**

DRILLING CO.: -
DRILLING METHOD **Hand Auger**
SAMPLING METHOD **Grab**
TOTAL DEPTH: **2'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0			Wet, reeds/grass, tan/brown silty f/c sand, roots		
	Sample taken 0-2' for laboratory analysis	0.0			

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-54**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/22/11**

DRILLING CO.: -
DRILLING METHOD **Hand Auger**
SAMPLING METHOD **Grab**
TOTAL DEPTH: **2'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0			Dk. brown silty f/c sand, wet @ 6", roots		
	Sample taken 0-2' for laboratory analysis	0.0			

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-55-WC**

PROJECT:	**Sunoco - Philadelphia Refinery**	DRILLING CO.:	-
SITE LOCATION:	**AOI-10**	DRILLING METHOD	**Hollow Stem Auger**
JOB NO.:		SAMPLING METHOD	**Acetate Sleeves**
LOGGED BY:	**Shaun Sykes**	TOTAL DEPTH:	**22'**
DATES DRILLED:	**4/12/11**		

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0	Sample taken 0-2' for laboratory analysis	2.2	[0-4'] (BC=WOH-7-5-3-6-2-1-5) 3' Recovery - Grass, brown silt, sand and gravel, moist; Bottom 2' - gray/brown sandy silt and gravel, moist		
-5	Sample taken 5-8' for laboratory analysis		[4-8'] (BC=3-2-1-1-1-4-3-7) 2' Recovery - Top 1' - Same as above w/ styrofoam pieces; Bottom 1' - Black/dk. gray sand and clay, odor, moist		
-10		20.6	[8-10'] (BC=18-65-50/4) 1' Recovery - Thin clear plastic sheeting, black sandy silt and some gravel, odor, moist, loose		
-15		4.8	[10-14'] (BC=1-1-6-4-4-4-4-6) 3' Recovery - Brick/black sand, some clay and gravel, amber colored waxy resin @ 13', change to all black sand (trace clay) @ 13.5', slight odor, moist/wet		
-20	Sample taken 20-22' for laboratory analysis	7.1	[14-18'] (BC=1-1-1-2-4-5-6-6) 2' Recovery - Black/dk. gray/brown sand and gravel, some clay (native), moist/wet		
			[18-22'] (BC=2-2-3-4-1-3-1-1) 6" Recovery - Dark gray fine sand, some clay, moist		Boring complete to 22'

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-56-WC**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/12/11**

DRILLING CO.: -
DRILLING METHOD **Hollow Stem Auger**
SAMPLING METHOD **Acetate Sleeve**
TOTAL DEPTH: **24'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0	Sample taken 0-2' for laboratory analysis	4.9	[0-4'] (BC=1-7-12-10-15-18-20-23) Full Recovery - Top 2' - Grass, tan/brown sandy silt and gravel, moist; Bottom 2' - Gravel/sand and concrete, dry, tight		
-5		33.7	[4-8'] (BC=13-13-11-14-19-17-15-13) 2' Recovery - Gray/crumbly fine sandy silt and some gravels, tight, dry		
		43.3	[8-10'] (BC=6-6-2-4) 4" Recovery - Gray silty clay, thin clear plastic sheeting w/ thick yellow plastic		
-10	Sample taken 10-12' for laboratory analysis	112	[10-14'] (BC=WOH-13-16-21-20-8-6-11) 2' Recovery - Dark brown/black sand and gravel, some clay, fabric material, some white waxy resin, moist, strong odor		
-15			[14-18'] (BC=WOH-3-14-16-57-21-19-19) 2' Recovery - Same as above w/ black tar/oily material		
			[18-20'] (BC=50/0.3) Concrete, drilled to 20'		
-20	Sample taken 22-24' for laboratory analysis	12.1	[20-24'] (BC=6-1-1-1-1-1-1-2) Black wet fine sand,gray clay w/ organics in bottom 6", moist		Boring complete to 24'

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-57**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/21/11**

DRILLING CO.: -
DRILLING METHOD **Hollow Stem Auger**
SAMPLING METHOD **Acetate Sleeve**
TOTAL DEPTH: **16'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0			[0-4'] (BC=2-2-3-4-5-4-5-6) 1' - Tan/brown sandy silt, wet; 3' - Black f/c sand and gravel, wet		
	Sample taken 0-2' for laboratory analysis	6.8			
		417.3	[4-8'] (BC=4-4-2-3-2-3-2-3) Black sand and gravel, strong odor, visible oil/product		
-5					
		1372			
		1361	[8-12'] (BC=2-1-2-2-2-3-2-3) 1' Recovery - Same as above w/ some clay		
-10		632			
		717	[12-16'] (BC=3-3-3-3-3-3-3-3) 1' Recovery - Gray/dk. gray f. sandy clay with brown organics (20%)		
		34.8			
-15		17.2			Boring complete to 16' (no waste material observed)

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-58**

PROJECT:	**Sunoco - Philadelphia Refinery**	DRILLING CO.:	-
SITE LOCATION:	**AOI-10**	DRILLING METHOD	**Hollow Stem Auger**
JOB NO.:		SAMPLING METHOD	**Acetate Sleeve**
LOGGED BY:	**Shaun Sykes**	TOTAL DEPTH:	**16'**
DATES DRILLED:	**4/14/11**		

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0	Sample taken 0-2' for laboratory analysis	3.2	[0-4'] (BC=WOH-WOH-WOH-1-1-1-2-2-WOH-WOH) 1' Recovery - Grass, brown sandy silt, wet, some gravel/root material		
			[4-8'] (BC=WOH-WOH-2-4-4-6-7-4) Black, wet, loose sand f/c, some silt/clay, gravel		
-5			[8-12'] (BC=4-2-5-3-2-3-2-2) No Recovery		
-10			[12-16'] (BC=2-2-2-2-2-3-4-4-4) Brown/dk. gray f. sandy clay w/ organics (brown) 10-20%		
-15					Boring complete to 16' (no waste material observed)

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-59**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/22/11**

DRILLING CO.: -
DRILLING METHOD **Hand Auger**
SAMPLING METHOD **Grab**
TOTAL DEPTH: **2'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0			Brown sandy silt, brick frags, some amber/white waxy resin material, dry		
	Sample taken 0-2' for laboratory analysis	0.0			

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-60**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/22/11**

DRILLING CO.: -
DRILLING METHOD **Hand Auger**
SAMPLING METHOD **Grab**
TOTAL DEPTH: **2'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0			Dk. brown/black f/c sand and silt, dry		
	Sample taken 0-2' for laboratory analysis	0.0			

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-61**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/22/11**

DRILLING CO.: -
DRILLING METHOD **Hand Auger**
SAMPLING METHOD **Grab**
TOTAL DEPTH: **2'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0			Light brown silty f/c sand, wet, roots/reeds		
	Sample taken 0-2' for laboratory analysis	0.0			

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-62**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/22/11**

DRILLING CO.: -
DRILLING METHOD **Hand Auger**
SAMPLING METHOD **Grab**
TOTAL DEPTH: **2'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0			Roots/reeds, dk. brown silty f/c sand w/ gravels, wet		
	Sample taken 0-2' for laboratory analysis	0.0			

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-63-WC**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/13/11**

DRILLING CO.: -
DRILLING METHOD **Hollow Stem Auger**
SAMPLING METHOD **Acetate Sleeve**
TOTAL DEPTH: **25'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0			[0-4'] (BC=1-4-9-7-9-10-6-4) 3' Recovery - Brown/orange brown fine sandy silt, moist, some gravels, tight		
	Sample taken 0-2' for laboratory analysis	0.0			
		0.0			
		0.8	[4-8'] (BC=3-2-3-4-8-24-21-24) 2.5' Recovery - Top 2' - Brown/gray brown f. sandy silt, some clay; Bottom 6" - Dark gray/green fine sand, some clay, moist, dense		
-5		4.6			
		18.4			
		26.2	[8-10'] (BC=8-63-30/.2) Brown/gray sandy silt, moist, some gravels		
		20.2			
-10		83.3	[10-12'] (BC=2-50/.3) 6" Recovery - Concrete, black sand and fill material, some gravel		
	Sample taken 12-14' for laboratory analysis	52.9	[12-14] (BC=36-50/.3) 1' Recovery - Top 6" - Black sand/gravel in clay, strong odor, wet; Bottom 6" - Saw dust/wood/plastic/fiber particles, wet		
-15			[14-15] (BC=65-50/.4) Little Recovery - Dark brown/black sand, gravel, cloth/fiber material, clear thin plastic material, drilled to 17'		
			[17-19'] (BC=13-12-8-9) Full Recovery - Black sand and gravels, some clay, strong odor, wood particles		
			[19-23'] (BC=7-8-12-11-5-5-4-4) No recovery - re-drive		
-20	Sample taken 21-23' for laboratory analysis	256			

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-64-WC**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/13/11**

DRILLING CO.: -
DRILLING METHOD **Hollow Stem Auger**
SAMPLING METHOD **Acetate Sleeve**
TOTAL DEPTH: **26'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0			[0-4'] (BC=9-13-19-12-10-8-6-6) 3' Recovery - Top 6" - Grass, medium brown silty clay, moist; Middle 12" - Red/black slag material w/ gravels, dry, metallic; Bottom 6" - Dark gray/black silt and sand		
	Sample taken 0-2' for laboratory analysis	2.1			
		18.7			
		24.2			
		36.5	[4-8'] (BC=5-4-2-2-2-1-1-2) No recovery		
-5					
			[8-10'] (BC=9-14-10-12) 1' Recovery - Black sand/clay, brick fragments, large gravel in bottom, strong odor		
		26.2			
-10		250	[10-14'] (BC=4-4-31-20-6-5-4-5) 2' Recovery - Black/dark gray sand and gravel, glass fragments, cement fragments, moist/wet, strong odor, trace clay		
	Sample taken 11-13' for laboratory analysis	172			
		199			
		88.5	[14-18'] (BC=8-5-4-2-3-2-13-14) 2' Recovery - Black/gray sand and gravel in clay, moist/wet, strong odor/oily, light gray clay in bottom 2"		
-15		109			
		117			
			[18-22'] (BC=WOH-5-7-4-4-5-5-7) Same as above, little recovery, wet		
-20					
			[22-26'] (BC=8-6-7-7-6-6-7-6) 3' Recovery - Gray clay w/ brown organics 20-30% (native), moist, slight odor		
	Sample taken 24-26' for laboratory analysis				
-25					Boring complete to 26'

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-65**

PROJECT:	**Sunoco - Philadelphia Refinery**	DRILLING CO.:	-
SITE LOCATION:	**AOI-10**	DRILLING METHOD	**Hollow Stem Auger**
JOB NO.:		SAMPLING METHOD	**Acetate Sleeve**
LOGGED BY:	**Shaun Sykes**	TOTAL DEPTH:	**16'**
DATES DRILLED:	**4/14/11**		

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0	Sample taken 0-2' for laboratory analysis	33.9	[0-4'] (BC=WOH/4') 1' Recovery - Grass, brown sandy silt, some clay, moist		
-5	Sample taken 6-8' for laboratory analysis	206	[4-8'] (BC=WOH-WOH-WOH-WOH-2-5-5-7) Full Recovery - Top 2' - Black sandy clay, moist/wet; Bottom 2' - Fiber material, black oily sludge/tar, strong odor		
-10		312	[8-12'] (BC=1-1-1-1-1-2-1-1) No Recovery		
-15	Sample taken 14-16' for laboratory analysis	22.4 10.2	[12-16'] (BC=3-4-3-3-4-2-2-2) 2' Recovery - Gray f. sandy clay, moist		Boring complete to 16'

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-66**

PROJECT:	**Sunoco - Philadelphia Refinery**	DRILLING CO.:	-
SITE LOCATION:	**AOI-10**	DRILLING METHOD	**Hand Auger**
JOB NO.:		SAMPLING METHOD	**Grab**
LOGGED BY:	**Shaun Sykes**	TOTAL DEPTH:	**2'**
DATES DRILLED:	**4/21/11**		

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0		0.0	Trash/garbage, sticks/wood, brown/tan f/c sandy clay, wet		
	Sample taken 0-2' for laboratory analysis	1.1	Coarse sand and gravel, some brown/tan clay, wet		

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-67**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/21/11**

DRILLING CO.: -
DRILLING METHOD **Hand Auger**
SAMPLING METHOD **Grab**
TOTAL DEPTH: **2'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0		0.0	Grass, brown f/c sandy silt and gravel, moist, increased sands w/ depth		
	Sample taken 0-2' for laboratory analysis				
		4.2	Wet, black fine sand		

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-68**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/14/11**

DRILLING CO.: -
DRILLING METHOD **Hollow Stem Auger**
SAMPLING METHOD **Acetate Sleeve**
TOTAL DEPTH: **20'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0	Sample taken 0-2' for laboratory analysis	1.1	[0-4'] (BC=1-20-25-27-28-35-25-12) Full Recovery - 1' - Grass, brown sandy silt and gravel, moist; 2' - Sand and gravel, f/c, moist/wet, gray/red/white; 1' - Black sand and gravel, f/c, little clay, moist/wet		
		2.8			
		2.9	[4-8'] (BC=1-2-9-18-10-4-1-1) Litte (4") Recovery - Same as above, wet		
-5		36.9			
			[8-12'] (BC=2-2-4-4-2-1-3-2) Black f. sandy clay, sl. micaceous, wet, odor		
-10		47.2			
			[12-16'] (BC=3-2-3-3-3-3-3-4) No recovery, wet		
-15					
			[16-20'] (BC=4-4-4-3-3-4-3-3) 1' Recovery - Dark gray/black clay w/ brown organics 20-30%, moist 50% organics bottom 3"		
		2.5			Boring complete to 20' (no waste material observed)
-20					

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-69-WC**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/12/11**

DRILLING CO.: -
DRILLING METHOD **Hollow Stem Auger**
SAMPLING METHOD **Acetate Sleeve**
TOTAL DEPTH: **16'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0	Sample taken 0-2' for laboratory analysis	0.0	[0-4'] (BC=1-3-5-7-14-6-6-3-4-8) 2' Recovery - Top 18"' - Grass, med. brown silt and some sand and gravels, moist, trace clay; Bottom 6" - Dark brown/orange sandy silt and gravels, trace clay		
-5	Sample taken 5-8' for laboratory analysis	0.0 2.1 5.6 8.7 12.4	[4-8'] (BC=4-3-4-10-7-6-15-18) 3' Recovery - Top 8" - Orange/brown silty clay, moist; Middle 2" - Tan fine sand, moist/wet; Bottom 14" - Black/dk. brown silty material, moist, strong odor, some black/oily tar material [8-10'] (BC=35-50/1) No Recovery		
-10			[10-12'] (BC=17-50/3) 6" Recovery - Large gravels some brown sandy silt, dry [12-16'] (BC=4-4-3-3-3-3-1-2) 3' Recovery - Top 2' - Black silty sand, wet, sl. odor; Bottom 1' - Gray silty sand (native), wet		
-15	Sample taken 15.5-16' for laboratory analysis				Boring complete to 16'

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-70-WC**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/11/11**

DRILLING CO.: -
DRILLING METHOD **Hollow Stem Auger**
SAMPLING METHOD **Direct Push - Grab**
TOTAL DEPTH: **16'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0			[0-4'] (BC=1-1-4-6-8-14-16-15) - 2.5' Recovery - Top 22" - Cover, orange-brown sandy clay, fill w/ gravel and roots, moist; Bottom 8" - Black, mostly fine-grained material (asphalt or tar) crumbles like soil in parts and stiff/pliable like soft asphalt in others, some gravels		
	Sample taken 0-2' for laboratory analysis	0.1			
		0.9			
		1.3	[4-8'] (BC=4-5-12-20-15-15-15-9) - Full Recovery - Same black silty material to 5'; 5-8' - Pure white waxy material, hard like resin in spots		
-5		1.3			
	Sample taken 5-8' for laboratory analysis	2.0			
		0.6			
		0.6	[8-12'] (BC=4-14-7-9-12-6-4-4) - 1' Recovery - 2" waxy material in w/ black material, gravel, wet at bottom - very strong odors, black oily material (asphalt) - sandy parts of fill holding oil		
		5.4			
-10					
		7.9			
			[12-16'] (BC=4-3-2-2-1-3-3-3) - 2.5' Recovery - Black fill/waste material to 15.5', gray clay - native (odors)		
		36.4			
	Sample taken 15.5-16' for laboratory analysis	36.9			
-15		20.4			Boring complete to 16'

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-71**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/5/11**

DRILLING CO.: -
DRILLING METHOD **Hand Auger**
SAMPLING METHOD **Grab**
TOTAL DEPTH: **2'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0		0.0	Grass, orange/brown sandy silt w/ organic matter, dry, no odor		
	Sample taken 0-2' for laboratory analysis	5.7	Change to balck sand and mixed gravels, dry, no odor		

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-72**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/5/11**

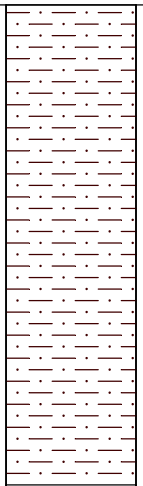
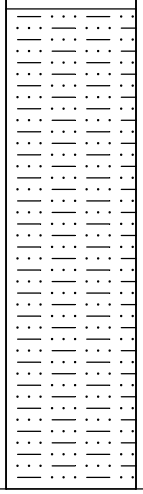
DRILLING CO.: -
DRILLING METHOD **Hand Auger**
SAMPLING METHOD **Grab**
TOTAL DEPTH: **2'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0		0.0	Grass, dk. brown/black silt w/ organic matter, wet @ 1', no odor		
	Sample taken 0-2' for laboratory analysis	9.3	Black sand and gravels w/ some black silt, wet, slight odor		

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-73**

PROJECT:	**Sunoco - Philadelphia Refinery**	DRILLING CO.:	-
SITE LOCATION:	**AOI-10**	DRILLING METHOD	**Hand Auger**
JOB NO.:		SAMPLING METHOD	**Grab**
LOGGED BY:	**Shaun Sykes**	TOTAL DEPTH:	**2'**
DATES DRILLED:	**4/5/11**		

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0		0.0	Grass, dark brown /black silt, trace sand, wet @ 1', no odor		
	Sample taken 0-2' for laboratory analysis	0.0	Black sand and gravels w/ some black silt, wet, slight odor		

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-75**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/18/11**

DRILLING CO.: -
DRILLING METHOD **Hollow Stem Auger**
SAMPLING METHOD **Acetate Sleeve**
TOTAL DEPTH: **28'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0	Sample taken 0-2' for laboratory analysis	0.0	[0-4'] (BC=1-7-15-11-12-13-11-12) 2' Recovery - Grass, brown sandy silt w/ gravel, fill-brick and cinders, dry		
		2.8	[4-8'] (BC=10-7-9-7-11-30-7-11) 2' Recovery - 1' - Same as above; 1' - Black/gray sand, trace clay, orange/brick/cinder in bottoms, dry, some plastic material		
-5		8.8			
		47.8	[8-12'] (BC=10-12-9-6-4-6-7-14) Full Recovery - Black fine sand w/ some clay, few gravels, wood/orangic matter, moist, strong odor		
-10		112			
		262			
		273	[12-16'] (BC=4-4-6-5-10-11-9-17) 1' Recovery - Black fine sand, moist		
		44.8			
-15		14.7	[16-20'] (BC=10-6-3-4-3-2-3-3) 1' Recovery - Black f/c sand and gravel, wet, odor		
		10.7			
-20		23.0	[20-24'] (BC=WOH-WOH-6-16-8-7-4-5) 1' Recovery - Same as above		
		31.9			
		151	[24-28'] (BC=3-3-3-4-2-4-3-9) Full Recovery - Dk. gray clay w/ some fine sand, organics (20%) (native)		
-25		13.3			
		7.6			
		4.1			Boring complete to 28' (no waste material observed)

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-76**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/20/11**

DRILLING CO.: -
DRILLING METHOD **Hand Auger**
SAMPLING METHOD **Grab**
TOTAL DEPTH: **2'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0	Sample taken 0-2' for laboratory analysis		Grass, brown sandy silt, some gravel/brick fill, dry		

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-77-WC**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/13/11**

DRILLING CO.: -
DRILLING METHOD **Hollow Stem Auger**
SAMPLING METHOD **Acetate Sleeve**
TOTAL DEPTH: **22'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0			[0-4'] (BC=WOH-1-2-4-6-6-33-15) 2' Recovery - Grass, brown sandy silt, roots, some brick/fill material, tan silty sand @ 3-3.4', black/dark brown sandy silt 3.5-4', trace clay, dense		
	Sample taken 0-2' for laboratory analysis	0.0			
		0.0			
		0.0	[4-8'] (BC=WOH-3-2-3-1-5-5-7) 2' Recovery - Top 6" - Black sandy clay, moist, strong odor; Middle 6" - White/waxy resin; Bottom 6" - Dark gray/brown silty sand, strong odor, moist, some fabric material		
-5					
		0.0			
	Sample taken 6.5-7' for laboratory analysis (**All waxy resin)	2.4			
		2.6	[8-10'] (BC=2-5-6-2) 1.5' Recovery - Black sandy silt, mostly fabric, wood material, glass, papers, strong odor		
		19.0			
-10					
	Sample taken 10-12' for laboratory analysis		[10-14'] (BC=2-2-40-7-35-16-12-10) 3' Recovery - Top 18" - Same as above, fiber material; Middle 6" - Black fine sand, moist; Bottom 12' - Red/brown sand, silt and gravel (old brick)		
		34.5			
		67.6			
		119			
			[14-18'] (BC=WOH-6-4-4-4-6-7-6) 2' Recovery - Black, wet, loose sand f/c, some clay and gravels (native) strong odor		
-15					
		4.7			
		38.2			
		56.4			
			[18-22'] (BC=8-6-4-9-8-6-5-5) 2' Recovery - Same as above, black fine sand w/ some clay, wet, strong odor, gray clay in tip of spoon		
		72.6			
-20	Sample taken 20-22' for laboratory analysis				
		84.4			Boring complete to 22'

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-78**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/21/11**

DRILLING CO.: -
DRILLING METHOD **Hand Auger**
SAMPLING METHOD **Grab**
TOTAL DEPTH: **2'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0			Grass, brown f/c sandy silt, dry		
		0.0			
	Sample taken 0-2' for laboratory analysis		Tan/brown/orange f/c sandy silt, micaceous, moist		
		0.0			

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-79**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/21/11**

DRILLING CO.: -
DRILLING METHOD **Hand Auger**
SAMPLING METHOD **Grab**
TOTAL DEPTH: **2'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0			Grass, brown f/c sandy silt, dry		
		0.0			
	Sample taken 0-2' for laboratory analysis		Tan/orange/gray f. sand and silt, moist, trace clay		
		0.0			

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-80**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/21/11**

DRILLING CO.: -
DRILLING METHOD **Hand Auger**
SAMPLING METHOD **Grab**
TOTAL DEPTH: **2'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0			Grass, brown f/c sandy silt, dry, micaceous		
	Sample taken 0-2' for laboratory analysis		Tan/orange/gray f. sand and silt, trace clay, moist/wet @ 2', micaceous		

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-81**

PROJECT:	**Sunoco - Philadelphia Refinery**	DRILLING CO.:	-
SITE LOCATION:	**AOI-10**	DRILLING METHOD	**Hollow Stem Auger**
JOB NO.:		SAMPLING METHOD	**Acetate Sleeve**
LOGGED BY:	**Shaun Sykes**	TOTAL DEPTH:	**10'**
DATES DRILLED:	**4/21/11**		

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0	Sample taken 0-2' for laboratory analysis	0.0	[0-4'] (BC=WOH-3-10-9-9-4-3-1) 2' Recovery - Grass, brown f/c sand, silt and gravel, moist		
		0.0	[4-8'] (BC=1-2-3-3-2-3-3-3) 3' Recovery - 2' - Coarse sands and gravel, wet; 1' - Gray clay, little f. sand, some organics		
-5		14.4			
		46.7			
		82.8	[8-10'] (BC=6-5) Little Recovery - Gray clay, some f. sand, wet/moist		
		277			Boring complete to 10' (no waste material observed)
-10					

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-82-WC**

PROJECT:	**Sunoco - Philadelphia Refinery**	DRILLING CO.:	-
SITE LOCATION:	**AOI-10**	DRILLING METHOD	**Hollow Stem Auger**
JOB NO.:		SAMPLING METHOD	**Acetate Sleeve**
LOGGED BY:	**Shaun Sykes**	TOTAL DEPTH:	**12'**
DATES DRILLED:	**4/20/11**		

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0	Sample taken 0-2' for laboratory analysis	0.0	[0-4'] (BC=WOH-1-1-2-4-7-6-5) Full Recovery - Grass/moss, dk. brown f/c sandy silt w/ some clay, gravels, wet, little woody material		
		4.3			
		12.7	[4-8'] (BC=1-1-4-12-10-15-16-4) Full Recovery - 2' - Gray/dk. gray f/c sand and gravel, wet, odor; 2' - Gray/dk. gray fine sand w/ clay at bottom, wet, strong odor		
-5		58.7			
		90.0			
		47.8	[8-12'] (BC=4-2-5-4-2-1-3-2) 2' Recovery - Gray clay, some fine sand w/ 20% organics, moist, odor (native)		
-10					Boring complete to 12' (no waste material observed)

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-83-WC**

PROJECT: **Sunoco - Philadelphia Refinery**
SITE LOCATION: **AOI-10**
JOB NO.:
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **4/21/11**

DRILLING CO.: -
DRILLING METHOD **Hollow Stem Auger**
SAMPLING METHOD **Acetate Sleeve**
TOTAL DEPTH: **14'**

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0	Sample taken 0-2' for laboratory analysis		[0-4'] (BC=3-2-3-2-2-4-6-4) 1' Recovery - Grass, brown f/c sandy silt, fill-brick, concrete, dry, some wood		
-5			[4-8'] (BC=15-14-9-6-5-5-4-2) 2' Recovery - 1' - Concrete/brick fill, f/c sand and gravel (black/dk. brown); 1' - Tan/gray f/c sand and clay, moist, no odors		
		0.0			
		0.0	[8-10'] (BC=6-5) Little Recovery - Large gravels and f/c sands, wet, some tan/brown clay		
-10		4.3	[10-14'] 1' Recovery - Gray f. sandy clay, some organics		Boring complete to 14' (no waste material observed)

SUBSURFACE BORING LOG

BOREHOLE NO. **BH-10-84**

PROJECT:	**Sunoco - Philadelphia Refinery**	DRILLING CO.:	-
SITE LOCATION:	**AOI-10**	DRILLING METHOD	**Hand Auger**
JOB NO.:		SAMPLING METHOD	**Grab**
LOGGED BY:	**Shaun Sykes**	TOTAL DEPTH:	**5'**
DATES DRILLED:	**4/22/11**		

DEPTH (feet)	SAMPLE INTERVAL	PID (ppm)	LITHOLOGY DESCRIPTION	LITH-OLOGY	COMMENTS
0			Wet, brown sandy silt and gravel, some clay		
			Same as above, dark brown/black		
			Black fine sandy clay, wet		
-5					End boring @ 5' (no waste material observed)

APPENDIX D

Soil, Groundwater, Sediment, and Surface Water Analytical Reports (on CD)

Lancaster Laboratories

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

Analysis Report

ANALYTICAL RESULTS

Prepared by:

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

Prepared for:

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

May 10, 2011

Project: SUN: Philadelphia Refinery AOI-10

Submittal Date: 04/28/2011
Group Number: 1244429
PO Number: PHILADELPHIA
State of Sample Origin: PA

Client Sample Description	Lancaster Labs (LLI) #
W-16_04272011 Grab Water	6271518
W-17_04272011 Grab Water	6271519
W-19_04272011 Grab Water	6271520
W-20_04272011 Grab Water	6271521
W-22_04272011 Grab Water	6271522
W-23_04272011 Grab Water	6271523
W-32_04272011 Grab Water	6271524
W-32D_04272011 Grab Water	6271525
W-33_04272011 Grab Water	6271526
W-1_04272011 Grab Water	6271527
W-34_04272011 Grab Water	6271528
W-5_04262011 Grab Water	6271529
W-9_04262011 Grab Water	6271530
W-15_04262011 Grab Water	6271531
W-25_04262011 Grab Water	6271532
W-26_04262011 Grab Water	6271533
W-27_04262011 Grab Water	6271534
W-30_04262011 Grab Water	6271535
W-2_04262011 Grab Water	6271536
W-6_04262011 Grab Water	6271537
W-11_04262011 Grab Water	6271538
W-12_04262011 Grab Water	6271539
W-13_04262011 Grab Water	6271540
W-1D_04262011 Grab Water	6271541
W-28_04262011 Grab Water	6271542
W-29_04262011 Grab Water	6271543
W-31_04262011 Grab Water	6271544

Lancaster Laboratories

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

Analysis Report

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

ELECTRONIC COPY TO	Langan	Attn: Dennis Webster
ELECTRONIC COPY TO	SUN: Aquaterra Tech.	Attn: Tiffani Doerr
ELECTRONIC COPY TO	LLI	Attn: EDD Group
ELECTRONIC COPY TO	Langan	Attn: Kristen Ward
ELECTRONIC COPY TO	Aquaterra Tech	Attn: Loretta Belfiglio

Questions? Contact your Client Services Representative
Jessica A Oknefski at (717) 656-2300 Ext. 1815

Respectfully Submitted,



Chad A. Moline
Group Leader

Lancaster Laboratories

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

Analysis Report

Sample Description: W-16_04272011 Grab Water
Philadelphia Refinery AOI-10
COC: 238116 W-16_04272011

LLI Sample # WW 6271518
LLI Group # 1244429
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/27/2011 12:20 by SS

Submitted: 04/28/2011 16:55
Reported: 05/10/2011 10:53

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

A1016

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/l**	**ug/l**	**ug/l**	
10943	Benzene	71-43-2	0.6 J	0.5	1	1
10943	1,2-Dichloroethane	107-06-2	N.D.	0.5	1	1
10943	Ethylbenzene	100-41-4	N.D.	0.5	1	1
10943	Isopropylbenzene	98-82-8	26	0.5	2	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	N.D.	0.5	1	1
10943	Toluene	108-88-3	N.D.	0.5	1	1
10943	1,2,4-Trimethylbenzene	95-63-6	N.D.	0.5	2	1
10943	1,3,5-Trimethylbenzene	108-67-8	N.D.	0.5	2	1
10943	Xylene (Total)	1330-20-7	0.6 J	0.5	1	1
GC/MS Semivolatiles	**SW-846 8270C**		**ug/l**	**ug/l**	**ug/l**	
07805	Chrysene	218-01-9	N.D.	1	5	1
07805	Fluorene	86-73-7	N.D.	1	5	1
07805	Naphthalene	91-20-3	N.D.	1	5	1
07805	Phenanthrene	85-01-8	N.D.	1	5	1
07805	Pyrene	129-00-0	N.D.	1	5	1
GC Miscellaneous	**SW-846 8011**		**ug/l**	**ug/l**	**ug/l**	
07879	Ethylene dibromide	106-93-4	N.D.	0.0095	0.028	1
Metals Dissolved	**SW-846 6020**		**mg/l**	**mg/l**	**mg/l**	
06035	Lead	7439-92-1	0.00018 J	0.000052	0.0010	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.
Trip blank vials were not received by the laboratory for this sample group.

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	P111193AA	04/30/2011 05:01	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	P111193AA	04/30/2011 05:01	Kevin A Sposito	1
07805	PAHs by 8270	SW-846 8270C	1	11119WAA026	05/01/2011 23:34	Linda M Hartenstine	1
07807	BNA Water Extraction	SW-846 3510C	1	11119WAA026	04/30/2011 09:20	Joseph S Feister	1
07879	EDB in Wastewater	SW-846 8011	1	111220024A	05/04/2011 03:47	Tyler O Griffin	1
07786	EDB Extraction	SW-846 8011	1	111220024A	05/03/2011 10:15	Edwin Ortiz	1
06035	Lead	SW-846 6020	1	111226050002A	05/04/2011 12:36	Choon Y Tian	1
06050	ICP/MS SW-846 Water Digest	SW-846 3010A modified	1	111226050002	05/03/2011 08:53	Denise K Conners	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-17_04272011 Grab Water
Philadelphia Refinery AOI-10
COC: 238116 W-17_04272011

LLI Sample # WW 6271519
LLI Group # 1244429
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/27/2011 12:10 by SS

Submitted: 04/28/2011 16:55
Reported: 05/10/2011 10:53

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

A1017

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/l**		**ug/l**	**ug/l**	
10943	Benzene	71-43-2	0.9	J	0.5	1	1
10943	1,2-Dichloroethane	107-06-2	N.D.		0.5	1	1
10943	Ethylbenzene	100-41-4	0.6	J	0.5	1	1
10943	Isopropylbenzene	98-82-8	43		0.5	2	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.5	1	1
10943	Toluene	108-88-3	N.D.		0.5	1	1
10943	1,2,4-Trimethylbenzene	95-63-6	0.9	J	0.5	2	1
10943	1,3,5-Trimethylbenzene	108-67-8	N.D.		0.5	2	1
10943	Xylene (Total)	1330-20-7	3		0.5	1	1
GC/MS Semivolatiles	**SW-846 8270C**		**ug/l**		**ug/l**	**ug/l**	
07805	Chrysene	218-01-9	N.D.		1	5	1
07805	Fluorene	86-73-7	N.D.		1	5	1
07805	Naphthalene	91-20-3	N.D.		1	5	1
07805	Phenanthrene	85-01-8	N.D.		1	5	1
07805	Pyrene	129-00-0	1	J	1	5	1
GC Miscellaneous	**SW-846 8011**		**ug/l**		**ug/l**	**ug/l**	
07879	Ethylene dibromide	106-93-4	N.D.		0.0094	0.028	1
Metals Dissolved	**SW-846 6020**		**mg/l**		**mg/l**	**mg/l**	
06035	Lead	7439-92-1	0.000084	J	0.000052	0.0010	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.
Trip blank vials were not received by the laboratory for this sample group.

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	P111193AA	04/30/2011 05:28	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	P111193AA	04/30/2011 05:28	Kevin A Sposito	1
07805	PAHs by 8270	SW-846 8270C	1	11119WAA026	05/01/2011 23:59	Linda M Hartenstine	1
07807	BNA Water Extraction	SW-846 3510C	1	11119WAA026	04/30/2011 09:20	Joseph S Feister	1
07879	EDB in Wastewater	SW-846 8011	1	111220024A	05/04/2011 04:47	Tyler O Griffin	1
07786	EDB Extraction	SW-846 8011	1	111220024A	05/03/2011 10:15	Edwin Ortiz	1
06035	Lead	SW-846 6020	1	111226050002A	05/04/2011 12:38	Choon Y Tian	1
06050	ICP/MS SW-846 Water Digest	SW-846 3010A modified	1	111226050002	05/03/2011 08:53	Denise K Conners	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-19_04272011 Grab Water
Philadelphia Refinery AOI-10
COC: 238116 W-19_04272011

LLI Sample # WW 6271520
LLI Group # 1244429
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/27/2011 09:35 by SS

Submitted: 04/28/2011 16:55
Reported: 05/10/2011 10:53

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

A1019

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/l**	**ug/l**	**ug/l**	
10943	Benzene	71-43-2	N.D.	0.5	1	1
10943	1,2-Dichloroethane	107-06-2	N.D.	0.5	1	1
10943	Ethylbenzene	100-41-4	N.D.	0.5	1	1
10943	Isopropylbenzene	98-82-8	N.D.	0.5	2	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	N.D.	0.5	1	1
10943	Toluene	108-88-3	N.D.	0.5	1	1
10943	1,2,4-Trimethylbenzene	95-63-6	N.D.	0.5	2	1
10943	1,3,5-Trimethylbenzene	108-67-8	N.D.	0.5	2	1
10943	Xylene (Total)	1330-20-7	N.D.	0.5	1	1
GC/MS Semivolatiles	**SW-846 8270C**		**ug/l**	**ug/l**	**ug/l**	
07805	Chrysene	218-01-9	N.D.	0.9	5	1
07805	Fluorene	86-73-7	N.D.	0.9	5	1
07805	Naphthalene	91-20-3	N.D.	0.9	5	1
07805	Phenanthrene	85-01-8	N.D.	0.9	5	1
07805	Pyrene	129-00-0	N.D.	0.9	5	1
GC Miscellaneous	**SW-846 8011**		**ug/l**	**ug/l**	**ug/l**	
07879	Ethylene dibromide	106-93-4	N.D.	0.0095	0.028	1
Metals Dissolved	**SW-846 6020**		**mg/l**	**mg/l**	**mg/l**	
06035	Lead	7439-92-1	N.D.	0.000052	0.0010	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.
Trip blank vials were not received by the laboratory for this sample group.

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	P111193AA	04/30/2011 05:56	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	P111193AA	04/30/2011 05:56	Kevin A Sposito	1
07805	PAHs by 8270	SW-846 8270C	1	11119WAA026	05/02/2011 00:23	Linda M Hartenstine	1
07807	BNA Water Extraction	SW-846 3510C	1	11119WAA026	04/30/2011 09:20	Joseph S Feister	1
07879	EDB in Wastewater	SW-846 8011	1	111220024A	05/04/2011 05:48	Tyler O Griffin	1
07786	EDB Extraction	SW-846 8011	1	111220024A	05/03/2011 10:15	Edwin Ortiz	1
06035	Lead	SW-846 6020	1	111226050002A	05/04/2011 12:44	Choon Y Tian	1
06050	ICP/MS SW-846 Water Digest	SW-846 3010A modified	1	111226050002	05/03/2011 08:53	Denise K Conners	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-20_04272011 Grab Water
Philadelphia Refinery AOI-10
COC: 238116 W-20_04272011

LLI Sample # WW 6271521
LLI Group # 1244429
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/27/2011 09:10 by SS

Submitted: 04/28/2011 16:55
Reported: 05/10/2011 10:53

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

A1020

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/l**	**ug/l**	**ug/l**	
10943	Benzene	71-43-2	N.D.	0.5	1	1
10943	1,2-Dichloroethane	107-06-2	N.D.	0.5	1	1
10943	Ethylbenzene	100-41-4	N.D.	0.5	1	1
10943	Isopropylbenzene	98-82-8	N.D.	0.5	2	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	N.D.	0.5	1	1
10943	Toluene	108-88-3	N.D.	0.5	1	1
10943	1,2,4-Trimethylbenzene	95-63-6	N.D.	0.5	2	1
10943	1,3,5-Trimethylbenzene	108-67-8	N.D.	0.5	2	1
10943	Xylene (Total)	1330-20-7	N.D.	0.5	1	1
GC/MS Semivolatiles	**SW-846 8270C**		**ug/l**	**ug/l**	**ug/l**	
07805	Chrysene	218-01-9	N.D.	1	5	1
07805	Fluorene	86-73-7	N.D.	1	5	1
07805	Naphthalene	91-20-3	N.D.	1	5	1
07805	Phenanthrene	85-01-8	N.D.	1	5	1
07805	Pyrene	129-00-0	N.D.	1	5	1
GC Miscellaneous	**SW-846 8011**		**ug/l**	**ug/l**	**ug/l**	
07879	Ethylene dibromide	106-93-4	N.D.	0.0095	0.028	1
Metals Dissolved	**SW-846 6020**		**mg/l**	**mg/l**	**mg/l**	
06035	Lead	7439-92-1	0.0032	0.000052	0.0010	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.
Trip blank vials were not received by the laboratory for this sample group.

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	P111193AA	04/30/2011 06:24	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	P111193AA	04/30/2011 06:24	Kevin A Sposito	1
07805	PAHs by 8270	SW-846 8270C	1	11119WAA026	05/02/2011 00:47	Linda M Hartenstine	1
07807	BNA Water Extraction	SW-846 3510C	1	11119WAA026	04/30/2011 09:20	Joseph S Feister	1
07879	EDB in Wastewater	SW-846 8011	1	111220024A	05/04/2011 06:18	Tyler O Griffin	1
07786	EDB Extraction	SW-846 8011	1	111220024A	05/03/2011 10:15	Edwin Ortiz	1
06035	Lead	SW-846 6020	1	111226050002A	05/04/2011 12:46	Choon Y Tian	1
06050	ICP/MS SW-846 Water Digest	SW-846 3010A modified	1	111226050002	05/03/2011 08:53	Denise K Conners	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-22_04272011 Grab Water
Philadelphia Refinery AOI-10
COC: 238116 W-22_04272011

LLI Sample # WW 6271522
LLI Group # 1244429
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/27/2011 10:40 by SS

Submitted: 04/28/2011 16:55
Reported: 05/10/2011 10:53

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

A1022

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/l**	**ug/l**	**ug/l**	
10943	Benzene	71-43-2	N.D.	0.5	1	1
10943	1,2-Dichloroethane	107-06-2	N.D.	0.5	1	1
10943	Ethylbenzene	100-41-4	N.D.	0.5	1	1
10943	Isopropylbenzene	98-82-8	N.D.	0.5	2	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	N.D.	0.5	1	1
10943	Toluene	108-88-3	N.D.	0.5	1	1
10943	1,2,4-Trimethylbenzene	95-63-6	N.D.	0.5	2	1
10943	1,3,5-Trimethylbenzene	108-67-8	N.D.	0.5	2	1
10943	Xylene (Total)	1330-20-7	N.D.	0.5	1	1
GC/MS Semivolatiles	**SW-846 8270C**		**ug/l**	**ug/l**	**ug/l**	
07805	Chrysene	218-01-9	1 J	1	5	1
07805	Fluorene	86-73-7	1 J	1	5	1
07805	Naphthalene	91-20-3	N.D.	1	5	1
07805	Phenanthrene	85-01-8	N.D.	1	5	1
07805	Pyrene	129-00-0	2 J	1	5	1
GC Miscellaneous	**SW-846 8011**		**ug/l**	**ug/l**	**ug/l**	
07879	Ethylene dibromide	106-93-4	N.D.	0.0095	0.029	1
Metals Dissolved	**SW-846 6020**		**mg/l**	**mg/l**	**mg/l**	
06035	Lead	7439-92-1	0.00020 J	0.000052	0.0010	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.
Trip blank vials were not received by the laboratory for this sample group.

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	P111193AA	04/30/2011 06:52	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	P111193AA	04/30/2011 06:52	Kevin A Sposito	1
07805	PAHs by 8270	SW-846 8270C	1	11120WAF026	05/03/2011 09:59	Brian K Graham	1
07807	BNA Water Extraction	SW-846 3510C	1	11120WAF026	05/02/2011 09:15	Cynthia J Salvatori	1
07879	EDB in Wastewater	SW-846 8011	1	111220024A	05/04/2011 06:48	Tyler O Griffin	1
07786	EDB Extraction	SW-846 8011	1	111220024A	05/03/2011 10:15	Edwin Ortiz	1
06035	Lead	SW-846 6020	1	111226050002A	05/04/2011 12:48	Choon Y Tian	1
06050	ICP/MS SW-846 Water Digest	SW-846 3010A modified	1	111226050002	05/03/2011 08:53	Denise K Conners	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-23_04272011 Grab Water
Philadelphia Refinery AOI-10
COC: 238116 W-23_04272011

LLI Sample # WW 6271523
LLI Group # 1244429
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/27/2011 10:50 by SS

Submitted: 04/28/2011 16:55
Reported: 05/10/2011 10:53

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

A1023

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		ug/l		ug/l	ug/l	
10943	Benzene	71-43-2	12		0.5	1	1
10943	1,2-Dichloroethane	107-06-2	N.D.		0.5	1	1
10943	Ethylbenzene	100-41-4	1		0.5	1	1
10943	Isopropylbenzene	98-82-8	1	J	0.5	2	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.5	1	1
10943	Toluene	108-88-3	2		0.5	1	1
10943	1,2,4-Trimethylbenzene	95-63-6	8		0.5	2	1
10943	1,3,5-Trimethylbenzene	108-67-8	2		0.5	2	1
10943	Xylene (Total)	1330-20-7	13		0.5	1	1
GC/MS Semivolatiles	**SW-846 8270C**		ug/l		ug/l	ug/l	
07805	Chrysene	218-01-9	N.D.		1	5	1
07805	Fluorene	86-73-7	1	J	1	5	1
07805	Naphthalene	91-20-3	3	J	1	5	1
07805	Phenanthrene	85-01-8	N.D.		1	5	1
07805	Pyrene	129-00-0	N.D.		1	5	1
GC Miscellaneous	**SW-846 8011**		ug/l		ug/l	ug/l	
07879	Ethylene dibromide	106-93-4	N.D.		0.0095	0.028	1
Metals Dissolved	**SW-846 6020**		mg/l		mg/l	mg/l	
06035	Lead	7439-92-1	N.D.		0.000052	0.0010	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.
Trip blank vials were not received by the laboratory for this sample group.

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	P111193AA	04/30/2011 07:20	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	P111193AA	04/30/2011 07:20	Kevin A Sposito	1
07805	PAHs by 8270	SW-846 8270C	1	11120WAF026	05/03/2011 10:25	Brian K Graham	1
07807	BNA Water Extraction	SW-846 3510C	1	11120WAF026	05/02/2011 09:15	Cynthia J Salvatori	1
07879	EDB in Wastewater	SW-846 8011	1	111220024A	05/04/2011 08:18	Tyler O Griffin	1
07786	EDB Extraction	SW-846 8011	1	111220024A	05/03/2011 10:15	Edwin Ortiz	1
06035	Lead	SW-846 6020	1	111226050002A	05/04/2011 12:49	Choon Y Tian	1
06050	ICP/MS SW-846 Water Digest	SW-846 3010A modified	1	111226050002	05/03/2011 08:53	Denise K Conners	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-32_04272011 Grab Water
Philadelphia Refinery AOI-10
COC: 238116 W-32_04272011

LLI Sample # WW 6271524
LLI Group # 1244429
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/27/2011 13:00 by SS

Submitted: 04/28/2011 16:55
Reported: 05/10/2011 10:53

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

A1032

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/l**		**ug/l**	**ug/l**	
10943	Benzene	71-43-2	56		0.5	1	1
10943	1,2-Dichloroethane	107-06-2	2		0.5	1	1
10943	Ethylbenzene	100-41-4	1		0.5	1	1
10943	Isopropylbenzene	98-82-8	8		0.5	2	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.5	1	1
10943	Toluene	108-88-3	1		0.5	1	1
10943	1,2,4-Trimethylbenzene	95-63-6	6		0.5	2	1
10943	1,3,5-Trimethylbenzene	108-67-8	1	J	0.5	2	1
10943	Xylene (Total)	1330-20-7	4		0.5	1	1
GC/MS Semivolatiles	**SW-846 8270C**		**ug/l**		**ug/l**	**ug/l**	
07805	Chrysene	218-01-9	4	J	1	5	1
07805	Fluorene	86-73-7	12		1	5	1
07805	Naphthalene	91-20-3	24		1	5	1
07805	Phenanthrene	85-01-8	13		1	5	1
07805	Pyrene	129-00-0	6		1	5	1
GC Miscellaneous	**SW-846 8011**		**ug/l**		**ug/l**	**ug/l**	
07879	Ethylene dibromide	106-93-4	N.D.		0.0094	0.028	1
Metals Dissolved	**SW-846 6020**		**mg/l**		**mg/l**	**mg/l**	
06035	Lead	7439-92-1	0.00037	J	0.000052	0.0010	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.
Trip blank vials were not received by the laboratory for this sample group.

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	P111194AA	04/29/2011 22:15	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	P111194AA	04/29/2011 22:15	Kevin A Sposito	1
07805	PAHs by 8270	SW-846 8270C	1	11120WAF026	05/03/2011 10:50	Brian K Graham	1
07807	BNA Water Extraction	SW-846 3510C	1	11120WAF026	05/02/2011 09:15	Cynthia J Salvatori	1
07879	EDB in Wastewater	SW-846 8011	1	111220024A	05/04/2011 08:49	Tyler O Griffin	1
07786	EDB Extraction	SW-846 8011	1	111220024A	05/03/2011 10:15	Edwin Ortiz	1
06035	Lead	SW-846 6020	1	111226050002A	05/04/2011 12:51	Choon Y Tian	1
06050	ICP/MS SW-846 Water Digest	SW-846 3010A modified	1	111226050002	05/03/2011 08:53	Denise K Conners	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-32D_04272011 Grab Water
Philadelphia Refinery AOI-10
COC: 238116 W-32D_04272011

LLI Sample # WW 6271525
LLI Group # 1244429
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/27/2011 13:20 by SS

Submitted: 04/28/2011 16:55
Reported: 05/10/2011 10:53

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

A102D

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/l**	**ug/l**	**ug/l**	
10943	Benzene	71-43-2	N.D.	0.5	1	1
10943	1,2-Dichloroethane	107-06-2	N.D.	0.5	1	1
10943	Ethylbenzene	100-41-4	N.D.	0.5	1	1
10943	Isopropylbenzene	98-82-8	N.D.	0.5	2	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	N.D.	0.5	1	1
10943	Toluene	108-88-3	N.D.	0.5	1	1
10943	1,2,4-Trimethylbenzene	95-63-6	N.D.	0.5	2	1
10943	1,3,5-Trimethylbenzene	108-67-8	N.D.	0.5	2	1
10943	Xylene (Total)	1330-20-7	N.D.	0.5	1	1
GC/MS Semivolatiles	**SW-846 8270C**		**ug/l**	**ug/l**	**ug/l**	
07805	Chrysene	218-01-9	N.D.	10	50	1
07805	Fluorene	86-73-7	N.D.	10	50	1
07805	Naphthalene	91-20-3	N.D.	10	50	1
07805	Phenanthrene	85-01-8	N.D.	10	50	1
07805	Pyrene	129-00-0	N.D.	10	50	1
Reporting limits were raised due to interference from the sample matrix.						
GC Miscellaneous	**SW-846 8011**		**ug/l**	**ug/l**	**ug/l**	
07879	Ethylene dibromide	106-93-4	N.D.	0.0094	0.028	1
Metals Dissolved	**SW-846 6020**		**mg/l**	**mg/l**	**mg/l**	
06035	Lead	7439-92-1	N.D.	0.000052	0.0010	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.
Trip blank vials were not received by the laboratory for this sample group.

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	P111194AA	04/29/2011 22:43	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	P111194AA	04/29/2011 22:43	Kevin A Sposito	1
07805	PAHs by 8270	SW-846 8270C	1	11124WAB026	05/05/2011 14:34	Brian K Graham	1
07807	BNA Water Extraction	SW-846 3510C	2	11124WAB026	05/04/2011 17:00	Timothy J Attenberger	1
07879	EDB in Wastewater	SW-846 8011	1	111220024A	05/04/2011 09:19	Tyler O Griffin	1
07786	EDB Extraction	SW-846 8011	1	111220024A	05/03/2011 10:15	Edwin Ortiz	1
06035	Lead	SW-846 6020	1	111226050002A	05/04/2011 12:53	Choon Y Tian	1
06050	ICP/MS SW-846 Water Digest	SW-846 3010A modified	1	111226050002	05/03/2011 08:53	Denise K Conners	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-33_04272011 Grab Water
Philadelphia Refinery AOI-10
COC: 238116 W-33_04272011

LLI Sample # WW 6271526
LLI Group # 1244429
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/27/2011 11:00 by SS

Submitted: 04/28/2011 16:55
Reported: 05/10/2011 10:53

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

A1033

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/l**		**ug/l**	**ug/l**	
10943	Benzene	71-43-2	250		5	10	10
10943	1,2-Dichloroethane	107-06-2	N.D.		5	10	10
10943	Ethylbenzene	100-41-4	13		5	10	10
10943	Isopropylbenzene	98-82-8	N.D.		5	20	10
10943	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		5	10	10
10943	Toluene	108-88-3	60		5	10	10
10943	1,2,4-Trimethylbenzene	95-63-6	36		5	20	10
10943	1,3,5-Trimethylbenzene	108-67-8	11	J	5	20	10
10943	Xylene (Total)	1330-20-7	70		5	10	10
Reporting limits were raised due to sample foaming.							
GC/MS Semivolatiles	**SW-846 8270C**		**ug/l**		**ug/l**	**ug/l**	
07805	Chrysene	218-01-9	6		1	5	1
07805	Fluorene	86-73-7	36		1	5	1
07805	Naphthalene	91-20-3	330		5	24	5
07805	Phenanthrene	85-01-8	66		1	5	1
07805	Pyrene	129-00-0	16		1	5	1
GC Miscellaneous	**SW-846 8011**		**ug/l**		**ug/l**	**ug/l**	
07879	Ethylene dibromide	106-93-4	N.D.		0.0094	0.028	1
Metals Dissolved	**SW-846 6020**		**mg/l**		**mg/l**	**mg/l**	
06035	Lead	7439-92-1	0.000068	J	0.000052	0.0010	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.
Trip blank vials were not received by the laboratory for this sample group.

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	D111232AA	05/03/2011 21:16	Daniel H Heller	10
01163	GC/MS VOA Water Prep	SW-846 5030B	1	D111232AA	05/03/2011 21:16	Daniel H Heller	10
07805	PAHs by 8270	SW-846 8270C	1	11120WAF026	05/03/2011 11:40	Brian K Graham	1
07805	PAHs by 8270	SW-846 8270C	1	11120WAF026	05/03/2011 14:21	Linda M Hartenstine	5
07807	BNA Water Extraction	SW-846 3510C	1	11120WAF026	05/02/2011 09:15	Cynthia J Salvatori	1
07879	EDB in Wastewater	SW-846 8011	1	111220024A	05/04/2011 09:49	Tyler O Griffin	1
07786	EDB Extraction	SW-846 8011	1	111220024A	05/03/2011 10:15	Edwin Ortiz	1
06035	Lead	SW-846 6020	1	111226050002A	05/04/2011 12:55	Choon Y Tian	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-33_04272011 Grab Water
Philadelphia Refinery AOI-10
COC: 238116 W-33_04272011

LLI Sample # WW 6271526
LLI Group # 1244429
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/27/2011 11:00 by SS

Submitted: 04/28/2011 16:55
Reported: 05/10/2011 10:53

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

A1033

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06050	ICP/MS SW-846 Water Digest	SW-846 3010A modified	1	111226050002	05/03/2011 08:53	Denise K Conners	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-1_04272011 Grab Water
Philadelphia Refinery AOI-10
COC: 238116 W-1_04272011

LLI Sample # WW 6271527
LLI Group # 1244429
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/27/2011 14:30 by SS

Submitted: 04/28/2011 16:55
Reported: 05/10/2011 10:53

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

A1001

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		ug/l	ug/l	ug/l	
10943	Benzene	71-43-2	N.D.	0.5	1	1
10943	1,2-Dichloroethane	107-06-2	N.D.	0.5	1	1
10943	Ethylbenzene	100-41-4	N.D.	0.5	1	1
10943	Isopropylbenzene	98-82-8	N.D.	0.5	2	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	2	0.5	1	1
10943	Toluene	108-88-3	N.D.	0.5	1	1
10943	1,2,4-Trimethylbenzene	95-63-6	N.D.	0.5	2	1
10943	1,3,5-Trimethylbenzene	108-67-8	N.D.	0.5	2	1
10943	Xylene (Total)	1330-20-7	N.D.	0.5	1	1
GC/MS Semivolatiles	**SW-846 8270C**		ug/l	ug/l	ug/l	
07805	Chrysene	218-01-9	20	1	5	1
07805	Fluorene	86-73-7	13	1	5	1
07805	Naphthalene	91-20-3	N.D.	1	5	1
07805	Phenanthrene	85-01-8	13	1	5	1
07805	Pyrene	129-00-0	37	1	5	1
GC Miscellaneous	**SW-846 8011**		ug/l	ug/l	ug/l	
07879	Ethylene dibromide	106-93-4	N.D.	0.0095	0.028	1
Metals Dissolved	**SW-846 6020**		mg/l	mg/l	mg/l	
06035	Lead	7439-92-1	N.D.	0.000052	0.0010	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.
Trip blank vials were not received by the laboratory for this sample group.

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	P111194AA	04/29/2011 23:11	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	P111194AA	04/29/2011 23:11	Kevin A Sposito	1
07805	PAHs by 8270	SW-846 8270C	1	11120WAF026	05/03/2011 12:05	Brian K Graham	1
07807	BNA Water Extraction	SW-846 3510C	1	11120WAF026	05/02/2011 09:15	Cynthia J Salvatori	1
07879	EDB in Wastewater	SW-846 8011	1	111220024A	05/04/2011 10:19	Tyler O Griffin	1
07786	EDB Extraction	SW-846 8011	1	111220024A	05/03/2011 10:15	Edwin Ortiz	1
06035	Lead	SW-846 6020	1	111226050002A	05/04/2011 12:58	Choon Y Tian	1
06050	ICP/MS SW-846 Water Digest	SW-846 3010A modified	1	111226050002	05/03/2011 08:53	Denise K Conners	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-34_04272011 Grab Water
Philadelphia Refinery AOI-10
COC: 238116 W-34_04272011

LLI Sample # WW 6271528
LLI Group # 1244429
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/27/2011 10:20 by SS

Submitted: 04/28/2011 16:55
Reported: 05/10/2011 10:53

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

A1034

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		ug/l		ug/l	ug/l	
10943	Benzene	71-43-2	7		0.5	1	1
10943	1,2-Dichloroethane	107-06-2	N.D.		0.5	1	1
10943	Ethylbenzene	100-41-4	2		0.5	1	1
10943	Isopropylbenzene	98-82-8	1	J	0.5	2	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.5	1	1
10943	Toluene	108-88-3	11		0.5	1	1
10943	1,2,4-Trimethylbenzene	95-63-6	9		0.5	2	1
10943	1,3,5-Trimethylbenzene	108-67-8	2		0.5	2	1
10943	Xylene (Total)	1330-20-7	19		0.5	1	1
GC/MS Semivolatiles	**SW-846 8270C**		ug/l		ug/l	ug/l	
07805	Chrysene	218-01-9	N.D.		1	5	1
07805	Fluorene	86-73-7	5	J	1	5	1
07805	Naphthalene	91-20-3	11		1	5	1
07805	Phenanthrene	85-01-8	10		1	5	1
07805	Pyrene	129-00-0	1	J	1	5	1
GC Miscellaneous	**SW-846 8011**		ug/l		ug/l	ug/l	
07879	Ethylene dibromide	106-93-4	N.D.		0.0095	0.028	1
Metals Dissolved	**SW-846 6020**		mg/l		mg/l	mg/l	
06035	Lead	7439-92-1	N.D.		0.000052	0.0010	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.
Trip blank vials were not received by the laboratory for this sample group.

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	P111194AA	04/29/2011 23:39	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	P111194AA	04/29/2011 23:39	Kevin A Sposito	1
07805	PAHs by 8270	SW-846 8270C	1	11120WAF026	05/03/2011 12:30	Brian K Graham	1
07807	BNA Water Extraction	SW-846 3510C	1	11120WAF026	05/02/2011 09:15	Cynthia J Salvatori	1
07879	EDB in Wastewater	SW-846 8011	1	111220024A	05/04/2011 10:49	Tyler O Griffin	1
07786	EDB Extraction	SW-846 8011	1	111220024A	05/03/2011 10:15	Edwin Ortiz	1
06035	Lead	SW-846 6020	1	111226050002A	05/04/2011 12:59	Choon Y Tian	1
06050	ICP/MS SW-846 Water Digest	SW-846 3010A modified	1	111226050002	05/03/2011 08:53	Denise K Conners	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-5_04262011 Grab Water
Philadelphia Refinery AOI-10
COC: 238116 W-5_04262011

LLI Sample # WW 6271529
LLI Group # 1244429
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/26/2011 11:50 by SS

Submitted: 04/28/2011 16:55
Reported: 05/10/2011 10:53

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

A1005

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		ug/l	ug/l	ug/l	
10943	Benzene	71-43-2	N.D.	0.5	1	1
10943	1,2-Dichloroethane	107-06-2	N.D.	0.5	1	1
10943	Ethylbenzene	100-41-4	N.D.	0.5	1	1
10943	Isopropylbenzene	98-82-8	N.D.	0.5	2	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	3	0.5	1	1
10943	Toluene	108-88-3	N.D.	0.5	1	1
10943	1,2,4-Trimethylbenzene	95-63-6	N.D.	0.5	2	1
10943	1,3,5-Trimethylbenzene	108-67-8	N.D.	0.5	2	1
10943	Xylene (Total)	1330-20-7	N.D.	0.5	1	1
GC/MS Semivolatiles	**SW-846 8270C**		ug/l	ug/l	ug/l	
07805	Chrysene	218-01-9	N.D.	1	5	1
07805	Fluorene	86-73-7	N.D.	1	5	1
07805	Naphthalene	91-20-3	N.D.	1	5	1
07805	Phenanthrene	85-01-8	N.D.	1	5	1
07805	Pyrene	129-00-0	N.D.	1	5	1
GC Miscellaneous	**SW-846 8011**		ug/l	ug/l	ug/l	
07879	Ethylene dibromide	106-93-4	N.D.	0.0095	0.029	1
Metals Dissolved	**SW-846 6020**		mg/l	mg/l	mg/l	
06035	Lead	7439-92-1	N.D.	0.000052	0.0010	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.
Trip blank vials were not received by the laboratory for this sample group.

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	P111262AA	05/06/2011 18:45	Nicholas R Rossi	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	P111262AA	05/06/2011 18:45	Nicholas R Rossi	1
07805	PAHs by 8270	SW-846 8270C	1	11119WAA026	05/02/2011 01:11	Linda M Hartenstine	1
07807	BNA Water Extraction	SW-846 3510C	1	11119WAA026	04/30/2011 09:20	Joseph S Feister	1
07879	EDB in Wastewater	SW-846 8011	1	111220024A	05/04/2011 11:19	Tyler O Griffin	1
07786	EDB Extraction	SW-846 8011	1	111220024A	05/03/2011 10:15	Edwin Ortiz	1
06035	Lead	SW-846 6020	1	111226050002A	05/04/2011 13:01	Choon Y Tian	1
06050	ICP/MS SW-846 Water Digest	SW-846 3010A modified	1	111226050002	05/03/2011 08:53	Denise K Conners	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-9_04262011 Grab Water
Philadelphia Refinery AOI-10
COC: 238116 W-9_04262011

LLI Sample # WW 6271530
LLI Group # 1244429
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/26/2011 10:40 by SS

Submitted: 04/28/2011 16:55
Reported: 05/10/2011 10:53

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

A1009

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/l**	**ug/l**	**ug/l**	
10943	Benzene	71-43-2	N.D.	0.5	1	1
10943	1,2-Dichloroethane	107-06-2	N.D.	0.5	1	1
10943	Ethylbenzene	100-41-4	N.D.	0.5	1	1
10943	Isopropylbenzene	98-82-8	N.D.	0.5	2	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	N.D.	0.5	1	1
10943	Toluene	108-88-3	N.D.	0.5	1	1
10943	1,2,4-Trimethylbenzene	95-63-6	N.D.	0.5	2	1
10943	1,3,5-Trimethylbenzene	108-67-8	N.D.	0.5	2	1
10943	Xylene (Total)	1330-20-7	N.D.	0.5	1	1
GC/MS Semivolatiles	**SW-846 8270C**		**ug/l**	**ug/l**	**ug/l**	
07805	Chrysene	218-01-9	N.D.	1	5	1
07805	Fluorene	86-73-7	N.D.	1	5	1
07805	Naphthalene	91-20-3	N.D.	1	5	1
07805	Phenanthrene	85-01-8	N.D.	1	5	1
07805	Pyrene	129-00-0	N.D.	1	5	1
GC Miscellaneous	**SW-846 8011**		**ug/l**	**ug/l**	**ug/l**	
07879	Ethylene dibromide	106-93-4	N.D.	0.0094	0.028	1
Metals Dissolved	**SW-846 6020**		**mg/l**	**mg/l**	**mg/l**	
06035	Lead	7439-92-1	N.D.	0.000052	0.0010	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.
Trip blank vials were not received by the laboratory for this sample group.

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	P111194AA	04/30/2011 00:35	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	P111194AA	04/30/2011 00:35	Kevin A Sposito	1
07805	PAHs by 8270	SW-846 8270C	1	11119WAA026	05/02/2011 01:36	Linda M Hartenstine	1
07807	BNA Water Extraction	SW-846 3510C	1	11119WAA026	04/30/2011 09:20	Joseph S Feister	1
07879	EDB in Wastewater	SW-846 8011	1	111220024A	05/04/2011 11:49	Tyler O Griffin	1
07786	EDB Extraction	SW-846 8011	1	111220024A	05/03/2011 10:15	Edwin Ortiz	1
06035	Lead	SW-846 6020	1	111226050002A	05/04/2011 13:07	Choon Y Tian	1
06050	ICP/MS SW-846 Water Digest	SW-846 3010A modified	1	111226050002	05/03/2011 08:53	Denise K Conners	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-15_04262011 Grab Water
Philadelphia Refinery AOI-10
COC: 238116 W-15_04262011

LLI Sample # WW 6271531
LLI Group # 1244429
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/26/2011 12:25 by SS

Submitted: 04/28/2011 16:55
Reported: 05/10/2011 10:53

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

A1015

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/l**	**ug/l**	**ug/l**	
10943	Benzene	71-43-2	N.D.	0.5	1	1
10943	1,2-Dichloroethane	107-06-2	N.D.	0.5	1	1
10943	Ethylbenzene	100-41-4	N.D.	0.5	1	1
10943	Isopropylbenzene	98-82-8	N.D.	0.5	2	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	N.D.	0.5	1	1
10943	Toluene	108-88-3	0.8 J	0.5	1	1
10943	1,2,4-Trimethylbenzene	95-63-6	N.D.	0.5	2	1
10943	1,3,5-Trimethylbenzene	108-67-8	N.D.	0.5	2	1
10943	Xylene (Total)	1330-20-7	N.D.	0.5	1	1
GC/MS Semivolatiles	**SW-846 8270C**		**ug/l**	**ug/l**	**ug/l**	
07805	Chrysene	218-01-9	1 J	1	5	1
07805	Fluorene	86-73-7	N.D.	1	5	1
07805	Naphthalene	91-20-3	N.D.	1	5	1
07805	Phenanthrene	85-01-8	N.D.	1	5	1
07805	Pyrene	129-00-0	2 J	1	5	1
GC Miscellaneous	**SW-846 8011**		**ug/l**	**ug/l**	**ug/l**	
07879	Ethylene dibromide	106-93-4	N.D.	0.0094	0.028	1
Metals Dissolved	**SW-846 6020**		**mg/l**	**mg/l**	**mg/l**	
06035	Lead	7439-92-1	0.00096 J	0.000052	0.0010	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.
Trip blank vials were not received by the laboratory for this sample group.

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	P111262AA	05/06/2011 19:13	Nicholas R Rossi	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	P111262AA	05/06/2011 19:13	Nicholas R Rossi	1
07805	PAHs by 8270	SW-846 8270C	1	11119WAA026	05/02/2011 02:00	Linda M Hartenstine	1
07807	BNA Water Extraction	SW-846 3510C	1	11119WAA026	04/30/2011 09:20	Joseph S Feister	1
07879	EDB in Wastewater	SW-846 8011	1	111220024A	05/04/2011 12:19	Tyler O Griffin	1
07786	EDB Extraction	SW-846 8011	1	111220024A	05/03/2011 10:15	Edwin Ortiz	1
06035	Lead	SW-846 6020	1	111226050002A	05/04/2011 13:09	Choon Y Tian	1
06050	ICP/MS SW-846 Water Digest	SW-846 3010A modified	1	111226050002	05/03/2011 08:53	Denise K Conners	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-25_04262011 Grab Water
Philadelphia Refinery AOI-10
COC: 238116 W-25_04262011

LLI Sample # WW 6271532
LLI Group # 1244429
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/26/2011 13:55 by SS

Submitted: 04/28/2011 16:55
Reported: 05/10/2011 10:53

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

A1025

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/l**	**ug/l**	**ug/l**	
10943	Benzene	71-43-2	N.D.	0.5	1	1
10943	1,2-Dichloroethane	107-06-2	N.D.	0.5	1	1
10943	Ethylbenzene	100-41-4	N.D.	0.5	1	1
10943	Isopropylbenzene	98-82-8	N.D.	0.5	2	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	N.D.	0.5	1	1
10943	Toluene	108-88-3	N.D.	0.5	1	1
10943	1,2,4-Trimethylbenzene	95-63-6	N.D.	0.5	2	1
10943	1,3,5-Trimethylbenzene	108-67-8	N.D.	0.5	2	1
10943	Xylene (Total)	1330-20-7	N.D.	0.5	1	1
GC/MS Semivolatiles	**SW-846 8270C**		**ug/l**	**ug/l**	**ug/l**	
07805	Chrysene	218-01-9	N.D.	1	5	1
07805	Fluorene	86-73-7	N.D.	1	5	1
07805	Naphthalene	91-20-3	N.D.	1	5	1
07805	Phenanthrene	85-01-8	N.D.	1	5	1
07805	Pyrene	129-00-0	N.D.	1	5	1
GC Miscellaneous	**SW-846 8011**		**ug/l**	**ug/l**	**ug/l**	
07879	Ethylene dibromide	106-93-4	N.D.	0.0094	0.028	1
Metals Dissolved	**SW-846 6020**		**mg/l**	**mg/l**	**mg/l**	
06035	Lead	7439-92-1	N.D.	0.000052	0.0010	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.
Trip blank vials were not received by the laboratory for this sample group.

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	P111194AA	04/30/2011 01:31	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	P111194AA	04/30/2011 01:31	Kevin A Sposito	1
07805	PAHs by 8270	SW-846 8270C	1	11119WAA026	05/02/2011 02:24	Linda M Hartenstine	1
07807	BNA Water Extraction	SW-846 3510C	1	11119WAA026	04/30/2011 09:20	Joseph S Feister	1
07879	EDB in Wastewater	SW-846 8011	1	111220024A	05/04/2011 12:49	Tyler O Griffin	1
07786	EDB Extraction	SW-846 8011	1	111220024A	05/03/2011 10:15	Edwin Ortiz	1
06035	Lead	SW-846 6020	1	111226050002A	05/04/2011 13:11	Choon Y Tian	1
06050	ICP/MS SW-846 Water Digest	SW-846 3010A modified	1	111226050002	05/03/2011 08:53	Denise K Conners	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-26_04262011 Grab Water
Philadelphia Refinery AOI-10
COC: 238116 W-26_04262011

LLI Sample # WW 6271533
LLI Group # 1244429
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/26/2011 14:10 by SS

Submitted: 04/28/2011 16:55
Reported: 05/10/2011 10:53

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

A1026

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/l**	**ug/l**	**ug/l**	
10943	Benzene	71-43-2	N.D.	0.5	1	1
10943	1,2-Dichloroethane	107-06-2	N.D.	0.5	1	1
10943	Ethylbenzene	100-41-4	N.D.	0.5	1	1
10943	Isopropylbenzene	98-82-8	N.D.	0.5	2	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	0.6 J	0.5	1	1
10943	Toluene	108-88-3	N.D.	0.5	1	1
10943	1,2,4-Trimethylbenzene	95-63-6	N.D.	0.5	2	1
10943	1,3,5-Trimethylbenzene	108-67-8	N.D.	0.5	2	1
10943	Xylene (Total)	1330-20-7	N.D.	0.5	1	1
GC/MS Semivolatiles	**SW-846 8270C**		**ug/l**	**ug/l**	**ug/l**	
07805	Chrysene	218-01-9	N.D.	1	5	1
07805	Fluorene	86-73-7	N.D.	1	5	1
07805	Naphthalene	91-20-3	N.D.	1	5	1
07805	Phenanthrene	85-01-8	N.D.	1	5	1
07805	Pyrene	129-00-0	N.D.	1	5	1
GC Miscellaneous	**SW-846 8011**		**ug/l**	**ug/l**	**ug/l**	
07879	Ethylene dibromide	106-93-4	N.D.	0.0095	0.028	1
Metals Dissolved	**SW-846 6020**		**mg/l**	**mg/l**	**mg/l**	
06035	Lead	7439-92-1	N.D.	0.000052	0.0010	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.
Trip blank vials were not received by the laboratory for this sample group.

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	P111194AA	04/30/2011 01:59	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	P111194AA	04/30/2011 01:59	Kevin A Sposito	1
07805	PAHs by 8270	SW-846 8270C	1	11119WAA026	05/02/2011 02:48	Linda M Hartenstine	1
07807	BNA Water Extraction	SW-846 3510C	1	11119WAA026	04/30/2011 09:20	Joseph S Feister	1
07879	EDB in Wastewater	SW-846 8011	1	111220024A	05/04/2011 14:19	Tyler O Griffin	1
07786	EDB Extraction	SW-846 8011	1	111220024A	05/03/2011 10:15	Edwin Ortiz	1
06035	Lead	SW-846 6020	1	111226050002A	05/04/2011 13:13	Choon Y Tian	1
06050	ICP/MS SW-846 Water Digest	SW-846 3010A modified	1	111226050002	05/03/2011 08:53	Denise K Conners	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-27_04262011 Grab Water
Philadelphia Refinery AOI-10
COC: 238116 W-27_04262011

LLI Sample # WW 6271534
LLI Group # 1244429
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/26/2011 13:10 by SS

Submitted: 04/28/2011 16:55
Reported: 05/10/2011 10:53

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

A1027

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		ug/l	ug/l	ug/l	
10943	Benzene	71-43-2	N.D.	0.5	1	1
10943	1,2-Dichloroethane	107-06-2	N.D.	0.5	1	1
10943	Ethylbenzene	100-41-4	N.D.	0.5	1	1
10943	Isopropylbenzene	98-82-8	N.D.	0.5	2	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	N.D.	0.5	1	1
10943	Toluene	108-88-3	N.D.	0.5	1	1
10943	1,2,4-Trimethylbenzene	95-63-6	N.D.	0.5	2	1
10943	1,3,5-Trimethylbenzene	108-67-8	N.D.	0.5	2	1
10943	Xylene (Total)	1330-20-7	N.D.	0.5	1	1
GC/MS Semivolatiles	**SW-846 8270C**		ug/l	ug/l	ug/l	
07805	Chrysene	218-01-9	N.D.	1	5	1
07805	Fluorene	86-73-7	N.D.	1	5	1
07805	Naphthalene	91-20-3	N.D.	1	5	1
07805	Phenanthrene	85-01-8	N.D.	1	5	1
07805	Pyrene	129-00-0	N.D.	1	5	1
GC Miscellaneous	**SW-846 8011**		ug/l	ug/l	ug/l	
07879	Ethylene dibromide	106-93-4	N.D.	0.0095	0.028	1
Metals Dissolved	**SW-846 6020**		mg/l	mg/l	mg/l	
06035	Lead	7439-92-1	0.00011 J	0.000052	0.0010	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.
Trip blank vials were not received by the laboratory for this sample group.

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	P111194AA	04/30/2011 02:27	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	P111194AA	04/30/2011 02:27	Kevin A Sposito	1
07805	PAHs by 8270	SW-846 8270C	1	11119WAA026	05/02/2011 03:13	Linda M Hartenstine	1
07807	BNA Water Extraction	SW-846 3510C	1	11119WAA026	04/30/2011 09:20	Joseph S Feister	1
07879	EDB in Wastewater	SW-846 8011	1	111220024A	05/04/2011 14:49	Tyler O Griffin	1
07786	EDB Extraction	SW-846 8011	1	111220024A	05/03/2011 10:15	Edwin Ortiz	1
06035	Lead	SW-846 6020	1	111226050002A	05/04/2011 13:15	Choon Y Tian	1
06050	ICP/MS SW-846 Water Digest	SW-846 3010A modified	1	111226050002	05/03/2011 08:53	Denise K Conners	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-30_04262011 Grab Water
Philadelphia Refinery AOI-10
COC: 238116 W-30_04262011

LLI Sample # WW 6271535
LLI Group # 1244429
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/26/2011 11:25 by SS

Submitted: 04/28/2011 16:55
Reported: 05/10/2011 10:53

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

A1030

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		ug/l	ug/l	ug/l	
10943	Benzene	71-43-2	N.D.	0.5	1	1
10943	1,2-Dichloroethane	107-06-2	N.D.	0.5	1	1
10943	Ethylbenzene	100-41-4	N.D.	0.5	1	1
10943	Isopropylbenzene	98-82-8	N.D.	0.5	2	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	N.D.	0.5	1	1
10943	Toluene	108-88-3	N.D.	0.5	1	1
10943	1,2,4-Trimethylbenzene	95-63-6	N.D.	0.5	2	1
10943	1,3,5-Trimethylbenzene	108-67-8	N.D.	0.5	2	1
10943	Xylene (Total)	1330-20-7	N.D.	0.5	1	1
GC/MS Semivolatiles	**SW-846 8270C**		ug/l	ug/l	ug/l	
07805	Chrysene	218-01-9	N.D.	1	5	1
07805	Fluorene	86-73-7	N.D.	1	5	1
07805	Naphthalene	91-20-3	N.D.	1	5	1
07805	Phenanthrene	85-01-8	N.D.	1	5	1
07805	Pyrene	129-00-0	N.D.	1	5	1
GC Miscellaneous	**SW-846 8011**		ug/l	ug/l	ug/l	
07879	Ethylene dibromide	106-93-4	N.D.	0.0094	0.028	1
Metals Dissolved	**SW-846 6020**		mg/l	mg/l	mg/l	
06035	Lead	7439-92-1	0.00013 J	0.000052	0.0010	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.
Trip blank vials were not received by the laboratory for this sample group.

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	P111194AA	04/30/2011 02:55	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	P111194AA	04/30/2011 02:55	Kevin A Sposito	1
07805	PAHs by 8270	SW-846 8270C	1	11119WAA026	05/02/2011 03:37	Linda M Hartenstine	1
07807	BNA Water Extraction	SW-846 3510C	1	11119WAA026	04/30/2011 09:20	Joseph S Feister	1
07879	EDB in Wastewater	SW-846 8011	1	111220024A	05/04/2011 15:19	Tyler O Griffin	1
07786	EDB Extraction	SW-846 8011	1	111220024A	05/03/2011 10:15	Edwin Ortiz	1
06035	Lead	SW-846 6020	1	111226050002A	05/04/2011 13:16	Choon Y Tian	1
06050	ICP/MS SW-846 Water Digest	SW-846 3010A modified	1	111226050002	05/03/2011 08:53	Denise K Conners	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-2_04262011 Grab Water
Philadelphia Refinery AOI-10
COC: 238116 W-2_04262011

LLI Sample # WW 6271536
LLI Group # 1244429
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/26/2011 11:25 by MH

Submitted: 04/28/2011 16:55
Reported: 05/10/2011 10:53

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

A1002

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/l**	**ug/l**	**ug/l**	
10943	Benzene	71-43-2	N.D.	0.5	1	1
10943	1,2-Dichloroethane	107-06-2	N.D.	0.5	1	1
10943	Ethylbenzene	100-41-4	N.D.	0.5	1	1
10943	Isopropylbenzene	98-82-8	N.D.	0.5	2	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	N.D.	0.5	1	1
10943	Toluene	108-88-3	N.D.	0.5	1	1
10943	1,2,4-Trimethylbenzene	95-63-6	N.D.	0.5	2	1
10943	1,3,5-Trimethylbenzene	108-67-8	N.D.	0.5	2	1
10943	Xylene (Total)	1330-20-7	N.D.	0.5	1	1
GC/MS Semivolatiles	**SW-846 8270C**		**ug/l**	**ug/l**	**ug/l**	
07805	Chrysene	218-01-9	N.D.	1	5	1
07805	Fluorene	86-73-7	N.D.	1	5	1
07805	Naphthalene	91-20-3	N.D.	1	5	1
07805	Phenanthrene	85-01-8	N.D.	1	5	1
07805	Pyrene	129-00-0	N.D.	1	5	1
GC Miscellaneous	**SW-846 8011**		**ug/l**	**ug/l**	**ug/l**	
07879	Ethylene dibromide	106-93-4	N.D.	0.0095	0.029	1
Metals Dissolved	**SW-846 6020**		**mg/l**	**mg/l**	**mg/l**	
06035	Lead	7439-92-1	N.D.	0.000052	0.0010	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.
Trip blank vials were not received by the laboratory for this sample group.

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	P111194AA	04/30/2011 03:23	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	P111194AA	04/30/2011 03:23	Kevin A Sposito	1
07805	PAHs by 8270	SW-846 8270C	1	11119WAA026	05/02/2011 04:01	Linda M Hartenstine	1
07807	BNA Water Extraction	SW-846 3510C	1	11119WAA026	04/30/2011 09:20	Joseph S Feister	1
07879	EDB in Wastewater	SW-846 8011	1	111220024A	05/04/2011 15:49	Tyler O Griffin	1
07786	EDB Extraction	SW-846 8011	1	111220024A	05/03/2011 10:15	Edwin Ortiz	1
06035	Lead	SW-846 6020	1	111226050002A	05/04/2011 13:18	Choon Y Tian	1
06050	ICP/MS SW-846 Water Digest	SW-846 3010A modified	1	111226050002	05/03/2011 08:53	Denise K Conners	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-6_04262011 Grab Water
Philadelphia Refinery AOI-10
COC: 238116 W-6_04262011

LLI Sample # WW 6271537
LLI Group # 1244429
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/26/2011 12:45 by MH

Submitted: 04/28/2011 16:55
Reported: 05/10/2011 10:53

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

A1006

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		ug/l	ug/l	ug/l	
10943	Benzene	71-43-2	N.D.	0.5	1	1
10943	1,2-Dichloroethane	107-06-2	N.D.	0.5	1	1
10943	Ethylbenzene	100-41-4	N.D.	0.5	1	1
10943	Isopropylbenzene	98-82-8	N.D.	0.5	2	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	N.D.	0.5	1	1
10943	Toluene	108-88-3	N.D.	0.5	1	1
10943	1,2,4-Trimethylbenzene	95-63-6	N.D.	0.5	2	1
10943	1,3,5-Trimethylbenzene	108-67-8	N.D.	0.5	2	1
10943	Xylene (Total)	1330-20-7	N.D.	0.5	1	1
GC/MS Semivolatiles	**SW-846 8270C**		ug/l	ug/l	ug/l	
07805	Chrysene	218-01-9	N.D.	1	5	1
07805	Fluorene	86-73-7	N.D.	1	5	1
07805	Naphthalene	91-20-3	N.D.	1	5	1
07805	Phenanthrene	85-01-8	N.D.	1	5	1
07805	Pyrene	129-00-0	N.D.	1	5	1
GC Miscellaneous	**SW-846 8011**		ug/l	ug/l	ug/l	
07879	Ethylene dibromide	106-93-4	N.D.	0.0095	0.028	1
Metals Dissolved	**SW-846 6020**		mg/l	mg/l	mg/l	
06035	Lead	7439-92-1	0.000072 J	0.000052	0.0010	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.
Trip blank vials were not received by the laboratory for this sample group.

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	P111194AA	04/30/2011 03:51	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	P111194AA	04/30/2011 03:51	Kevin A Sposito	1
07805	PAHs by 8270	SW-846 8270C	1	11119WAA026	05/02/2011 04:26	Linda M Hartenstine	1
07807	BNA Water Extraction	SW-846 3510C	1	11119WAA026	04/30/2011 09:20	Joseph S Feister	1
07879	EDB in Wastewater	SW-846 8011	1	111220024A	05/04/2011 16:20	Tyler O Griffin	1
07786	EDB Extraction	SW-846 8011	1	111220024A	05/03/2011 10:15	Edwin Ortiz	1
06035	Lead	SW-846 6020	1	111226050002A	05/04/2011 12:25	Choon Y Tian	1
06050	ICP/MS SW-846 Water Digest	SW-846 3010A modified	1	111226050002	05/03/2011 08:53	Denise K Conners	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-11_04262011 Grab Water
Philadelphia Refinery AOI-10
COC: 238116 W-11_04262011

LLI Sample # WW 6271538
LLI Group # 1244429
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/26/2011 13:20 by MH

Submitted: 04/28/2011 16:55
Reported: 05/10/2011 10:53

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

A1011

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		ug/l	ug/l	ug/l	
10943	Benzene	71-43-2	N.D.	0.5	1	1
10943	1,2-Dichloroethane	107-06-2	N.D.	0.5	1	1
10943	Ethylbenzene	100-41-4	N.D.	0.5	1	1
10943	Isopropylbenzene	98-82-8	N.D.	0.5	2	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	N.D.	0.5	1	1
10943	Toluene	108-88-3	N.D.	0.5	1	1
10943	1,2,4-Trimethylbenzene	95-63-6	N.D.	0.5	2	1
10943	1,3,5-Trimethylbenzene	108-67-8	N.D.	0.5	2	1
10943	Xylene (Total)	1330-20-7	N.D.	0.5	1	1
GC/MS Semivolatiles	**SW-846 8270C**		ug/l	ug/l	ug/l	
07805	Chrysene	218-01-9	N.D.	1	5	1
07805	Fluorene	86-73-7	N.D.	1	5	1
07805	Naphthalene	91-20-3	N.D.	1	5	1
07805	Phenanthrene	85-01-8	N.D.	1	5	1
07805	Pyrene	129-00-0	N.D.	1	5	1
GC Miscellaneous	**SW-846 8011**		ug/l	ug/l	ug/l	
07879	Ethylene dibromide	106-93-4	N.D.	0.0094	0.028	1
Metals Dissolved	**SW-846 6020**		mg/l	mg/l	mg/l	
06035	Lead	7439-92-1	N.D.	0.000052	0.0010	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.
Trip blank vials were not received by the laboratory for this sample group.

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	P111194AA	04/30/2011 04:19	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	P111194AA	04/30/2011 04:19	Kevin A Sposito	1
07805	PAHs by 8270	SW-846 8270C	1	11119WAA026	05/02/2011 12:40	Linda M Hartenstine	1
07807	BNA Water Extraction	SW-846 3510C	1	11119WAA026	04/30/2011 09:20	Joseph S Feister	1
07879	EDB in Wastewater	SW-846 8011	1	111240001A	05/04/2011 20:20	Tyler O Griffin	1
07786	EDB Extraction	SW-846 8011	1	111240001A	05/04/2011 11:10	Edwin Ortiz	1
06035	Lead	SW-846 6020	1	111236050002A	05/04/2011 16:48	Choon Y Tian	1
06050	ICP/MS SW-846 Water Digest	SW-846 3010A modified	1	111236050002	05/04/2011 09:00	Denise K Conners	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-12_04262011 Grab Water
Philadelphia Refinery AOI-10
COC: 238116 W-12_04262011

LLI Sample # WW 6271539
LLI Group # 1244429
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/26/2011 13:55 by MH

Submitted: 04/28/2011 16:55
Reported: 05/10/2011 10:53

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

A1012

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/l**	**ug/l**	**ug/l**	
10943	Benzene	71-43-2	8	0.5	1	1
10943	1,2-Dichloroethane	107-06-2	N.D.	0.5	1	1
10943	Ethylbenzene	100-41-4	3	0.5	1	1
10943	Isopropylbenzene	98-82-8	2	0.5	2	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	N.D.	0.5	1	1
10943	Toluene	108-88-3	1	0.5	1	1
10943	1,2,4-Trimethylbenzene	95-63-6	4	0.5	2	1
10943	1,3,5-Trimethylbenzene	108-67-8	0.6 J	0.5	2	1
10943	Xylene (Total)	1330-20-7	10	0.5	1	1
GC/MS Semivolatiles	**SW-846 8270C**		**ug/l**	**ug/l**	**ug/l**	
07805	Chrysene	218-01-9	1 J	1	5	1
07805	Fluorene	86-73-7	1 J	1	5	1
07805	Naphthalene	91-20-3	1 J	1	5	1
07805	Phenanthrene	85-01-8	N.D.	1	5	1
07805	Pyrene	129-00-0	2 J	1	5	1
GC Miscellaneous	**SW-846 8011**		**ug/l**	**ug/l**	**ug/l**	
07879	Ethylene dibromide	106-93-4	N.D.	0.0095	0.029	1
Metals Dissolved	**SW-846 6020**		**mg/l**	**mg/l**	**mg/l**	
06035	Lead	7439-92-1	0.00018 J	0.000052	0.0010	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.
Trip blank vials were not received by the laboratory for this sample group.

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	P111194AA	04/30/2011 04:47	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	P111194AA	04/30/2011 04:47	Kevin A Sposito	1
07805	PAHs by 8270	SW-846 8270C	1	11119WAA026	05/02/2011 13:04	Linda M Hartenstine	1
07807	BNA Water Extraction	SW-846 3510C	1	11119WAA026	04/30/2011 09:20	Joseph S Feister	1
07879	EDB in Wastewater	SW-846 8011	1	111240001A	05/04/2011 21:20	Tyler O Griffin	1
07786	EDB Extraction	SW-846 8011	1	111240001A	05/04/2011 11:10	Edwin Ortiz	1
06035	Lead	SW-846 6020	1	111236050002A	05/04/2011 16:50	Choon Y Tian	1
06050	ICP/MS SW-846 Water Digest	SW-846 3010A modified	1	111236050002	05/04/2011 09:00	Denise K Conners	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-13_04262011 Grab Water
Philadelphia Refinery AOI-10
COC: 238116 W-13_04262011

LLI Sample # WW 6271540
LLI Group # 1244429
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/26/2011 14:15 by MH

Submitted: 04/28/2011 16:55
Reported: 05/10/2011 10:53

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

A1013

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		ug/l	ug/l	ug/l	
10943	Benzene	71-43-2	N.D.	0.5	1	1
10943	1,2-Dichloroethane	107-06-2	N.D.	0.5	1	1
10943	Ethylbenzene	100-41-4	N.D.	0.5	1	1
10943	Isopropylbenzene	98-82-8	N.D.	0.5	2	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	N.D.	0.5	1	1
10943	Toluene	108-88-3	N.D.	0.5	1	1
10943	1,2,4-Trimethylbenzene	95-63-6	N.D.	0.5	2	1
10943	1,3,5-Trimethylbenzene	108-67-8	N.D.	0.5	2	1
10943	Xylene (Total)	1330-20-7	N.D.	0.5	1	1
GC/MS Semivolatiles	**SW-846 8270C**		ug/l	ug/l	ug/l	
07805	Chrysene	218-01-9	N.D.	1	5	1
07805	Fluorene	86-73-7	N.D.	1	5	1
07805	Naphthalene	91-20-3	N.D.	1	5	1
07805	Phenanthrene	85-01-8	N.D.	1	5	1
07805	Pyrene	129-00-0	N.D.	1	5	1
GC Miscellaneous	**SW-846 8011**		ug/l	ug/l	ug/l	
07879	Ethylene dibromide	106-93-4	N.D.	0.0095	0.029	1
Metals Dissolved	**SW-846 6020**		mg/l	mg/l	mg/l	
06035	Lead	7439-92-1	N.D.	0.000052	0.0010	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.
Trip blank vials were not received by the laboratory for this sample group.

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	P111194AA	04/30/2011 05:15	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	P111194AA	04/30/2011 05:15	Kevin A Sposito	1
07805	PAHs by 8270	SW-846 8270C	1	11119WAA026	05/02/2011 13:28	Linda M Hartenstine	1
07807	BNA Water Extraction	SW-846 3510C	1	11119WAA026	04/30/2011 09:20	Joseph S Feister	1
07879	EDB in Wastewater	SW-846 8011	1	111240001A	05/04/2011 22:21	Tyler O Griffin	1
07786	EDB Extraction	SW-846 8011	1	111240001A	05/04/2011 11:10	Edwin Ortiz	1
06035	Lead	SW-846 6020	1	111236050002A	05/04/2011 16:52	Choon Y Tian	1
06050	ICP/MS SW-846 Water Digest	SW-846 3010A modified	1	111236050002	05/04/2011 09:00	Denise K Conners	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-1D_04262011 Grab Water
Philadelphia Refinery AOI-10
COC: 238116 W-1D_04262011

LLI Sample # WW 6271541
LLI Group # 1244429
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/26/2011 10:45 by MH

Submitted: 04/28/2011 16:55
Reported: 05/10/2011 10:53

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

A101D

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		ug/l		ug/l	ug/l	
10943	Benzene	71-43-2	N.D.		0.5	1	1
10943	1,2-Dichloroethane	107-06-2	N.D.		0.5	1	1
10943	Ethylbenzene	100-41-4	N.D.		0.5	1	1
10943	Isopropylbenzene	98-82-8	N.D.		0.5	2	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.5	1	1
10943	Toluene	108-88-3	0.8	J	0.5	1	1
10943	1,2,4-Trimethylbenzene	95-63-6	N.D.		0.5	2	1
10943	1,3,5-Trimethylbenzene	108-67-8	N.D.		0.5	2	1
10943	Xylene (Total)	1330-20-7	N.D.		0.5	1	1
GC/MS Semivolatiles	**SW-846 8270C**		ug/l		ug/l	ug/l	
07805	Chrysene	218-01-9	N.D.		1	5	1
07805	Fluorene	86-73-7	N.D.		1	5	1
07805	Naphthalene	91-20-3	N.D.		1	5	1
07805	Phenanthrene	85-01-8	N.D.		1	5	1
07805	Pyrene	129-00-0	N.D.		1	5	1
GC Miscellaneous	**SW-846 8011**		ug/l		ug/l	ug/l	
07879	Ethylene dibromide	106-93-4	N.D.		0.0095	0.028	1
Metals Dissolved	**SW-846 6020**		mg/l		mg/l	mg/l	
06035	Lead	7439-92-1	N.D.		0.000052	0.0010	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.
Trip blank vials were not received by the laboratory for this sample group.

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	P111194AA	04/30/2011 05:43	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	P111194AA	04/30/2011 05:43	Kevin A Sposito	1
07805	PAHs by 8270	SW-846 8270C	1	11119WAA026	05/02/2011 13:52	Linda M Hartenstine	1
07807	BNA Water Extraction	SW-846 3510C	1	11119WAA026	04/30/2011 09:20	Joseph S Feister	1
07879	EDB in Wastewater	SW-846 8011	1	111240001A	05/04/2011 22:51	Tyler O Griffin	1
07786	EDB Extraction	SW-846 8011	1	111240001A	05/04/2011 11:10	Edwin Ortiz	1
06035	Lead	SW-846 6020	1	111236050002A	05/04/2011 16:54	Choon Y Tian	1
06050	ICP/MS SW-846 Water Digest	SW-846 3010A modified	1	111236050002	05/04/2011 09:00	Denise K Conners	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-28_04262011 Grab Water
Philadelphia Refinery AOI-10
COC: 238116 W-28_04262011

LLI Sample # WW 6271542
LLI Group # 1244429
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/26/2011 12:10 by MH

Submitted: 04/28/2011 16:55
Reported: 05/10/2011 10:53

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

A1028

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		ug/l		ug/l	ug/l	
10943	Benzene	71-43-2	0.5	J	0.5	1	1
10943	1,2-Dichloroethane	107-06-2	N.D.		0.5	1	1
10943	Ethylbenzene	100-41-4	N.D.		0.5	1	1
10943	Isopropylbenzene	98-82-8	23		0.5	2	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.5	1	1
10943	Toluene	108-88-3	0.8	J	0.5	1	1
10943	1,2,4-Trimethylbenzene	95-63-6	1	J	0.5	2	1
10943	1,3,5-Trimethylbenzene	108-67-8	N.D.		0.5	2	1
10943	Xylene (Total)	1330-20-7	1		0.5	1	1
GC/MS Semivolatiles	**SW-846 8270C**		ug/l		ug/l	ug/l	
07805	Chrysene	218-01-9	2	J	1	5	1
07805	Fluorene	86-73-7	12		1	5	1
07805	Naphthalene	91-20-3	3	J	1	5	1
07805	Phenanthrene	85-01-8	21		1	5	1
07805	Pyrene	129-00-0	8		1	5	1
GC Miscellaneous	**SW-846 8011**		ug/l		ug/l	ug/l	
07879	Ethylene dibromide	106-93-4	N.D.		0.0095	0.028	1
Metals Dissolved	**SW-846 6020**		mg/l		mg/l	mg/l	
06035	Lead	7439-92-1	0.00019	J	0.000052	0.0010	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.
Trip blank vials were not received by the laboratory for this sample group.

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	P111194AA	04/30/2011 06:11	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	P111194AA	04/30/2011 06:11	Kevin A Sposito	1
07805	PAHs by 8270	SW-846 8270C	1	11119WAA026	05/02/2011 14:17	Linda M Hartenstine	1
07807	BNA Water Extraction	SW-846 3510C	1	11119WAA026	04/30/2011 09:20	Joseph S Feister	1
07879	EDB in Wastewater	SW-846 8011	1	111240001A	05/04/2011 23:21	Tyler O Griffin	1
07786	EDB Extraction	SW-846 8011	1	111240001A	05/04/2011 11:10	Edwin Ortiz	1
06035	Lead	SW-846 6020	1	111236050002A	05/04/2011 16:56	Choon Y Tian	1
06050	ICP/MS SW-846 Water Digest	SW-846 3010A modified	1	111236050002	05/04/2011 09:00	Denise K Conners	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-29_04262011 Grab Water
Philadelphia Refinery AOI-10
COC: 238116 W-29_04262011

LLI Sample # WW 6271543
LLI Group # 1244429
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/26/2011 11:05 by MH

Submitted: 04/28/2011 16:55
Reported: 05/10/2011 10:53

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

A1029

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/l**		**ug/l**	**ug/l**	
10943	Benzene	71-43-2	N.D.		0.5	1	1
10943	1,2-Dichloroethane	107-06-2	N.D.		0.5	1	1
10943	Ethylbenzene	100-41-4	N.D.		0.5	1	1
10943	Isopropylbenzene	98-82-8	N.D.		0.5	2	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	0.6	J	0.5	1	1
10943	Toluene	108-88-3	N.D.		0.5	1	1
10943	1,2,4-Trimethylbenzene	95-63-6	N.D.		0.5	2	1
10943	1,3,5-Trimethylbenzene	108-67-8	N.D.		0.5	2	1
10943	Xylene (Total)	1330-20-7	N.D.		0.5	1	1
GC/MS Semivolatiles	**SW-846 8270C**		**ug/l**		**ug/l**	**ug/l**	
07805	Chrysene	218-01-9	N.D.		0.9	5	1
07805	Fluorene	86-73-7	1	J	0.9	5	1
07805	Naphthalene	91-20-3	N.D.		0.9	5	1
07805	Phenanthrene	85-01-8	2	J	0.9	5	1
07805	Pyrene	129-00-0	N.D.		0.9	5	1
GC Miscellaneous	**SW-846 8011**		**ug/l**		**ug/l**	**ug/l**	
07879	Ethylene dibromide	106-93-4	N.D.		0.0094	0.028	1
Metals Dissolved	**SW-846 6020**		**mg/l**		**mg/l**	**mg/l**	
06035	Lead	7439-92-1	N.D.		0.000052	0.0010	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.
Trip blank vials were not received by the laboratory for this sample group.

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	P111194AA	04/30/2011 06:39	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	P111194AA	04/30/2011 06:39	Kevin A Sposito	1
07805	PAHs by 8270	SW-846 8270C	1	11119WAA026	05/02/2011 14:41	Linda M Hartenstine	1
07807	BNA Water Extraction	SW-846 3510C	1	11119WAA026	04/30/2011 09:20	Joseph S Feister	1
07879	EDB in Wastewater	SW-846 8011	1	111240001A	05/04/2011 23:51	Tyler O Griffin	1
07786	EDB Extraction	SW-846 8011	1	111240001A	05/04/2011 11:10	Edwin Ortiz	1
06035	Lead	SW-846 6020	1	111236050002A	05/04/2011 16:57	Choon Y Tian	1
06050	ICP/MS SW-846 Water Digest	SW-846 3010A modified	1	111236050002	05/04/2011 09:00	Denise K Conners	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-31_04262011 Grab Water
Philadelphia Refinery AOI-10
COC: 238116 W-31_04262011

LLI Sample # WW 6271544
LLI Group # 1244429
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/26/2011 15:15 by MH

Submitted: 04/28/2011 16:55
Reported: 05/10/2011 10:53

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

A1031

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		ug/l		ug/l	ug/l	
10943	Benzene	71-43-2	10		0.5	1	1
10943	1,2-Dichloroethane	107-06-2	N.D.		0.5	1	1
10943	Ethylbenzene	100-41-4	5		0.5	1	1
10943	Isopropylbenzene	98-82-8	9		0.5	2	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.5	1	1
10943	Toluene	108-88-3	4		0.5	1	1
10943	1,2,4-Trimethylbenzene	95-63-6	28		0.5	2	1
10943	1,3,5-Trimethylbenzene	108-67-8	9		0.5	2	1
10943	Xylene (Total)	1330-20-7	21		0.5	1	1
GC/MS Semivolatiles	**SW-846 8270C**		ug/l		ug/l	ug/l	
07805	Chrysene	218-01-9	4	J	1	5	1
07805	Fluorene	86-73-7	5	J	1	5	1
07805	Naphthalene	91-20-3	13		1	5	1
07805	Phenanthrene	85-01-8	17		1	5	1
07805	Pyrene	129-00-0	9		1	5	1
GC Miscellaneous	**SW-846 8011**		ug/l		ug/l	ug/l	
07879	Ethylene dibromide	106-93-4	N.D.		0.0095	0.028	1
Metals Dissolved	**SW-846 6020**		mg/l		mg/l	mg/l	
06035	Lead	7439-92-1	0.0060		0.000052	0.0010	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.
Trip blank vials were not received by the laboratory for this sample group.

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	P111194AA	04/30/2011 07:06	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	P111194AA	04/30/2011 07:06	Kevin A Sposito	1
07805	PAHs by 8270	SW-846 8270C	1	11119WAA026	05/02/2011 15:05	Linda M Hartenstine	1
07807	BNA Water Extraction	SW-846 3510C	1	11119WAA026	04/30/2011 09:20	Joseph S Feister	1
07879	EDB in Wastewater	SW-846 8011	1	111240001A	05/05/2011 00:21	Tyler O Griffin	1
07786	EDB Extraction	SW-846 8011	1	111240001A	05/04/2011 11:10	Edwin Ortiz	1
06035	Lead	SW-846 6020	1	111236050002A	05/04/2011 16:59	Choon Y Tian	1
06050	ICP/MS SW-846 Water Digest	SW-846 3010A modified	1	111236050002	05/04/2011 09:00	Denise K Conners	1

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

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1244429
Reported: 05/10/11 at 10:53 AM

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

Laboratory Compliance Quality Control

Analysis Name	Blank Result	Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: D111232AA	Sample number(s): 6271526								
Benzene	N.D.	0.5	1	ug/l	95		79-120		
1,2-Dichloroethane	N.D.	0.5	1	ug/l	96		70-130		
Ethylbenzene	N.D.	0.5	1	ug/l	95		79-120		
Isopropylbenzene	N.D.	0.5	2	ug/l	95		77-120		
Methyl Tertiary Butyl Ether	N.D.	0.5	1	ug/l	91		76-120		
Toluene	N.D.	0.5	1	ug/l	97		79-120		
1,2,4-Trimethylbenzene	N.D.	0.5	2	ug/l	92		74-120		
1,3,5-Trimethylbenzene	N.D.	0.5	2	ug/l	94		75-120		
Xylene (Total)	N.D.	0.5	1	ug/l	96		80-120		
Batch number: P111193AA	Sample number(s): 6271518-6271523								
Benzene	N.D.	0.5	1	ug/l	93	93	79-120	0	30
1,2-Dichloroethane	N.D.	0.5	1	ug/l	75	75	70-130	1	30
Ethylbenzene	N.D.	0.5	1	ug/l	89	88	79-120	2	30
Isopropylbenzene	N.D.	0.5	2	ug/l	86	86	77-120	1	30
Methyl Tertiary Butyl Ether	N.D.	0.5	1	ug/l	99	100	76-120	1	30
Toluene	N.D.	0.5	1	ug/l	91	89	79-120	2	30
1,2,4-Trimethylbenzene	N.D.	0.5	2	ug/l	90	89	74-120	1	30
1,3,5-Trimethylbenzene	N.D.	0.5	2	ug/l	91	91	75-120	0	30
Xylene (Total)	N.D.	0.5	1	ug/l	88	87	80-120	2	30
Batch number: P111194AA	Sample number(s): 6271524-6271525,6271527-6271528,6271530,6271532-6271544								
Benzene	N.D.	0.5	1	ug/l	98	98	79-120	0	30
1,2-Dichloroethane	N.D.	0.5	1	ug/l	78	78	70-130	0	30
Ethylbenzene	N.D.	0.5	1	ug/l	94	94	79-120	1	30
Isopropylbenzene	N.D.	0.5	2	ug/l	92	92	77-120	0	30
Methyl Tertiary Butyl Ether	N.D.	0.5	1	ug/l	99	97	76-120	2	30
Toluene	N.D.	0.5	1	ug/l	96	97	79-120	1	30
1,2,4-Trimethylbenzene	N.D.	0.5	2	ug/l	94	95	74-120	1	30
1,3,5-Trimethylbenzene	N.D.	0.5	2	ug/l	96	99	75-120	3	30
Xylene (Total)	N.D.	0.5	1	ug/l	93	93	80-120	0	30
Batch number: P111262AA	Sample number(s): 6271529,6271531								
Benzene	N.D.	0.5	1	ug/l	97	98	79-120	2	30
1,2-Dichloroethane	N.D.	0.5	1	ug/l	80	80	70-130	1	30
Ethylbenzene	N.D.	0.5	1	ug/l	93	93	79-120	1	30
Isopropylbenzene	N.D.	0.5	2	ug/l	91	90	77-120	1	30
Methyl Tertiary Butyl Ether	N.D.	0.5	1	ug/l	100	101	76-120	1	30
Toluene	N.D.	0.5	1	ug/l	95	94	79-120	1	30
1,2,4-Trimethylbenzene	N.D.	0.5	2	ug/l	92	91	74-120	1	30
1,3,5-Trimethylbenzene	N.D.	0.5	2	ug/l	95	93	75-120	3	30
Xylene (Total)	N.D.	0.5	1	ug/l	92	91	80-120	2	30
Batch number: 11119WAA026	Sample number(s): 6271518-6271521,6271529-6271544								
Chrysene	N.D.	1.	5	ug/l	96	94	82-112	2	30
Fluorene	N.D.	1.	5	ug/l	97	94	82-113	3	30

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

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1244429
Reported: 05/10/11 at 10:53 AM

Analysis Name	Blank Result	Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Naphthalene	N.D.	1.	5	ug/l	92	94	77-107	2	30
Phenanthrene	N.D.	1.	5	ug/l	98	95	83-112	3	30
Pyrene	N.D.	1.	5	ug/l	99	94	80-115	5	30
Batch number: 11120WAF026	Sample number(s): 6271522-6271524,6271526-6271528								
Chrysene	N.D.	1.	5	ug/l	97	94	82-112	3	30
Fluorene	N.D.	1.	5	ug/l	99	98	82-113	1	30
Naphthalene	N.D.	1.	5	ug/l	94	95	77-107	0	30
Phenanthrene	N.D.	1.	5	ug/l	97	97	83-112	0	30
Pyrene	N.D.	1.	5	ug/l	97	98	80-115	1	30
Batch number: 11124WAB026	Sample number(s): 6271525								
Chrysene	N.D.	1.	5	ug/l	95	97	82-112	3	30
Fluorene	N.D.	1.	5	ug/l	97	97	82-113	1	30
Naphthalene	N.D.	1.	5	ug/l	93	95	77-107	3	30
Phenanthrene	N.D.	1.	5	ug/l	94	97	83-112	4	30
Pyrene	N.D.	1.	5	ug/l	99	101	80-115	3	30
Batch number: 111220024A	Sample number(s): 6271518-6271537								
Ethylene dibromide	N.D.	0.010	0.030	ug/l	96	96	60-140	0	20
Batch number: 111240001A	Sample number(s): 6271538-6271544								
Ethylene dibromide	N.D.	0.010	0.030	ug/l	96	96	60-140	0	20
Batch number: 111226050002A	Sample number(s): 6271518-6271537								
Lead	N.D.	0.00005 2	0.0010	mg/l	101		90-115		
Batch number: 111236050002A	Sample number(s): 6271538-6271544								
Lead	N.D.	0.00005 2	0.0010	mg/l	102		90-115		

Sample Matrix Quality Control

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

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: D111232AA	Sample number(s): 6271526 UNSPK: P272733								
Benzene	95	88	80-126	6	30				
1,2-Dichloroethane	96	87	66-141	10	30				
Ethylbenzene	97	92	71-134	5	30				
Isopropylbenzene	102	96	75-128	6	30				
Methyl Tertiary Butyl Ether	93	85	72-126	9	30				
Toluene	104	96	80-125	8	30				
1,2,4-Trimethylbenzene	89	85	72-130	2	30				
1,3,5-Trimethylbenzene	104	95	72-131	7	30				
Xylene (Total)	85	84	79-125	0	30				
Batch number: 111220024A	Sample number(s): 6271518-6271537 UNSPK: 6271518 BKG: 6271519								
Ethylene dibromide	74		65-135			N.D.	N.D.	0 (1)	30
Batch number: 111240001A	Sample number(s): 6271538-6271544 UNSPK: 6271538 BKG: 6271539								

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

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1244429
Reported: 05/10/11 at 10:53 AM

Sample Matrix Quality Control

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

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Ethylene dibromide	77		65-135			N.D.	N.D.	0 (1)	30
Batch number: 111226050002A	Sample number(s): 6271518-6271537 UNSPK: 6271537 BKG: 6271537								
Lead	103	107	83-120	3	20	0.000072 J	0.000057 J	23* (1)	20
Batch number: 111236050002A	Sample number(s): 6271538-6271544 UNSPK: P272075 BKG: P272075								
Lead	104	106	83-120	2	20	0.000085 J	0.000074 J	14 (1)	20

Surrogate Quality Control

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

Analysis Name: UST BTEX, MTBE in Water
Batch number: D111232AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6271526	90	94	100	99
Blank	92	96	100	98
LCS	91	97	100	105
MS	89	99	101	105
MSD	91	98	102	107
Limits:	80-116	77-113	80-113	78-113

Analysis Name: UST BTEX, MTBE in Water
Batch number: P111193AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6271518	96	96	99	91
6271519	94	97	99	94
6271520	95	96	98	90
6271521	95	97	99	90
6271522	95	98	98	89
6271523	96	98	98	92
Blank	94	95	99	90
LCS	94	99	98	92
LCSD	96	97	97	92
Limits:	80-116	77-113	80-113	78-113

Analysis Name: UST BTEX, MTBE in Water
Batch number: P111194AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6271524	93	97	93	92
6271525	95	94	96	93
6271527	94	96	94	90
6271528	93	94	95	91
6271530	93	95	95	91

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

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1244429
Reported: 05/10/11 at 10:53 AM

Surrogate Quality Control

6271532	94	95	95	91
6271533	95	96	94	91
6271534	93	97	94	90
6271535	93	97	95	89
6271536	93	94	96	89
6271537	94	95	94	89
6271538	94	96	95	89
6271539	93	94	94	91
6271540	94	98	94	90
6271541	93	97	95	88
6271542	93	94	93	91
6271543	94	94	95	92
6271544	94	95	94	93
Blank	94	97	95	90
LCS	94	97	94	91
LCSD	93	97	94	90
Limits:	80-116	77-113	80-113	78-113

Analysis Name: UST BTEX, MTBE in Water
Batch number: P111262AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6271529	94	98	93	90
6271531	95	95	92	88
Blank	95	100	93	91
LCS	93	96	92	91
LCSD	94	97	94	91
Limits:	80-116	77-113	80-113	78-113

Analysis Name: PAHs by 8270
Batch number: 11119WAA026

	Nitrobenzene-d5	2-Fluorobiphenyl	Terphenyl-d14
6271518	102	97	95
6271519	97	94	94
6271520	102	97	95
6271521	98	94	92
6271529	99	93	92
6271530	98	94	93
6271531	97	95	91
6271532	96	92	93
6271533	97	94	91
6271534	97	92	92
6271535	99	96	95
6271536	101	97	93
6271537	96	93	92
6271538	96	84	76
6271539	96	92	94
6271540	97	90	89
6271541	98	90	94
6271542	96	92	96
6271543	97	94	97
6271544	103	95	95
Blank	101	98	91
LCS	100	95	92
LCSD	98	93	88

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

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1244429
Reported: 05/10/11 at 10:53 AM

Surrogate Quality Control

Limits:	52-120	63-114	34-118

Analysis Name: PAHs by 8270
Batch number: 11120WAF026

	Nitrobenzene-d5	2-Fluorobiphenyl	Terphenyl-d14
6271522	93	99	89
6271523	96	95	90
6271524	89	86	80
6271526	94	97	89
6271527	99	98	91
6271528	95	99	94
Blank	95	96	92
LCS	96	99	95
LCSD	95	99	96
Limits:	52-120	63-114	34-118

Analysis Name: PAHs by 8270
Batch number: 11124WAB026

	Nitrobenzene-d5	2-Fluorobiphenyl	Terphenyl-d14
6271525	88	89	76
Blank	94	94	87
LCS	96	97	92
LCSD	97	97	92
Limits:	52-120	63-114	34-118

Analysis Name: EDB in Wastewater
Batch number: 111220024A

	1,1,2,2-Tetrachloroethane
6271518	79
6271519	84
6271520	82
6271521	76
6271522	88
6271523	116
6271524	109
6271525	91
6271526	94
6271527	88
6271528	107
6271529	87
6271530	80
6271531	82
6271532	81
6271533	88
6271534	83
6271535	82
6271536	83
6271537	86
Blank	103
DUP	94

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

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1244429
Reported: 05/10/11 at 10:53 AM

Surrogate Quality Control

LCS	103
LCSD	102
MS	89
Limits:	46-136

Analysis Name: EDB in Wastewater
Batch number: 111240001A

	1,1,2,2-Tetrachloroethane
6271538	75
6271539	126
6271540	79
6271541	79
6271542	86
6271543	84
6271544	129
Blank	99
DUP	128
LCS	102
LCSD	102
MS	77
Limits:	46-136

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

Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 124429 Sample # 6271518-44

COC # 238116

Please print. Instructions on reverse side correspond with circled numbers. Cooler temp 0.9-3.6°C

For Lab Use Only
FSC:
SCR#:

(1)
Client: SUN-AQUATERRA Acct. #:
Project Name/#: PHILA REF AOI-10 PWSID #:
Project Manager: T. DOERR P.O.#:
Sampler: S.SYKES / M. HINDERER Quote #:
Name of state where samples were collected: PA

(5) Analyses Requested — Preservation Codes

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

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

(2) Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water (Potable / NPDES)	Other	Total # of Containers	Remarks
W-16_04272011	4/27/11	1220	X			X		8	A See attached list for analyses
W-17_04272011	4/27/11	1210	X			X		8	
W-19_04272011	4/27/11	935	X			X		8	
W-20_04272011	4/27/11	910	X			X		8	
W-22_04272011	4/27/11	1040	X			X		8	
W-23_04272011	4/27/11	1050	X			X		8	
W-32_04272011	4/27/11	1300	X			X		8	
W-32D_04272011	4/27/11	1320	X			X		8	
W-33_04272011	4/27/11	1100	X			X		8	
W-1_04272011	4/27/11	1430	X			X		8	

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

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

(9)

Relinquished by:	Date	Time	Received by:	Date	Time
[signature] 4/28/11	4/28/11	0900	Sample Fridge	4/28/11	0900
[signature] IAGT	4/28/11	1003	[signature]	4/28/11	1003
[signature] 4/28/11		1655			
			[signature] 4/28/11		1655

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

Issued by Dept. 6042 Management
2102.05

Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1244429 Sample # 6271518-44

COC # 241185

Please print. Instructions on reverse side correspond with circled numbers. cooler temp 0.9-3.6 °C

(1)
Client: SUN-AQUATERRA Acct. #:
Project Name/#: PHILA REF AOI-10 PWSID #:
Project Manager: T. DOERR P.O.#:
Sampler: S. SYKES / M. HINDERLING Quote #:
Name of state where samples were collected: PA

For Lab Use Only
FSC:
SCR#:

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

(2) Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	(4) Matrix: Soil	Water (Potable / NPDES)	Other	Total # of Containers	(5) Analyses Requested / Preservation Codes	Remarks	(6) Temperature of samples upon receipt (if requested)
W-34_04272011	4/27/11	1020	X			X		8	X	☆ See attached list for analyses	

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

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

(9)

Relinquished by:	Date	Time	Received by:	Date	Time
[signature] IAQT	4/28/11	0900	Sample Fridge	4/28/11	0900
[signature] IAQT	4/28/11	1003	[signature]	4/28/11	1003
[signature]	4/28/11	1655			
			[signature]		
			[signature]	4/28/11	1655

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

Issued by Dept. 6042 Management
2102.05

Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1244429 Sample # 6271518-44

COC # 238118

Please print. Instructions on reverse side correspond with circled numbers. Cooler temp 0.9-3.6 °C

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

Project Name/#: PHILA REF AOI-10 PWSID #:

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

Sampler: S. SYKES Quote #:

Name of state where samples were collected: PA

For Lab Use Only
FSC:
SCR#:

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

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

(2) Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	(4) Matrix: Soil	Water (Potable / NPDES)	Other	Total # of Containers	(5) Analyses Requested / Preservation Codes: Lead (Dissolved)	Benzene	Cumene	Ethylbenzene	Toluene	MTBE	Xylenes (Total)	1,2,4 Trimethylbenzene	1,3,5 Trimethylbenzene	Chrysene	Fluorene	Naphthalene	Pyrene	Remarks
W-5-04262011	4/26/11	1150	X		X			8	X	X	X	X	X	X	X	X	X	X	X	X	X	
W-9-04262011	4/26/11	1040	X		X			8	X	X	X	X	X	X	X	X	X	X	X	X	X	* List attached
W-15-04262011	4/26/11	1225	X		X			8	X	X	X	X	X	X	X	X	X	X	X	X	X	
W-25-04262011	4/26/11	1355	X		X			8	X	X	X	X	X	X	X	X	X	X	X	X	X	
W-26-04262011	4/26/11	1410	X		X			8	X	X	X	X	X	X	X	X	X	X	X	X	X	
W-27-04262011	4/26/11	1310	X		X			8	X	X	X	X	X	X	X	X	X	X	X	X	X	
W-30-04262011	4/26/11	1125	X		X			8	X	X	X	X	X	X	X	X	X	X	X	X	X	

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

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

(9)

Relinquished by:	Date	Time	Received by:	Date	Time
[signature] / AGT	4/26/11	1700	Sample Fridge	4/26/11	1700
[signature] / AGT	4/28/11	1005	[signature]	4/28/11	1007
[signature]	4/28/11	1655			
			[signature]	4/28/11	1655

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

Issued by Dept. 6042 Management
2102.05

Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1244429 Sample # 6271518-44

COC # 232884

Please print. Instructions on reverse side correspond with circled numbers. Cooler temp 0.9-3.6°C

For Lab Use Only
FSC:
SCR#:

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

(1)
Client: Aquatella Acct. #:
Project Name/#: PHILA. Ref. AOI-10 PWSID #:
Project Manager: T. Doell P.O.#:
Sampler: Mike Hinderling Quote #:
Name of state where samples were collected: PA

(2) (3) (4) (5) (6)

Sample Identification	Date Collected	Time Collected	Grab	Composite	Soil	Water	Other	Total # of Containers	Lead (dissolved)	Benzene, Cumene, Ethylbenzene, Toluene	Ethylene dibromide, MTBE	Xylenes (Total), 1,2,4 Trimethylbenzene	1,3,5 Trimethylbenzene	Chrysene, Fluorene, Naphthalene, Phenanthrene	Pyrene			Remarks
W-2 - 04262011	4/26/11	1125	X			X		8	X	X	X	X	X	X	X			
W-6 - 04262011	4/26/11	1245	X			X		8	X	X	X	X	X	X	X			*List attatched
W-11 - 04262011	4/26/11	1320	X			X		8	X	X	X	X	X	X	X			
W-12 - 04262011	4/26/11	1355	X			X		8	X	X	X	X	X	X	X			
W-13 - 04262011	4/26/11	1415	X			X		8	X	X	X	X	X	X	X			
W-1D - 04262011	4/26/11	1045	X			X		8	X	X	X	X	X	X	X			
W-28 - 04262011	4/26/11	1210	X			X		8	X	X	X	X	X	X	X			
W-29 - 04262011	4/26/11	1105	X			X		8	X	X	X	X	X	X	X			
W-31 - 04262011	4/26/11	1515	X			X		8	X	X	X	X	X	X	X			

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

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

SDG Complete? Yes No

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

(9)

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]	4/26/11	1700	Fridge	4/26/11	1700
[signature] /AQT	4/28/11	1003	[signature]	4/28/11	1003
[signature]	4/28/11	1655			
			[signature]	4/28/11	1655

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

2102.03

acct#10132 Cap#1244429
sample#6271518-44

Table 1a
Constituents of Concern for Groundwater
AOI 10 Work Plan for Site Characterization
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

METALS	CAS No.
Lead (dissolved)	7439-92-1

VOLATILE ORGANIC COMPOUNDS	CAS No.
1,2-Dichloroethane	107-06-2
1,2,4-Trimethylbenzene	95-63-6
1,3,5-Trimethylbenzene	108-67-8
Benzene	71-43-2
Cumene	98-82-8
Ethylbenzene	100-41-4
Ethylene dibromide	106-93-4
Methyl tertiary butyl ether	1634-04-4
Toluene	108-88-3
Xylenes (total)	1330-20-7

SEMI-VOLATILE ORGANIC COMPOUNDS	CAS No.
Chrysene	218-01-9
Fluorene	86-73-7
Naphthalene	91-20-3
Phenanthrene	85-01-8
Pyrene	129-00-0

Notes:
1. Constituents are from Pennsylvania Corrective Action Process (CAP) Regulation Amendments effective December 1, 2001; provided in Chapter VI, Section E (pgs. 29-30) of PADEP Document, *Closure Requirements for Underground Storage Tank Systems*, effective April 1, 1998 and the March 18, 2008 revised PADEP Petroleum Short List.
2. Select groundwater samples to be collected within the CAMU will be analyzed for full TCL VOCs, TCL SVOCs, and TAL metals.

Explanation of Symbols and Abbreviations

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

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
ug	microgram(s)	**mg**	milligram(s)
ml	milliliter(s)	**l**	liter(s)
m3	cubic meter(s)	**ul**	microliter(s)

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

> greater than

J estimated value – The result is ≥ the Method Detection Limit (MDL) and < the Limit of Quantitation (LOQ).

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

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

U.S. EPA CLP Data Qualifiers:

Organic Qualifiers

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

Inorganic Qualifiers

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

Analytical test results meet all requirements of NELAC unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

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

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

Lancaster Laboratories

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

Analysis Report

ANALYTICAL RESULTS

Prepared by:

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

Prepared for:

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

May 05, 2011

Project: SUN: Philadelphia Refinery AOI-10

Submittal Date: 04/25/2011
Group Number: 1243735
PO Number: PHILADELPHIA
State of Sample Origin: PA

Client Sample Description	Lancaster Labs (LLI) #
BH-10-59_0-2' Grab Soil	6267997

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

ELECTRONIC COPY TO	Langan	Attn: Dennis Webster
ELECTRONIC COPY TO	SUN: Aquaterra Tech.	Attn: Tiffani Doerr
ELECTRONIC COPY TO	LLI	Attn: EDD Group
ELECTRONIC COPY TO	Langan	Attn: Kristen Ward
ELECTRONIC COPY TO	Aquaterra Tech	Attn: Loretta Belfiglio

Lancaster Laboratories

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

Analysis Report

Questions? Contact your Client Services Representative
Jessica A Oknefski at (717) 656-2300 Ext. 1815

Respectfully Submitted,



Chad A. Moline
Group Leader

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-59_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259433 BH-10-59_0-2'

LLI Sample # SW 6267997
LLI Group # 1243735
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/22/2011 10:30 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-59

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	12	6	0.6	0.98
10950	1,2-Dibromoethane	106-93-4	< 6	6	1	0.98
10950	1,2-Dichloroethane	107-06-2	< 6	6	1	0.98
10950	Ethylbenzene	100-41-4	< 6	6	1	0.98
10950	Isopropylbenzene	98-82-8	< 6	6	1	0.98
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 6	6	0.6	0.98
10950	Toluene	108-88-3	6	6	1	0.98
10950	1,2,4-Trimethylbenzene	95-63-6	< 6	6	1	0.98
10950	1,3,5-Trimethylbenzene	108-67-8	< 6	6	1	0.98
10950	Xylene (Total)	1330-20-7	< 6	6	1	0.98

The GC/MS volatile internal standard peak areas were outside the QC limits. A re-analysis was performed, and the matrix effect was confirmed.

GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	< 2,000	2,000	410	10
10724	Benzo(a)anthracene	56-55-3	2,100	2,000	410	10
10724	Benzo(a)pyrene	50-32-8	< 2,000	2,000	410	10
10724	Benzo(b)fluoranthene	205-99-2	2,100	2,000	410	10
10724	Benzo(g,h,i)perylene	191-24-2	< 2,000	2,000	410	10
10724	Chrysene	218-01-9	2,300	2,000	410	10
10724	Fluorene	86-73-7	< 2,000	2,000	410	10
10724	Naphthalene	91-20-3	< 2,000	2,000	410	10
10724	Phenanthrene	85-01-8	4,100	2,000	410	10
10724	Pyrene	129-00-0	3,900	2,000	410	10

Reporting limits were raised due to interference from the sample matrix.

The GC/MS semivolatile internal standard peak areas were outside of the QC limits for both the initial injection and the re-injection. The values here are from the initial injection of the sample.

Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	401	1.17	0.0606	10
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	18.3	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-59_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259433 BH-10-59_0-2'

LLI Sample # SW 6267997
LLI Group # 1243735
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/22/2011 10:30 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-59

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	X111191AA	04/29/2011 10:42	Emily R Styer	0.98
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111624232	04/22/2011 10:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111624232	04/22/2011 10:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111624232	04/22/2011 10:30	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11118SLE026	05/04/2011 10:32	Brian K Graham	10
10814	BNA Soil Microwave PAH	SW-846 3546	1	11118SLE026	04/29/2011 03:35	Roman Kuropatkin	1
06135	Lead	SW-846 6020	1	111171026001A	04/29/2011 15:31	Choon Y Tian	10
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111171026001	04/27/2011 12:18	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11118820008A	04/28/2011 19:48	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1243735
Reported: 05/05/11 at 06:45 PM

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

Laboratory Compliance Quality Control

Analysis Name	Blank Result	Blank LOQ**	Blank MDL	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: X111191AA	Sample number(s): 6267997								
Benzene	< 5	5.	0.5	ug/kg	95		80-120		
1,2-Dibromoethane	< 5	5.	1	ug/kg	101		80-120		
1,2-Dichloroethane	< 5	5.	1	ug/kg	95		71-129		
Ethylbenzene	< 5	5.	1	ug/kg	98		80-120		
Isopropylbenzene	< 5	5.	1	ug/kg	101		76-120		
Methyl Tertiary Butyl Ether	< 5	5.	0.5	ug/kg	89		74-121		
Toluene	< 5	5.	1	ug/kg	97		80-120		
1,2,4-Trimethylbenzene	< 5	5.	1	ug/kg	96		79-120		
1,3,5-Trimethylbenzene	< 5	5.	1	ug/kg	97		78-120		
Xylene (Total)	< 5	5.	1	ug/kg	101		80-120		
Batch number: 11118SLE026	Sample number(s): 6267997								
Anthracene	< 170	170.	33	ug/kg	97		83-111		
Benzo(a)anthracene	< 170	170.	33	ug/kg	98		82-111		
Benzo(a)pyrene	< 170	170.	33	ug/kg	103		63-138		
Benzo(b)fluoranthene	< 170	170.	33	ug/kg	110		61-133		
Benzo(g,h,i)perylene	< 170	170.	33	ug/kg	106		63-130		
Chrysene	< 170	170.	33	ug/kg	97		81-111		
Fluorene	< 170	170.	33	ug/kg	101		81-117		
Naphthalene	< 170	170.	33	ug/kg	94		83-112		
Phenanthrene	< 170	170.	33	ug/kg	95		83-109		
Pyrene	< 170	170.	33	ug/kg	97		80-121		
Batch number: 111171026001A	Sample number(s): 6267997								
Lead	< 0.198	0.198	0.0103	mg/kg	92		83-110		
Batch number: 11118820008A	Sample number(s): 6267997								
Moisture					100		99-101		

Sample Matrix Quality Control

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

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: X111191AA	Sample number(s): 6267997 UNSPK: P266108								
Benzene	62	107	55-143	14	30				
1,2-Dibromoethane	78	103	54-129	6	30				
1,2-Dichloroethane	55685 (2)	-747 (2)	68-131	197*	30				
Ethylbenzene	92	101	44-141	26	30				

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

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1243735
Reported: 05/05/11 at 06:45 PM

Sample Matrix Quality Control

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

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Isopropylbenzene	163*	64	38-144	89*	30				
Methyl Tertiary Butyl Ether	77	85	55-129	24	30				
Toluene	160*	115	50-146	63*	30				
1,2,4-Trimethylbenzene	88	89	37-149	29	30				
1,3,5-Trimethylbenzene	63	97	38-150	9	30				
Xylene (Total)	87	103	44-136	18	30				
Batch number: 11118SLE026	Sample number(s): 6267997 UNSPK: P267988								
Anthracene	108	694*	40-147	133*	30				
Benzo(a)anthracene	131	1575*	32-150	149*	30				
Benzo(a)pyrene	140*	1628*	57-129	148*	30				
Benzo(b)fluoranthene	159*	2292*	53-131	155*	30				
Benzo(g,h,i)perylene	118	839*	60-123	129*	30				
Chrysene	122*	1441*	76-114	146*	30				
Fluorene	98	310*	46-137	99*	30				
Naphthalene	139*	428*	52-132	89*	30				
Phenanthrene	161*	2138*	34-147	154*	30				
Pyrene	154*	2829*	76-124	157*	30				
Batch number: 111171026001A	Sample number(s): 6267997 UNSPK: P267982 BKG: P267982								
Lead	-1433 (2)	-224 (2)	75-125	7	20	524	487	7	20
Batch number: 11118820008A	Sample number(s): 6267997 BKG: P267991								
Moisture						17.3	17.0	2	15

Surrogate Quality Control

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

Analysis Name: TCL(4.3)by 8260(soil)
Batch number: X111191AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6267997	110	112*	119	66*
Blank	102	104	91	92
LCS	101	106	101	98
MS	94	70	107	90
MSD	97	98	103	93
Limits:	71-114	70-109	70-123	70-111

Analysis Name: PAH 8270 (microwave)
Batch number: 11118SLE026

	Nitrobenzene-d5	2-Fluorobiphenyl	Terphenyl-d14
6267997	58	66	60
Blank	90	93	94
LCS	91	101	93

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

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1243735
Reported: 05/05/11 at 06:45 PM

Surrogate Quality Control

MS	100	111	94
MSD	100	102	87
Limits:	55-121	56-121	43-124

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

Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1243735 Sample # 6267997

COC # 259433

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

(1)
Client: SUN - AQUATERRA Acct. #:
Project Name/#: PHILA REF AOI-10 PWSID #:
Project Manager: T. DOERR P.O.#:
Sampler: S. SYKES Quote #:
Name of state where samples were collected: PA

For Lab Use Only
FSC:
SCR#:

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

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

(2) Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water	Other	Total # of Containers	(5) Analyses Requested / Preservation Codes	Remarks
BH-10-59_0-2'	4/22/11	1030	X		X			4	X	☆ See attached list for analyses
										temp 1.8-2.4°C

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

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

SDG Complete? Yes No

Relinquished by:	Date	Time	Received by:	Date	Time
			D Ryady	3/25/11	TRS
D Ryady	3/24/11	945			
Sample Fridge	4/22/11	1330	Sample Fridge	4/22/11	1330
IAQT	4/25/11	1070	D Ryady	4/25/11	1070
D Ryady	4/25/11	1550		4/25/11	1550

(9)

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

Issued by Dept. 6042 Management
2102.05

acct 10132 grp 1243735

#6267997

★ So. 1

Table 1b
Constituents of Concern for Soil
AOI 10 Work Plan for Site Characterization
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

METALS	CAS No.
Lead (total)	7439-92-1

VOLATILE ORGANIC COMPOUNDS	CAS No.
1,2-Dichloroethane	107-06-2
1,2,4-Trimethylbenzene	95-63-6
1,3,5-Trimethylbenzene	108-67-8
Benzene	71-43-2
Cumene	98-82-8
Ethylbenzene	100-41-4
Ethylene dibromide	106-93-4
Methyl tertiary butyl ether	1634-04-4
Toluene	108-88-3
Xylenes (total)	1330-20-7

SEMI-VOLATILE ORGANIC COMPOUNDS	CAS No.
Anthracene	120-12-7
Benzo(a)anthracene	56-55-3
Benzo (g,h,i) perylene	191-24-2
Benzo(a)pyrene	50-32-8
Benzo(b)fluoranthene	205-99-2
Chrysene	218-01-9
Fluorene	86-73-7
Naphthalene	91-20-3
Phenanthrene	85-01-8
Pyrene	129-00-0

Notes:

1. Constituents are from Pennsylvania Corrective Action Process (CAP) Regulation Amendments effective December 1, 2001; provided in Chapter VI, Section E (pgs. 29-30) of PADEP Document, *Closure Requirements for Underground Storage Tank Systems,* effective April 1, 1998 and the March 18, 2008 revised PADEP Petroleum Short List.
2. *Select soil samples* to be collected within the CAMU and delineation soil samples will be analyzed for full TCL VOCs, TCL SVOCs, and TAL metals.

Explanation of Symbols and Abbreviations

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

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
ug	microgram(s)	**mg**	milligram(s)
ml	milliliter(s)	**l**	liter(s)
m3	cubic meter(s)	**ul**	microliter(s)

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

> greater than

J estimated value – The result is ≥ the Method Detection Limit (MDL) and < the Limit of Quantitation (LOQ).

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

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

U.S. EPA CLP Data Qualifiers:

Organic Qualifiers

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

Inorganic Qualifiers

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

Analytical test results meet all requirements of NELAC unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

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

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

Lancaster Laboratories

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

Analysis Report

ANALYTICAL RESULTS

Prepared by:

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

Prepared for:

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

May 05, 2011

Project: SUN: Philadelphia Refinery AOI-10

Submittal Date: 04/25/2011
Group Number: 1243734
PO Number: PHILADELPHIA
State of Sample Origin: PA

Client Sample Description	Lancaster Labs (LLI) #
BH-10-67_0-2' Grab Soil	6267982
BH-10-66_0-2' Grab Soil	6267983
BH-10-78_0-2' Grab Soil	6267984
BH-10-79_0-2' Grab Soil	6267985
BH-10-80_0-2' Grab Soil	6267986
BH-10-53_0-2' Grab Soil	6267987
BH-10-54_0-2' Grab Soil	6267988
BH-10-62_0-2' Grab Soil	6267989
BH-10-61_0-2' Grab Soil	6267990
BH-10-60_0-2' Grab Soil	6267991
BH-10-75_0-2' Grab Soil	6267992
BH-10-82_0-2' Grab Soil	6267993
BH-10-81_0-2' Grab Soil	6267994
BH-10-83_0-2' Grab Soil	6267995
BH-10-57_0-2' Grab Soil	6267996

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

ELECTRONIC COPY TO	Langan	Attn: Dennis Webster
ELECTRONIC COPY TO	SUN: Aquaterra Tech.	Attn: Tiffani Doerr
ELECTRONIC COPY TO	LLI	Attn: EDD Group
ELECTRONIC	Langan	Attn: Kristen Ward

Lancaster Laboratories

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

Analysis Report

COPY TO
ELECTRONIC COPY TO Aquaterra Tech Attn: Loretta Belfiglio

Questions? Contact your Client Services Representative
Jessica A Oknefski at (717) 656-2300 Ext. 1815

Respectfully Submitted,

Chad A. Moline
Group Leader

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-67_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-67_0-2'

LLI Sample # SW 6267982
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/21/2011 11:00 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-67

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	110	10	1	1.08
10950	1,2-Dibromoethane	106-93-4	< 10	10	2	1.08
10950	1,2-Dichloroethane	107-06-2	< 10	10	2	1.08
10950	Ethylbenzene	100-41-4	23	10	2	1.08
10950	Isopropylbenzene	98-82-8	< 10	10	2	1.08
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 10	10	1	1.08
10950	Toluene	108-88-3	220	10	2	1.08
10950	1,2,4-Trimethylbenzene	95-63-6	160	10	2	1.08
10950	1,3,5-Trimethylbenzene	108-67-8	29	10	2	1.08
10950	Xylene (Total)	1330-20-7	300	10	2	1.08
	The GC/MS volatile internal standard peak areas were outside the QC limits. A re-analysis was performed, and the matrix effect was confirmed.					
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	330	310	62	1
10724	Benzo(a)anthracene	56-55-3	620	310	62	1
10724	Benzo(a)pyrene	50-32-8	570	310	62	1
10724	Benzo(b)fluoranthene	205-99-2	700	310	62	1
10724	Benzo(g,h,i)perylene	191-24-2	390	310	62	1
10724	Chrysene	218-01-9	750	310	62	1
10724	Fluorene	86-73-7	< 310	310	62	1
10724	Naphthalene	91-20-3	< 310	310	62	1
10724	Phenanthrene	85-01-8	1,100	310	62	1
10724	Pyrene	129-00-0	1,200	310	62	1
Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	985	3.69	0.192	20
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	46.8	0.50	0.50	1
	"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.					

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-67_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-67_0-2'

LLI Sample # SW 6267982
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/21/2011 11:00 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-67

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	A111182AA	04/29/2011 05:55	Angela D Sneeringer	1.08
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111624232	04/21/2011 11:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111624232	04/21/2011 11:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111624232	04/21/2011 11:00	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11116SLD026	04/28/2011 20:49	Matthew S Woods	1
10814	BNA Soil Microwave PAH	SW-846 3546	1	11116SLD026	04/27/2011 09:00	Kerrie A Freeburn	1
06135	Lead	SW-846 6020	1	111171026001A	04/29/2011 14:56	Choon Y Tian	20
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111171026001	04/27/2011 12:18	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11118820008A	04/28/2011 19:48	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-66_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-66_0-2'

LLI Sample # SW 6267983
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/21/2011 11:15 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-66

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	< 5	5	0.5	0.79
10950	1,2-Dibromoethane	106-93-4	< 5	5	1	0.79
10950	1,2-Dichloroethane	107-06-2	< 5	5	1	0.79
10950	Ethylbenzene	100-41-4	< 5	5	1	0.79
10950	Isopropylbenzene	98-82-8	< 5	5	1	0.79
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 5	5	0.5	0.79
10950	Toluene	108-88-3	< 5	5	1	0.79
10950	1,2,4-Trimethylbenzene	95-63-6	< 5	5	1	0.79
10950	1,3,5-Trimethylbenzene	108-67-8	< 5	5	1	0.79
10950	Xylene (Total)	1330-20-7	< 5	5	1	0.79
	The GC/MS volatile internal standard peak areas were outside the QC limits. A re-analysis was performed, and the matrix effect was confirmed.					
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	< 200	200	40	1
10724	Benzo(a)anthracene	56-55-3	< 200	200	40	1
10724	Benzo(a)pyrene	50-32-8	< 200	200	40	1
10724	Benzo(b)fluoranthene	205-99-2	< 200	200	40	1
10724	Benzo(g,h,i)perylene	191-24-2	< 200	200	40	1
10724	Chrysene	218-01-9	< 200	200	40	1
10724	Fluorene	86-73-7	< 200	200	40	1
10724	Naphthalene	91-20-3	< 200	200	40	1
10724	Phenanthrene	85-01-8	< 200	200	40	1
10724	Pyrene	129-00-0	< 200	200	40	1
Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	250	0.592	0.0308	5
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	18.0	0.50	0.50	1
	"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.					

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-66_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-66_0-2'

LLI Sample # SW 6267983
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/21/2011 11:15 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-66

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	A111182AA	04/29/2011 06:18	Angela D Sneeringer	0.79
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111624232	04/21/2011 11:15	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111624232	04/21/2011 11:15	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111624232	04/21/2011 11:15	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11116SLD026	04/28/2011 21:15	Matthew S Woods	1
10814	BNA Soil Microwave PAH	SW-846 3546	1	11116SLD026	04/27/2011 09:00	Kerrie A Freeburn	1
06135	Lead	SW-846 6020	1	111171026001A	04/29/2011 15:13	Choon Y Tian	5
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111171026001	04/27/2011 12:18	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11118820008A	04/28/2011 19:48	Scott W Freisher	1

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-78_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-78_0-2'

LLI Sample # SW 6267984
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/21/2011 14:00 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-78

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	< 5	5	0.5	0.82
10950	1,2-Dibromoethane	106-93-4	< 5	5	1	0.82
10950	1,2-Dichloroethane	107-06-2	< 5	5	1	0.82
10950	Ethylbenzene	100-41-4	< 5	5	1	0.82
10950	Isopropylbenzene	98-82-8	< 5	5	1	0.82
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 5	5	0.5	0.82
10950	Toluene	108-88-3	< 5	5	1	0.82
10950	1,2,4-Trimethylbenzene	95-63-6	< 5	5	1	0.82
10950	1,3,5-Trimethylbenzene	108-67-8	< 5	5	1	0.82
10950	Xylene (Total)	1330-20-7	< 5	5	1	0.82
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	430	200	39	1
10724	Benzo(a)anthracene	56-55-3	910	200	39	1
10724	Benzo(a)pyrene	50-32-8	660	200	39	1
10724	Benzo(b)fluoranthene	205-99-2	810	200	39	1
10724	Benzo(g,h,i)perylene	191-24-2	330	200	39	1
10724	Chrysene	218-01-9	820	200	39	1
10724	Fluorene	86-73-7	< 200	200	39	1
10724	Naphthalene	91-20-3	< 200	200	39	1
10724	Phenanthrene	85-01-8	1,300	200	39	1
10724	Pyrene	129-00-0	1,300	200	39	1
Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	79.3	0.236	0.0123	2
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	15.3	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	A111182AA	04/29/2011 06:40	Angela D Sneeringer	0.82
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111624232	04/21/2011 14:00	Client Supplied	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-78_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-78_0-2'

LLI Sample # SW 6267984
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/21/2011 14:00 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-78

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111624232	04/21/2011 14:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111624232	04/21/2011 14:00	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11116SLD026	04/28/2011 21:42	Matthew S Woods	1
10814	BNA Soil Microwave PAH	SW-846 3546	1	11116SLD026	04/27/2011 09:00	Kerrie A Freeburn	1
06135	Lead	SW-846 6020	1	111171026001A	04/29/2011 14:37	Choon Y Tian	2
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111171026001	04/27/2011 12:18	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11118820008A	04/28/2011 19:48	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-79_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-79_0-2'

LLI Sample # SW 6267985
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/21/2011 14:30 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-79

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	< 5	5	0.5	0.8
10950	1,2-Dibromoethane	106-93-4	< 5	5	0.9	0.8
10950	1,2-Dichloroethane	107-06-2	< 5	5	0.9	0.8
10950	Ethylbenzene	100-41-4	< 5	5	0.9	0.8
10950	Isopropylbenzene	98-82-8	< 5	5	0.9	0.8
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 5	5	0.5	0.8
10950	Toluene	108-88-3	< 5	5	0.9	0.8
10950	1,2,4-Trimethylbenzene	95-63-6	< 5	5	0.9	0.8
10950	1,3,5-Trimethylbenzene	108-67-8	< 5	5	0.9	0.8
10950	Xylene (Total)	1330-20-7	< 5	5	0.9	0.8
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	< 190	190	38	1
10724	Benzo(a)anthracene	56-55-3	< 190	190	38	1
10724	Benzo(a)pyrene	50-32-8	< 190	190	38	1
10724	Benzo(b)fluoranthene	205-99-2	< 190	190	38	1
10724	Benzo(g,h,i)perylene	191-24-2	< 190	190	38	1
10724	Chrysene	218-01-9	< 190	190	38	1
10724	Fluorene	86-73-7	< 190	190	38	1
10724	Naphthalene	91-20-3	< 190	190	38	1
10724	Phenanthrene	85-01-8	< 190	190	38	1
10724	Pyrene	129-00-0	< 190	190	38	1
Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	145	0.561	0.0292	5
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	12.6	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	A111182AA	04/29/2011 07:02	Angela D Sneeringer	0.8
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111624232	04/21/2011 14:30	Client Supplied	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-79_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-79_0-2'

LLI Sample # SW 6267985
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/21/2011 14:30 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-79

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111624232	04/21/2011 14:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111624232	04/21/2011 14:30	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11116SLD026	04/29/2011 14:07	Matthew S Woods	1
10814	BNA Soil Microwave PAH	SW-846 3546	1	11116SLD026	04/27/2011 09:00	Kerrie A Freeburn	1
06135	Lead	SW-846 6020	1	111171026001A	04/29/2011 15:15	Choon Y Tian	5
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111171026001	04/27/2011 12:18	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11118820008A	04/28/2011 19:48	Scott W Freisher	1

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-80_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-80_0-2'

LLI Sample # SW 6267986
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/21/2011 15:00 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-80

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	9	5	0.5	0.81
10950	1,2-Dibromoethane	106-93-4	< 5	5	1	0.81
10950	1,2-Dichloroethane	107-06-2	< 5	5	1	0.81
10950	Ethylbenzene	100-41-4	< 5	5	1	0.81
10950	Isopropylbenzene	98-82-8	< 5	5	1	0.81
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 5	5	0.5	0.81
10950	Toluene	108-88-3	< 5	5	1	0.81
10950	1,2,4-Trimethylbenzene	95-63-6	< 5	5	1	0.81
10950	1,3,5-Trimethylbenzene	108-67-8	< 5	5	1	0.81
10950	Xylene (Total)	1330-20-7	< 5	5	1	0.81
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	570	200	40	1
10724	Benzo(a)anthracene	56-55-3	1,700	200	40	1
10724	Benzo(a)pyrene	50-32-8	1,400	200	40	1
10724	Benzo(b)fluoranthene	205-99-2	1,900	200	40	1
10724	Benzo(g,h,i)perylene	191-24-2	790	200	40	1
10724	Chrysene	218-01-9	1,600	200	40	1
10724	Fluorene	86-73-7	< 200	200	40	1
10724	Naphthalene	91-20-3	< 200	200	40	1
10724	Phenanthrene	85-01-8	1,900	200	40	1
10724	Pyrene	129-00-0	2,900	200	40	1
Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	234	1.15	0.0599	10
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	16.5	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	A111182AA	04/29/2011 07:25	Angela D Sneeringer	0.81
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111624232	04/21/2011 15:00	Client Supplied	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-80_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-80_0-2'

LLI Sample # SW 6267986
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/21/2011 15:00 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-80

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111624232	04/21/2011 15:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111624232	04/21/2011 15:00	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11116SLD026	04/29/2011 14:33	Matthew S Woods	1
10814	BNA Soil Microwave PAH	SW-846 3546	1	11116SLD026	04/27/2011 09:00	Kerrie A Freeburn	1
06135	Lead	SW-846 6020	1	111171026001A	04/29/2011 15:17	Choon Y Tian	10
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111171026001	04/27/2011 12:18	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11118820008A	04/28/2011 19:48	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-53_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-53_0-2'

LLI Sample # SW 6267987
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/22/2011 08:30 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-53

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	18	9	0.9	0.98
10950	1,2-Dibromoethane	106-93-4	< 9	9	2	0.98
10950	1,2-Dichloroethane	107-06-2	< 9	9	2	0.98
10950	Ethylbenzene	100-41-4	< 9	9	2	0.98
10950	Isopropylbenzene	98-82-8	< 9	9	2	0.98
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 9	9	0.9	0.98
10950	Toluene	108-88-3	10	9	2	0.98
10950	1,2,4-Trimethylbenzene	95-63-6	< 9	9	2	0.98
10950	1,3,5-Trimethylbenzene	108-67-8	< 9	9	2	0.98
10950	Xylene (Total)	1330-20-7	< 9	9	2	0.98

The GC/MS volatile internal standard peak areas were outside the QC limits. A re-analysis was performed, and the matrix effect was confirmed.

GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	< 320	320	63	1
10724	Benzo(a)anthracene	56-55-3	530	320	63	1
10724	Benzo(a)pyrene	50-32-8	390	320	63	1
10724	Benzo(b)fluoranthene	205-99-2	480	320	63	1
10724	Benzo(g,h,i)perylene	191-24-2	< 320	320	63	1
10724	Chrysene	218-01-9	470	320	63	1
10724	Fluorene	86-73-7	< 320	320	63	1
10724	Naphthalene	91-20-3	< 320	320	63	1
10724	Phenanthrene	85-01-8	900	320	63	1
10724	Pyrene	129-00-0	860	320	63	1

The GC/MS semivolatile internal standard peak areas were outside of the QC limits for both the initial injection and the re-injection. The values here are from the initial injection of the sample.

Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	3,310	9.45	0.491	50

Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	48.1	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-53_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-53_0-2'

LLI Sample # SW 6267987
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/22/2011 08:30 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-53

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	A111182AA	04/29/2011 07:47	Angela D Sneeringer	0.98
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111624232	04/22/2011 08:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111624232	04/22/2011 08:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111624232	04/22/2011 08:30	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11116SLD026	04/29/2011 15:00	Matthew S Woods	1
10814	BNA Soil Microwave PAH	SW-846 3546	1	11116SLD026	04/27/2011 09:00	Kerrie A Freeburn	1
06135	Lead	SW-846 6020	1	111171026001A	04/29/2011 15:18	Choon Y Tian	50
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111171026001	04/27/2011 12:18	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11118820008A	04/28/2011 19:48	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-54_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-54_0-2'

LLI Sample # SW 6267988
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/22/2011 09:00 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-54

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	< 5	5	0.5	0.82
10950	1,2-Dibromoethane	106-93-4	< 5	5	1	0.82
10950	1,2-Dichloroethane	107-06-2	< 5	5	1	0.82
10950	Ethylbenzene	100-41-4	< 5	5	1	0.82
10950	Isopropylbenzene	98-82-8	< 5	5	1	0.82
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 5	5	0.5	0.82
10950	Toluene	108-88-3	7	5	1	0.82
10950	1,2,4-Trimethylbenzene	95-63-6	< 5	5	1	0.82
10950	1,3,5-Trimethylbenzene	108-67-8	< 5	5	1	0.82
10950	Xylene (Total)	1330-20-7	< 5	5	1	0.82

The GC/MS volatile internal standard peak areas were outside the QC limits. A re-analysis was performed, and the matrix effect was confirmed.

GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	830	210	41	1
10724	Benzo(a)anthracene	56-55-3	2,400	210	41	1
10724	Benzo(a)pyrene	50-32-8	2,500	210	41	1
10724	Benzo(b)fluoranthene	205-99-2	3,200	210	41	1
10724	Benzo(g,h,i)perylene	191-24-2	1,700	210	41	1
10724	Chrysene	218-01-9	2,600	210	41	1
10724	Fluorene	86-73-7	210	210	41	1
10724	Naphthalene	91-20-3	870	210	41	1
10724	Phenanthrene	85-01-8	2,800	210	41	1
10724	Pyrene	129-00-0	4,400	210	41	1

The GC/MS semivolatile internal standard peak areas were outside of QC limits. The matrix spike and matrix spike duplicate samples were analyzed and internal standard peak areas were again outside of QC limits, indicating a matrix effect.

Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	186	0.625	0.0325	5
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	20.0	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-54_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-54_0-2'

LLI Sample # SW 6267988
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/22/2011 09:00 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-54

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	A111182AA	04/29/2011 08:09	Angela D Sneeringer	0.82
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111624232	04/22/2011 09:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111624232	04/22/2011 09:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111624232	04/22/2011 09:00	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11118SLE026	05/04/2011 07:54	Brian K Graham	1
10814	BNA Soil Microwave PAH	SW-846 3546	1	11118SLE026	04/29/2011 03:35	Roman Kuropatkin	1
06135	Lead	SW-846 6020	1	111171026001A	04/29/2011 15:20	Choon Y Tian	5
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111171026001	04/27/2011 12:18	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11118820008A	04/28/2011 19:48	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-62_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-62_0-2'

LLI Sample # SW 6267989
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/22/2011 09:30 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-62

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	51	10	1	1.07
10950	1,2-Dibromoethane	106-93-4	< 10	10	2	1.07
10950	1,2-Dichloroethane	107-06-2	< 10	10	2	1.07
10950	Ethylbenzene	100-41-4	< 10	10	2	1.07
10950	Isopropylbenzene	98-82-8	< 10	10	2	1.07
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 10	10	1	1.07
10950	Toluene	108-88-3	24	10	2	1.07
10950	1,2,4-Trimethylbenzene	95-63-6	< 10	10	2	1.07
10950	1,3,5-Trimethylbenzene	108-67-8	< 10	10	2	1.07
10950	Xylene (Total)	1330-20-7	< 10	10	2	1.07

The GC/MS volatile internal standard peak areas were outside the QC limits. A re-analysis was performed, and the matrix effect was confirmed.

GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	< 3,100	3,100	620	10
10724	Benzo(a)anthracene	56-55-3	< 3,100	3,100	620	10
10724	Benzo(a)pyrene	50-32-8	< 3,100	3,100	620	10
10724	Benzo(b)fluoranthene	205-99-2	< 3,100	3,100	620	10
10724	Benzo(g,h,i)perylene	191-24-2	3,400	3,100	620	10
10724	Chrysene	218-01-9	< 3,100	3,100	620	10
10724	Fluorene	86-73-7	< 3,100	3,100	620	10
10724	Naphthalene	91-20-3	4,200	3,100	620	10
10724	Phenanthrene	85-01-8	< 3,100	3,100	620	10
10724	Pyrene	129-00-0	< 3,100	3,100	620	10

Reporting limits were raised due to interference from the sample matrix.

The GC/MS semivolatile internal standard peak areas were outside of the QC limits for both the initial injection and the re-injection. The values here are from the initial injection of the sample.

Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	2,580	9.13	0.475	50
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	46.3	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-62_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-62_0-2'

LLI Sample # SW 6267989
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/22/2011 09:30 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-62

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	A111182AA	04/29/2011 08:31	Angela D Sneeringer	1.07
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111624232	04/22/2011 09:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111624232	04/22/2011 09:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111624232	04/22/2011 09:30	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11118SLE026	05/04/2011 09:13	Brian K Graham	10
10814	BNA Soil Microwave PAH	SW-846 3546	1	11118SLE026	04/29/2011 03:35	Roman Kuropatkin	1
06135	Lead	SW-846 6020	1	111171026001A	04/29/2011 15:22	Choon Y Tian	50
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111171026001	04/27/2011 12:18	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11118820008A	04/28/2011 19:48	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-61_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-61_0-2'

LLI Sample # SW 6267990
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/22/2011 09:45 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-61

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	< 5	5	0.5	0.8
10950	1,2-Dibromoethane	106-93-4	< 5	5	1	0.8
10950	1,2-Dichloroethane	107-06-2	< 5	5	1	0.8
10950	Ethylbenzene	100-41-4	< 5	5	1	0.8
10950	Isopropylbenzene	98-82-8	< 5	5	1	0.8
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 5	5	0.5	0.8
10950	Toluene	108-88-3	< 5	5	1	0.8
10950	1,2,4-Trimethylbenzene	95-63-6	< 5	5	1	0.8
10950	1,3,5-Trimethylbenzene	108-67-8	< 5	5	1	0.8
10950	Xylene (Total)	1330-20-7	< 5	5	1	0.8
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	290	200	40	1
10724	Benzo(a)anthracene	56-55-3	650	200	40	1
10724	Benzo(a)pyrene	50-32-8	580	200	40	1
10724	Benzo(b)fluoranthene	205-99-2	700	200	40	1
10724	Benzo(g,h,i)perylene	191-24-2	340	200	40	1
10724	Chrysene	218-01-9	570	200	40	1
10724	Fluorene	86-73-7	< 200	200	40	1
10724	Naphthalene	91-20-3	< 200	200	40	1
10724	Phenanthrene	85-01-8	1,100	200	40	1
10724	Pyrene	129-00-0	1,000	200	40	1
	The GC/MS semivolatile internal standard peak areas were outside of the QC limits for both the initial injection and the re-injection. The values here are from the initial injection of the sample.					
Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	118	0.581	0.0302	5
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	17.3	0.50	0.50	1
	"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.					

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-61_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-61_0-2'

LLI Sample # SW 6267990
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/22/2011 09:45 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-61

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	X111191AA	04/29/2011 09:56	Emily R Styer	0.8
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111624232	04/22/2011 09:45	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111624232	04/22/2011 09:45	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111624232	04/22/2011 09:45	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11118SLE026	05/04/2011 09:39	Brian K Graham	1
10814	BNA Soil Microwave PAH	SW-846 3546	1	11118SLE026	04/29/2011 03:35	Roman Kuropatkin	1
06135	Lead	SW-846 6020	1	111171026001A	04/29/2011 15:27	Choon Y Tian	5
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111171026001	04/27/2011 12:18	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11118820008A	04/28/2011 19:48	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-60_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-60_0-2'

LLI Sample # SW 6267991
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/22/2011 10:00 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-60

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	20	8	0.8	1.26
10950	1,2-Dibromoethane	106-93-4	< 8	8	2	1.26
10950	1,2-Dichloroethane	107-06-2	< 8	8	2	1.26
10950	Ethylbenzene	100-41-4	< 8	8	2	1.26
10950	Isopropylbenzene	98-82-8	< 8	8	2	1.26
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 8	8	0.8	1.26
10950	Toluene	108-88-3	11	8	2	1.26
10950	1,2,4-Trimethylbenzene	95-63-6	< 8	8	2	1.26
10950	1,3,5-Trimethylbenzene	108-67-8	< 8	8	2	1.26
10950	Xylene (Total)	1330-20-7	< 8	8	2	1.26

The GC/MS volatile internal standard peak areas were outside the QC limits. A re-analysis was performed, and the matrix effect was confirmed.

GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	< 20,000	20,000	4,000	10
10724	Benzo(a)anthracene	56-55-3	< 20,000	20,000	4,000	10
10724	Benzo(a)pyrene	50-32-8	< 20,000	20,000	4,000	10
10724	Benzo(b)fluoranthene	205-99-2	< 20,000	20,000	4,000	10
10724	Benzo(g,h,i)perylene	191-24-2	< 20,000	20,000	4,000	10
10724	Chrysene	218-01-9	< 20,000	20,000	4,000	10
10724	Fluorene	86-73-7	< 20,000	20,000	4,000	10
10724	Naphthalene	91-20-3	< 20,000	20,000	4,000	10
10724	Phenanthrene	85-01-8	< 20,000	20,000	4,000	10
10724	Pyrene	129-00-0	< 20,000	20,000	4,000	10

Reporting limits were raised due to interference from the sample matrix.

The GC/MS semivolatile internal standard peak areas were outside of the QC limits for both the initial injection and the re-injection. The values here are from the initial injection of the sample.

Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	777	2.35	0.122	20
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	17.3	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-60_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-60_0-2'

LLI Sample # SW 6267991
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/22/2011 10:00 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-60

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	X111191AA	04/29/2011 10:19	Emily R Styer	1.26
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111624232	04/22/2011 10:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111624232	04/22/2011 10:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111624232	04/22/2011 10:00	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11118SLE026	05/04/2011 10:06	Brian K Graham	10
10814	BNA Soil Microwave PAH	SW-846 3546	1	11118SLE026	04/29/2011 03:35	Roman Kuropatkin	1
06135	Lead	SW-846 6020	1	111171026001A	04/29/2011 15:29	Choon Y Tian	20
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111171026001	04/27/2011 12:18	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11118820008A	04/28/2011 19:48	Scott W Freisher	1

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-75_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-75_0-2'

LLI Sample # SW 6267992
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/19/2011 16:00 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-75

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		ug/kg	ug/kg	ug/kg	
10950	Acetone	67-64-1	99	19	7	0.82
10950	Benzene	71-43-2	5	5	0.5	0.82
10950	Bromodichloromethane	75-27-4	< 5	5	0.9	0.82
10950	Bromoform	75-25-2	< 5	5	0.9	0.82
10950	Bromomethane	74-83-9	< 5	5	2	0.82
10950	2-Butanone	78-93-3	15	9	4	0.82
10950	Carbon Disulfide	75-15-0	< 5	5	0.9	0.82
10950	Carbon Tetrachloride	56-23-5	< 5	5	0.9	0.82
10950	Chlorobenzene	108-90-7	< 5	5	0.9	0.82
10950	Chloroethane	75-00-3	< 5	5	2	0.82
10950	Chloroform	67-66-3	< 5	5	0.9	0.82
10950	Chloromethane	74-87-3	< 5	5	2	0.82
10950	Cyclohexane	110-82-7	< 5	5	0.9	0.82
10950	1,2-Dibromo-3-chloropropane	96-12-8	< 5	5	2	0.82
10950	Dibromochloromethane	124-48-1	< 5	5	0.9	0.82
10950	1,2-Dibromoethane	106-93-4	< 5	5	0.9	0.82
10950	1,2-Dichlorobenzene	95-50-1	< 5	5	0.9	0.82
10950	1,3-Dichlorobenzene	541-73-1	< 5	5	0.9	0.82
10950	1,4-Dichlorobenzene	106-46-7	< 5	5	0.9	0.82
10950	Dichlorodifluoromethane	75-71-8	< 5	5	2	0.82
10950	1,1-Dichloroethane	75-34-3	< 5	5	0.9	0.82
10950	1,2-Dichloroethane	107-06-2	< 5	5	0.9	0.82
10950	1,1-Dichloroethene	75-35-4	< 5	5	0.9	0.82
10950	cis-1,2-Dichloroethene	156-59-2	< 5	5	0.9	0.82
10950	trans-1,2-Dichloroethene	156-60-5	< 5	5	0.9	0.82
10950	1,2-Dichloropropane	78-87-5	< 5	5	0.9	0.82
10950	cis-1,3-Dichloropropene	10061-01-5	< 5	5	0.9	0.82
10950	trans-1,3-Dichloropropene	10061-02-6	< 5	5	0.9	0.82
10950	Ethylbenzene	100-41-4	< 5	5	0.9	0.82
10950	Freon 113	76-13-1	< 9	9	2	0.82
10950	2-Hexanone	591-78-6	< 9	9	3	0.82
10950	Isopropylbenzene	98-82-8	< 5	5	0.9	0.82
10950	Methyl Acetate	79-20-9	< 5	5	2	0.82
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 5	5	0.5	0.82
10950	4-Methyl-2-pentanone	108-10-1	< 9	9	3	0.82
10950	Methylcyclohexane	108-87-2	< 5	5	0.9	0.82
10950	Methylene Chloride	75-09-2	< 5	5	2	0.82
10950	Styrene	100-42-5	< 5	5	0.9	0.82
10950	1,1,2,2-Tetrachloroethane	79-34-5	< 5	5	0.9	0.82
10950	Tetrachloroethene	127-18-4	< 5	5	0.9	0.82
10950	Toluene	108-88-3	< 5	5	0.9	0.82
10950	1,2,4-Trichlorobenzene	120-82-1	< 5	5	0.9	0.82
10950	1,1,1-Trichloroethane	71-55-6	< 5	5	0.9	0.82
10950	1,1,2-Trichloroethane	79-00-5	< 5	5	0.9	0.82
10950	Trichloroethene	79-01-6	< 5	5	0.9	0.82
10950	Trichlorofluoromethane	75-69-4	< 5	5	2	0.82
10950	Vinyl Chloride	75-01-4	< 5	5	0.9	0.82
10950	Xylene (Total)	1330-20-7	< 5	5	0.9	0.82

The GC/MS volatile internal standard peak areas were outside the QC limits. A re-analysis was performed, and the matrix effect

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

Sample Description: BH-10-75_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-75_0-2'

LLI Sample # SW 6267992
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/19/2011 16:00 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-75

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
was confirmed.						
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	360	190	38	1
10727	Acenaphthylene	208-96-8	310	190	38	1
10727	Acetophenone	98-86-2	< 190	190	77	1
10727	Anthracene	120-12-7	1,200	190	38	1
10727	Atrazine	1912-24-9	< 190	190	38	1
10727	Benzaldehyde	100-52-7	< 190	190	77	1
10727	Benzo(a)anthracene	56-55-3	3,800	190	38	1
10727	Benzo(a)pyrene	50-32-8	2,800	190	38	1
10727	Benzo(b)fluoranthene	205-99-2	3,600	190	38	1
10727	Benzo(g,h,i)perylene	191-24-2	1,900	190	38	1
10727	Benzo(k)fluoranthene	207-08-9	2,100	190	38	1
10727	1,1'-Biphenyl	92-52-4	< 190	190	38	1
10727	4-Bromophenyl-phenylether	101-55-3	< 190	190	38	1
10727	Butylbenzylphthalate	85-68-7	< 190	190	77	1
10727	Di-n-butylphthalate	84-74-2	< 190	190	77	1
10727	Caprolactam	105-60-2	< 190	190	38	1
10727	Carbazole	86-74-8	600	190	38	1
10727	4-Chloro-3-methylphenol	59-50-7	< 190	190	77	1
10727	4-Chloroaniline	106-47-8	< 190	190	77	1
10727	bis(2-Chloroethoxy)methane	111-91-1	< 190	190	38	1
10727	bis(2-Chloroethyl)ether	111-44-4	< 190	190	38	1
10727	2-Chloronaphthalene	91-58-7	< 190	190	38	1
10727	2-Chlorophenol	95-57-8	< 190	190	38	1
10727	4-Chlorophenyl-phenylether	7005-72-3	< 190	190	38	1
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	< 190	190	38	1
10727	Chrysene	218-01-9	3,500	190	38	1
10727	Dibenz(a,h)anthracene	53-70-3	640	190	38	1
10727	Dibenzofuran	132-64-9	340	190	38	1
10727	3,3'-Dichlorobenzidine	91-94-1	< 380	380	110	1
10727	2,4-Dichlorophenol	120-83-2	< 190	190	38	1
10727	Diethylphthalate	84-66-2	< 190	190	77	1
10727	2,4-Dimethylphenol	105-67-9	< 190	190	77	1
10727	Dimethylphthalate	131-11-3	< 190	190	77	1
10727	4,6-Dinitro-2-methylphenol	534-52-1	< 570	570	190	1
10727	2,4-Dinitrophenol	51-28-5	< 1,100	1,100	380	1
10727	2,4-Dinitrotoluene	121-14-2	< 190	190	77	1
10727	2,6-Dinitrotoluene	606-20-2	< 190	190	38	1
10727	bis(2-Ethylhexyl)phthalate	117-81-7	< 380	380	77	1
10727	Fluoranthene	206-44-0	6,600	380	77	2
10727	Fluorene	86-73-7	340	190	38	1
10727	Hexachlorobenzene	118-74-1	< 190	190	38	1
10727	Hexachlorobutadiene	87-68-3	< 190	190	77	1
10727	Hexachlorocyclopentadiene	77-47-4	< 570	570	190	1
10727	Hexachloroethane	67-72-1	< 190	190	38	1
10727	Indeno(1,2,3-cd)pyrene	193-39-5	1,800	190	38	1
10727	Isophorone	78-59-1	< 190	190	38	1
10727	2-Methylnaphthalene	91-57-6	260	190	38	1
10727	2-Methylphenol	95-48-7	< 190	190	77	1
10727	4-Methylphenol	106-44-5	< 190	190	77	1

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

Sample Description: BH-10-75_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-75_0-2'

LLI Sample # SW 6267992
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/19/2011 16:00 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-75

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.					
10727	Naphthalene	91-20-3	290	190	38	1
10727	2-Nitroaniline	88-74-4	< 190	190	38	1
10727	3-Nitroaniline	99-09-2	< 190	190	77	1
10727	4-Nitroaniline	100-01-6	< 190	190	77	1
10727	Nitrobenzene	98-95-3	< 190	190	38	1
10727	2-Nitrophenol	88-75-5	< 190	190	38	1
10727	4-Nitrophenol	100-02-7	< 570	570	190	1
10727	N-Nitroso-di-n-propylamine	621-64-7	< 190	190	38	1
10727	N-Nitrosodiphenylamine	86-30-6	< 190	190	38	1
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.					
10727	Di-n-octylphthalate	117-84-0	< 190	190	77	1
10727	Pentachlorophenol	87-86-5	< 570	570	190	1
10727	Phenanthrene	85-01-8	4,800	380	77	2
10727	Phenol	108-95-2	< 190	190	38	1
10727	Pyrene	129-00-0	5,400	380	77	2
10727	2,4,5-Trichlorophenol	95-95-4	< 190	190	77	1
10727	2,4,6-Trichlorophenol	88-06-2	< 190	190	38	1
Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	15,700	22.6	5.68	1
06944	Antimony	7440-36-0	< 2.26	2.26	1.13	1
06935	Arsenic	7440-38-2	61.3	2.26	1.07	1
06946	Barium	7440-39-3	147	0.565	0.0452	1
06947	Beryllium	7440-41-7	0.856	0.565	0.0768	1
06949	Cadmium	7440-43-9	< 0.565	0.565	0.158	1
01650	Calcium	7440-70-2	9,930	22.6	6.92	1
06951	Chromium	7440-47-3	45.5	1.69	0.666	1
06952	Cobalt	7440-48-4	8.16	0.565	0.215	1
06953	Copper	7440-50-8	61.8	1.13	0.248	1
01654	Iron	7439-89-6	26,000	22.6	5.32	1
06955	Lead	7439-92-1	192	1.69	0.678	1
01657	Magnesium	7439-95-4	3,960	11.3	2.87	1
06958	Manganese	7439-96-5	464	0.565	0.0881	1
06961	Nickel	7440-02-0	25.3	1.13	0.215	1
01662	Potassium	7440-09-7	1,630	56.5	20.3	1
06936	Selenium	7782-49-2	< 2.26	2.26	1.11	1
06966	Silver	7440-22-4	< 0.565	0.565	0.203	1
01667	Sodium	7440-23-5	292	113	42.1	1
06925	Thallium	7440-28-0	< 3.39	3.39	1.64	1
06971	Vanadium	7440-62-2	62.9	0.565	0.215	1
06972	Zinc	7440-66-6	189	2.26	0.745	1
	SW-846 7471A		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.182	0.113	0.0032	1

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

Sample Description: BH-10-75_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-75_0-2'

LLI Sample # SW 6267992
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/19/2011 16:00 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-75

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
Wet Chemistry	**SM20 2540 G**		%	%	%	
00111	Moisture	n.a.	13.2	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	X111191AA	04/29/2011 11:28	Emily R Styer	0.82
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111624232	04/19/2011 16:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111624232	04/19/2011 16:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111624232	04/19/2011 16:00	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11117SLJ026	04/30/2011 06:52	Ryan P Byrne	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11117SLJ026	04/30/2011 12:33	Chad A Moline	2
10809	BNA Soil Microwave	SW-846 3546	1	11117SLJ026	04/28/2011 08:45	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111175708002	05/03/2011 19:49	John P Hook	1
06944	Antimony	SW-846 6010B	1	111175708002	05/03/2011 19:49	John P Hook	1
06935	Arsenic	SW-846 6010B	1	111175708002	05/03/2011 19:49	John P Hook	1
06946	Barium	SW-846 6010B	1	111175708002	05/03/2011 19:49	John P Hook	1
06947	Beryllium	SW-846 6010B	1	111175708002	05/03/2011 19:49	John P Hook	1
06949	Cadmium	SW-846 6010B	1	111175708002	05/03/2011 19:49	John P Hook	1
01650	Calcium	SW-846 6010B	1	111175708002	05/03/2011 19:49	John P Hook	1
06951	Chromium	SW-846 6010B	1	111175708002	05/03/2011 19:49	John P Hook	1
06952	Cobalt	SW-846 6010B	1	111175708002	05/03/2011 19:49	John P Hook	1
06953	Copper	SW-846 6010B	1	111175708002	05/03/2011 19:49	John P Hook	1
01654	Iron	SW-846 6010B	1	111175708002	05/03/2011 19:49	John P Hook	1
06955	Lead	SW-846 6010B	1	111175708002	05/03/2011 19:49	John P Hook	1
01657	Magnesium	SW-846 6010B	1	111175708002	05/03/2011 19:49	John P Hook	1
06958	Manganese	SW-846 6010B	1	111175708002	05/03/2011 19:49	John P Hook	1
06961	Nickel	SW-846 6010B	1	111175708002	05/03/2011 19:49	John P Hook	1
01662	Potassium	SW-846 6010B	1	111175708002	05/03/2011 19:49	John P Hook	1
06936	Selenium	SW-846 6010B	1	111175708002	05/04/2011 21:56	John W Yanzuk II	1
06966	Silver	SW-846 6010B	1	111175708002	05/03/2011 19:49	John P Hook	1
01667	Sodium	SW-846 6010B	1	111175708002	05/03/2011 19:49	John P Hook	1
06925	Thallium	SW-846 6010B	1	111175708002	05/04/2011 21:56	John W Yanzuk II	1
06971	Vanadium	SW-846 6010B	1	111175708002	05/03/2011 19:49	John P Hook	1
06972	Zinc	SW-846 6010B	1	111175708002	05/03/2011 19:49	John P Hook	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-75_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-75_0-2'

LLI Sample # SW 6267992
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/19/2011 16:00 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-75

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
00159	Mercury	SW-846 7471A	1	111175711001	04/28/2011 07:18	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111175708002	04/27/2011 20:11	Annamaria Stipkovits	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111175711001	04/27/2011 23:40	Annamaria Stipkovits	1
00111	Moisture	SM20 2540 G	1	11118820008A	04/28/2011 19:48	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-82_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-82_0-2'

LLI Sample # SW 6267993
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/20/2011 15:15 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-82

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		ug/kg	ug/kg	ug/kg	
10950	Acetone	67-64-1	320	23	8	0.77
10950	Benzene	71-43-2	< 6	6	0.6	0.77
10950	Bromodichloromethane	75-27-4	< 6	6	1	0.77
10950	Bromoform	75-25-2	< 6	6	1	0.77
10950	Bromomethane	74-83-9	< 6	6	2	0.77
10950	2-Butanone	78-93-3	13	12	5	0.77
10950	Carbon Disulfide	75-15-0	< 6	6	1	0.77
10950	Carbon Tetrachloride	56-23-5	< 6	6	1	0.77
10950	Chlorobenzene	108-90-7	< 6	6	1	0.77
10950	Chloroethane	75-00-3	< 6	6	2	0.77
10950	Chloroform	67-66-3	< 6	6	1	0.77
10950	Chloromethane	74-87-3	< 6	6	2	0.77
10950	Cyclohexane	110-82-7	< 6	6	1	0.77
10950	1,2-Dibromo-3-chloropropane	96-12-8	< 6	6	2	0.77
10950	Dibromochloromethane	124-48-1	< 6	6	1	0.77
10950	1,2-Dibromoethane	106-93-4	< 6	6	1	0.77
10950	1,2-Dichlorobenzene	95-50-1	< 6	6	1	0.77
10950	1,3-Dichlorobenzene	541-73-1	< 6	6	1	0.77
10950	1,4-Dichlorobenzene	106-46-7	< 6	6	1	0.77
10950	Dichlorodifluoromethane	75-71-8	< 6	6	2	0.77
10950	1,1-Dichloroethane	75-34-3	< 6	6	1	0.77
10950	1,2-Dichloroethane	107-06-2	< 6	6	1	0.77
10950	1,1-Dichloroethene	75-35-4	< 6	6	1	0.77
10950	cis-1,2-Dichloroethene	156-59-2	< 6	6	1	0.77
10950	trans-1,2-Dichloroethene	156-60-5	< 6	6	1	0.77
10950	1,2-Dichloropropane	78-87-5	< 6	6	1	0.77
10950	cis-1,3-Dichloropropene	10061-01-5	< 6	6	1	0.77
10950	trans-1,3-Dichloropropene	10061-02-6	< 6	6	1	0.77
10950	Ethylbenzene	100-41-4	< 6	6	1	0.77
10950	Freon 113	76-13-1	< 12	12	2	0.77
10950	2-Hexanone	591-78-6	< 12	12	4	0.77
10950	Isopropylbenzene	98-82-8	< 6	6	1	0.77
10950	Methyl Acetate	79-20-9	< 6	6	2	0.77
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 6	6	0.6	0.77
10950	4-Methyl-2-pentanone	108-10-1	< 12	12	4	0.77
10950	Methylcyclohexane	108-87-2	< 6	6	1	0.77
10950	Methylene Chloride	75-09-2	< 6	6	2	0.77
10950	Styrene	100-42-5	< 6	6	1	0.77
10950	1,1,2,2-Tetrachloroethane	79-34-5	< 6	6	1	0.77
10950	Tetrachloroethene	127-18-4	< 6	6	1	0.77
10950	Toluene	108-88-3	< 6	6	1	0.77
10950	1,2,4-Trichlorobenzene	120-82-1	< 6	6	1	0.77
10950	1,1,1-Trichloroethane	71-55-6	< 6	6	1	0.77
10950	1,1,2-Trichloroethane	79-00-5	< 6	6	1	0.77
10950	Trichloroethene	79-01-6	< 6	6	1	0.77
10950	Trichlorofluoromethane	75-69-4	< 6	6	2	0.77
10950	Vinyl Chloride	75-01-4	< 6	6	1	0.77
10950	Xylene (Total)	1330-20-7	< 6	6	1	0.77

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

Sample Description: BH-10-82_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-82_0-2'

LLI Sample # SW 6267993
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/20/2011 15:15 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-82

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**	**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	250	250	50	1
10727	Acenaphthylene	208-96-8	< 250	250	50	1
10727	Acetophenone	98-86-2	< 250	250	100	1
10727	Anthracene	120-12-7	740	250	50	1
10727	Atrazine	1912-24-9	< 250	250	50	1
10727	Benzaldehyde	100-52-7	< 250	250	100	1
10727	Benzo(a)anthracene	56-55-3	1,300	250	50	1
10727	Benzo(a)pyrene	50-32-8	960	250	50	1
10727	Benzo(b)fluoranthene	205-99-2	1,100	250	50	1
10727	Benzo(g,h,i)perylene	191-24-2	540	250	50	1
10727	Benzo(k)fluoranthene	207-08-9	630	250	50	1
10727	1,1'-Biphenyl	92-52-4	< 250	250	50	1
10727	4-Bromophenyl-phenylether	101-55-3	< 250	250	50	1
10727	Butylbenzylphthalate	85-68-7	< 250	250	100	1
10727	Di-n-butylphthalate	84-74-2	< 250	250	100	1
10727	Caprolactam	105-60-2	< 250	250	50	1
10727	Carbazole	86-74-8	270	250	50	1
10727	4-Chloro-3-methylphenol	59-50-7	< 250	250	100	1
10727	4-Chloroaniline	106-47-8	< 250	250	100	1
10727	bis(2-Chloroethoxy)methane	111-91-1	< 250	250	50	1
10727	bis(2-Chloroethyl)ether	111-44-4	< 250	250	50	1
10727	2-Chloronaphthalene	91-58-7	< 250	250	50	1
10727	2-Chlorophenol	95-57-8	< 250	250	50	1
10727	4-Chlorophenyl-phenylether	7005-72-3	< 250	250	50	1
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	< 250	250	50	1
10727	Chrysene	218-01-9	1,200	250	50	1
10727	Dibenz(a,h)anthracene	53-70-3	< 250	250	50	1
10727	Dibenzofuran	132-64-9	< 250	250	50	1
10727	3,3'-Dichlorobenzidine	91-94-1	< 500	500	150	1
10727	2,4-Dichlorophenol	120-83-2	< 250	250	50	1
10727	Diethylphthalate	84-66-2	< 250	250	100	1
10727	2,4-Dimethylphenol	105-67-9	< 250	250	100	1
10727	Dimethylphthalate	131-11-3	< 250	250	100	1
10727	4,6-Dinitro-2-methylphenol	534-52-1	< 750	750	250	1
10727	2,4-Dinitrophenol	51-28-5	< 1,500	1,500	500	1
10727	2,4-Dinitrotoluene	121-14-2	< 250	250	100	1
10727	2,6-Dinitrotoluene	606-20-2	< 250	250	50	1
10727	bis(2-Ethylhexyl)phthalate	117-81-7	< 500	500	100	1
10727	Fluoranthene	206-44-0	1,900	250	50	1
10727	Fluorene	86-73-7	280	250	50	1
10727	Hexachlorobenzene	118-74-1	< 250	250	50	1
10727	Hexachlorobutadiene	87-68-3	< 250	250	100	1
10727	Hexachlorocyclopentadiene	77-47-4	< 750	750	250	1
10727	Hexachloroethane	67-72-1	< 250	250	50	1
10727	Indeno(1,2,3-cd)pyrene	193-39-5	550	250	50	1
10727	Isophorone	78-59-1	< 250	250	50	1
10727	2-Methylnaphthalene	91-57-6	< 250	250	50	1
10727	2-Methylphenol	95-48-7	< 250	250	100	1
10727	4-Methylphenol	106-44-5	< 250	250	100	1

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

Sample Description: BH-10-82_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-82_0-2'

LLI Sample # SW 6267993
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/20/2011 15:15 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-82

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.					
10727	Naphthalene	91-20-3	< 250	250	50	1
10727	2-Nitroaniline	88-74-4	< 250	250	50	1
10727	3-Nitroaniline	99-09-2	< 250	250	100	1
10727	4-Nitroaniline	100-01-6	< 250	250	100	1
10727	Nitrobenzene	98-95-3	< 250	250	50	1
10727	2-Nitrophenol	88-75-5	< 250	250	50	1
10727	4-Nitrophenol	100-02-7	< 750	750	250	1
10727	N-Nitroso-di-n-propylamine	621-64-7	< 250	250	50	1
10727	N-Nitrosodiphenylamine	86-30-6	< 250	250	50	1
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.					
10727	Di-n-octylphthalate	117-84-0	< 250	250	100	1
10727	Pentachlorophenol	87-86-5	< 750	750	250	1
10727	Phenanthrene	85-01-8	2,500	250	50	1
10727	Phenol	108-95-2	< 250	250	50	1
10727	Pyrene	129-00-0	2,500	250	50	1
10727	2,4,5-Trichlorophenol	95-95-4	< 250	250	100	1
10727	2,4,6-Trichlorophenol	88-06-2	< 250	250	50	1
Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	26,300	30.0	7.56	1
06944	Antimony	7440-36-0	< 3.00	3.00	1.50	1
06935	Arsenic	7440-38-2	17.0	3.00	1.43	1
06946	Barium	7440-39-3	261	0.751	0.0601	1
06947	Beryllium	7440-41-7	1.10	0.751	0.102	1
06949	Cadmium	7440-43-9	< 0.751	0.751	0.210	1
01650	Calcium	7440-70-2	21,500	30.0	9.21	1
06951	Chromium	7440-47-3	117	2.25	0.886	1
06952	Cobalt	7440-48-4	11.0	0.751	0.285	1
06953	Copper	7440-50-8	122	1.50	0.331	1
01654	Iron	7439-89-6	47,200	150	35.4	5
06955	Lead	7439-92-1	584	2.25	0.901	1
01657	Magnesium	7439-95-4	7,070	15.0	3.82	1
06958	Manganese	7439-96-5	576	0.751	0.117	1
06961	Nickel	7440-02-0	41.6	1.50	0.285	1
01662	Potassium	7440-09-7	2,020	75.1	27.0	1
06936	Selenium	7782-49-2	< 15.0	15.0	7.36	5
06966	Silver	7440-22-4	< 0.751	0.751	0.270	1
01667	Sodium	7440-23-5	< 150	150	56.0	1
06925	Thallium	7440-28-0	< 22.5	22.5	10.9	5
06971	Vanadium	7440-62-2	106	0.751	0.285	1
06972	Zinc	7440-66-6	271	3.00	0.992	1
	SW-846 7471A		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.215	0.146	0.0042	1

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

Sample Description: BH-10-82_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-82_0-2'

LLI Sample # SW 6267993
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/20/2011 15:15 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-82

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
Wet Chemistry	**SM20 2540 G**		%	%	%	
00111	Moisture	n.a.	34.1	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	X111231AA	05/03/2011 03:44	Holly Berry	0.77
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111624232	04/20/2011 15:15	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111624232	04/20/2011 15:15	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111624232	04/20/2011 15:15	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11117SLJ026	04/30/2011 07:17	Ryan P Byrne	1
10809	BNA Soil Microwave	SW-846 3546	1	11117SLJ026	04/28/2011 08:45	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111175708002	05/03/2011 20:14	John P Hook	1
06944	Antimony	SW-846 6010B	1	111175708002	05/03/2011 20:14	John P Hook	1
06935	Arsenic	SW-846 6010B	1	111175708002	05/03/2011 20:14	John P Hook	1
06946	Barium	SW-846 6010B	1	111175708002	05/03/2011 20:14	John P Hook	1
06947	Beryllium	SW-846 6010B	1	111175708002	05/03/2011 20:14	John P Hook	1
06949	Cadmium	SW-846 6010B	1	111175708002	05/03/2011 20:14	John P Hook	1
01650	Calcium	SW-846 6010B	1	111175708002	05/03/2011 20:14	John P Hook	1
06951	Chromium	SW-846 6010B	1	111175708002	05/03/2011 20:14	John P Hook	1
06952	Cobalt	SW-846 6010B	1	111175708002	05/03/2011 20:14	John P Hook	1
06953	Copper	SW-846 6010B	1	111175708002	05/03/2011 20:14	John P Hook	1
01654	Iron	SW-846 6010B	1	111175708002	05/03/2011 21:20	John P Hook	5
06955	Lead	SW-846 6010B	1	111175708002	05/03/2011 20:14	John P Hook	1
01657	Magnesium	SW-846 6010B	1	111175708002	05/03/2011 20:14	John P Hook	1
06958	Manganese	SW-846 6010B	1	111175708002	05/03/2011 20:14	John P Hook	1
06961	Nickel	SW-846 6010B	1	111175708002	05/03/2011 20:14	John P Hook	1
01662	Potassium	SW-846 6010B	1	111175708002	05/03/2011 20:14	John P Hook	1
06936	Selenium	SW-846 6010B	1	111175708002	05/04/2011 13:18	Joanne M Gates	5
06966	Silver	SW-846 6010B	1	111175708002	05/03/2011 20:14	John P Hook	1
01667	Sodium	SW-846 6010B	1	111175708002	05/03/2011 20:14	John P Hook	1
06925	Thallium	SW-846 6010B	1	111175708002	05/04/2011 13:18	Joanne M Gates	5
06971	Vanadium	SW-846 6010B	1	111175708002	05/03/2011 20:14	John P Hook	1
06972	Zinc	SW-846 6010B	1	111175708002	05/03/2011 20:14	John P Hook	1
00159	Mercury	SW-846 7471A	1	111175711001	04/28/2011 07:25	Damary Valentin	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-82_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-82_0-2'

LLI Sample # SW 6267993
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/20/2011 15:15 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-82

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
05708	SW SW846 ICP Digest	SW-846 3050B	1	111175708002	04/27/2011 20:11	Annamaria Stipkovits	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111175711001	04/27/2011 23:40	Annamaria Stipkovits	1
00111	Moisture	SM20 2540 G	1	11118820008A	04/28/2011 19:48	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-81_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-81_0-2'

LLI Sample # SW 6267994
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/21/2011 09:00 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-81

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		ug/kg	ug/kg	ug/kg	
10950	Acetone	67-64-1	33	18	6	0.77
10950	Benzene	71-43-2	< 5	5	0.5	0.77
10950	Bromodichloromethane	75-27-4	< 5	5	0.9	0.77
10950	Bromoform	75-25-2	< 5	5	0.9	0.77
10950	Bromomethane	74-83-9	< 5	5	2	0.77
10950	2-Butanone	78-93-3	< 9	9	4	0.77
10950	Carbon Disulfide	75-15-0	< 5	5	0.9	0.77
10950	Carbon Tetrachloride	56-23-5	< 5	5	0.9	0.77
10950	Chlorobenzene	108-90-7	< 5	5	0.9	0.77
10950	Chloroethane	75-00-3	< 5	5	2	0.77
10950	Chloroform	67-66-3	< 5	5	0.9	0.77
10950	Chloromethane	74-87-3	< 5	5	2	0.77
10950	Cyclohexane	110-82-7	< 5	5	0.9	0.77
10950	1,2-Dibromo-3-chloropropane	96-12-8	< 5	5	2	0.77
10950	Dibromochloromethane	124-48-1	< 5	5	0.9	0.77
10950	1,2-Dibromoethane	106-93-4	< 5	5	0.9	0.77
10950	1,2-Dichlorobenzene	95-50-1	< 5	5	0.9	0.77
10950	1,3-Dichlorobenzene	541-73-1	< 5	5	0.9	0.77
10950	1,4-Dichlorobenzene	106-46-7	< 5	5	0.9	0.77
10950	Dichlorodifluoromethane	75-71-8	< 5	5	2	0.77
10950	1,1-Dichloroethane	75-34-3	< 5	5	0.9	0.77
10950	1,2-Dichloroethane	107-06-2	< 5	5	0.9	0.77
10950	1,1-Dichloroethene	75-35-4	< 5	5	0.9	0.77
10950	cis-1,2-Dichloroethene	156-59-2	< 5	5	0.9	0.77
10950	trans-1,2-Dichloroethene	156-60-5	< 5	5	0.9	0.77
10950	1,2-Dichloropropane	78-87-5	< 5	5	0.9	0.77
10950	cis-1,3-Dichloropropene	10061-01-5	< 5	5	0.9	0.77
10950	trans-1,3-Dichloropropene	10061-02-6	< 5	5	0.9	0.77
10950	Ethylbenzene	100-41-4	< 5	5	0.9	0.77
10950	Freon 113	76-13-1	< 9	9	2	0.77
10950	2-Hexanone	591-78-6	< 9	9	3	0.77
10950	Isopropylbenzene	98-82-8	< 5	5	0.9	0.77
10950	Methyl Acetate	79-20-9	< 5	5	2	0.77
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 5	5	0.5	0.77
10950	4-Methyl-2-pentanone	108-10-1	< 9	9	3	0.77
10950	Methylcyclohexane	108-87-2	< 5	5	0.9	0.77
10950	Methylene Chloride	75-09-2	< 5	5	2	0.77
10950	Styrene	100-42-5	< 5	5	0.9	0.77
10950	1,1,2,2-Tetrachloroethane	79-34-5	< 5	5	0.9	0.77
10950	Tetrachloroethene	127-18-4	< 5	5	0.9	0.77
10950	Toluene	108-88-3	< 5	5	0.9	0.77
10950	1,2,4-Trichlorobenzene	120-82-1	< 5	5	0.9	0.77
10950	1,1,1-Trichloroethane	71-55-6	< 5	5	0.9	0.77
10950	1,1,2-Trichloroethane	79-00-5	< 5	5	0.9	0.77
10950	Trichloroethene	79-01-6	< 5	5	0.9	0.77
10950	Trichlorofluoromethane	75-69-4	< 5	5	2	0.77
10950	Vinyl Chloride	75-01-4	< 5	5	0.9	0.77
10950	Xylene (Total)	1330-20-7	< 5	5	0.9	0.77

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

Sample Description: BH-10-81_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-81_0-2'

LLI Sample # SW 6267994
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/21/2011 09:00 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-81

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**	**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	< 200	200	40	1
10727	Acenaphthylene	208-96-8	< 200	200	40	1
10727	Acetophenone	98-86-2	< 200	200	80	1
10727	Anthracene	120-12-7	390	200	40	1
10727	Atrazine	1912-24-9	< 200	200	40	1
10727	Benzaldehyde	100-52-7	< 200	200	80	1
10727	Benzo(a)anthracene	56-55-3	1,900	200	40	1
10727	Benzo(a)pyrene	50-32-8	2,700	200	40	1
10727	Benzo(b)fluoranthene	205-99-2	2,500	200	40	1
10727	Benzo(g,h,i)perylene	191-24-2	3,100	200	40	1
10727	Benzo(k)fluoranthene	207-08-9	840	200	40	1
10727	1,1'-Biphenyl	92-52-4	< 200	200	40	1
10727	4-Bromophenyl-phenylether	101-55-3	< 200	200	40	1
10727	Butylbenzylphthalate	85-68-7	< 200	200	80	1
10727	Di-n-butylphthalate	84-74-2	< 200	200	80	1
10727	Caprolactam	105-60-2	< 200	200	40	1
10727	Carbazole	86-74-8	< 200	200	40	1
10727	4-Chloro-3-methylphenol	59-50-7	< 200	200	80	1
10727	4-Chloroaniline	106-47-8	< 200	200	80	1
10727	bis(2-Chloroethoxy)methane	111-91-1	< 200	200	40	1
10727	bis(2-Chloroethyl)ether	111-44-4	< 200	200	40	1
10727	2-Chloronaphthalene	91-58-7	< 200	200	40	1
10727	2-Chlorophenol	95-57-8	< 200	200	40	1
10727	4-Chlorophenyl-phenylether	7005-72-3	< 200	200	40	1
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	< 200	200	40	1
10727	Chrysene	218-01-9	2,400	200	40	1
10727	Dibenz(a,h)anthracene	53-70-3	2,200	200	40	1
10727	Dibenzofuran	132-64-9	< 200	200	40	1
10727	3,3'-Dichlorobenzidine	91-94-1	< 400	400	120	1
10727	2,4-Dichlorophenol	120-83-2	< 200	200	40	1
10727	Diethylphthalate	84-66-2	< 200	200	80	1
10727	2,4-Dimethylphenol	105-67-9	< 200	200	80	1
10727	Dimethylphthalate	131-11-3	< 200	200	80	1
10727	4,6-Dinitro-2-methylphenol	534-52-1	< 600	600	200	1
10727	2,4-Dinitrophenol	51-28-5	< 1,200	1,200	400	1
10727	2,4-Dinitrotoluene	121-14-2	< 200	200	80	1
10727	2,6-Dinitrotoluene	606-20-2	< 200	200	40	1
10727	bis(2-Ethylhexyl)phthalate	117-81-7	400	400	80	1
10727	Fluoranthene	206-44-0	1,700	200	40	1
10727	Fluorene	86-73-7	< 200	200	40	1
10727	Hexachlorobenzene	118-74-1	< 200	200	40	1
10727	Hexachlorobutadiene	87-68-3	< 200	200	80	1
10727	Hexachlorocyclopentadiene	77-47-4	< 600	600	200	1
10727	Hexachloroethane	67-72-1	< 200	200	40	1
10727	Indeno(1,2,3-cd)pyrene	193-39-5	1,900	200	40	1
10727	Isophorone	78-59-1	< 200	200	40	1
10727	2-Methylnaphthalene	91-57-6	510	200	40	1
10727	2-Methylphenol	95-48-7	< 200	200	80	1
10727	4-Methylphenol	106-44-5	< 200	200	80	1

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

Sample Description: BH-10-81_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-81_0-2'

LLI Sample # SW 6267994
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/21/2011 09:00 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-81

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.					
10727	Naphthalene	91-20-3	360	200	40	1
10727	2-Nitroaniline	88-74-4	< 200	200	40	1
10727	3-Nitroaniline	99-09-2	< 200	200	80	1
10727	4-Nitroaniline	100-01-6	< 200	200	80	1
10727	Nitrobenzene	98-95-3	< 200	200	40	1
10727	2-Nitrophenol	88-75-5	< 200	200	40	1
10727	4-Nitrophenol	100-02-7	< 600	600	200	1
10727	N-Nitroso-di-n-propylamine	621-64-7	< 200	200	40	1
10727	N-Nitrosodiphenylamine	86-30-6	< 200	200	40	1
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.					
10727	Di-n-octylphthalate	117-84-0	< 200	200	80	1
10727	Pentachlorophenol	87-86-5	< 600	600	200	1
10727	Phenanthrene	85-01-8	1,600	200	40	1
10727	Phenol	108-95-2	< 200	200	40	1
10727	Pyrene	129-00-0	2,000	200	40	1
10727	2,4,5-Trichlorophenol	95-95-4	< 200	200	80	1
10727	2,4,6-Trichlorophenol	88-06-2	< 200	200	40	1
Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	10,100	118	29.6	5
06944	Antimony	7440-36-0	< 11.8	11.8	5.88	5
	Reporting limits for ICP metals were raised due to interference from the sample matrix.					
06935	Arsenic	7440-38-2	38.9	11.8	5.58	5
06946	Barium	7440-39-3	122	0.588	0.0470	1
06947	Beryllium	7440-41-7	0.698	0.588	0.0799	1
06949	Cadmium	7440-43-9	< 2.94	2.94	0.823	5
01650	Calcium	7440-70-2	6,520	23.5	7.21	1
06951	Chromium	7440-47-3	54.8	8.82	3.47	5
06952	Cobalt	7440-48-4	13.1	2.94	1.12	5
06953	Copper	7440-50-8	94.2	5.88	1.29	5
01654	Iron	7439-89-6	68,100	118	27.7	5
06955	Lead	7439-92-1	242	8.82	3.53	5
01657	Magnesium	7439-95-4	3,040	11.8	2.99	1
06958	Manganese	7439-96-5	539	0.588	0.0917	1
06961	Nickel	7440-02-0	37.2	5.88	1.12	5
01662	Potassium	7440-09-7	1,690	294	106	5
06936	Selenium	7782-49-2	< 11.8	11.8	5.76	5
06966	Silver	7440-22-4	< 2.94	2.94	1.06	5
01667	Sodium	7440-23-5	138	118	43.8	1
06925	Thallium	7440-28-0	< 17.6	17.6	8.52	5
06971	Vanadium	7440-62-2	63.1	2.94	1.12	5
06972	Zinc	7440-66-6	141	11.8	3.88	5

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

Sample Description: BH-10-81_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-81_0-2'

LLI Sample # SW 6267994
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/21/2011 09:00 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-81

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.373	0.118	0.0034	1
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	16.6	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	X111231AA	05/03/2011 04:06	Holly Berry	0.77
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111624232	04/21/2011 09:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111624232	04/21/2011 09:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111624232	04/21/2011 09:00	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11117SLJ026	04/30/2011 12:58	Chad A Moline	1
10809	BNA Soil Microwave	SW-846 3546	1	11117SLJ026	04/28/2011 08:45	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111175708002	05/03/2011 21:24	John P Hook	5
06944	Antimony	SW-846 6010B	1	111175708002	05/03/2011 21:24	John P Hook	5
06935	Arsenic	SW-846 6010B	1	111175708002	05/03/2011 21:24	John P Hook	5
06946	Barium	SW-846 6010B	1	111175708002	05/03/2011 20:18	John P Hook	1
06947	Beryllium	SW-846 6010B	1	111175708002	05/03/2011 20:18	John P Hook	1
06949	Cadmium	SW-846 6010B	1	111175708002	05/03/2011 21:24	John P Hook	5
01650	Calcium	SW-846 6010B	1	111175708002	05/03/2011 20:18	John P Hook	1
06951	Chromium	SW-846 6010B	1	111175708002	05/03/2011 21:24	John P Hook	5
06952	Cobalt	SW-846 6010B	1	111175708002	05/03/2011 21:24	John P Hook	5
06953	Copper	SW-846 6010B	1	111175708002	05/03/2011 21:24	John P Hook	5
01654	Iron	SW-846 6010B	1	111175708002	05/03/2011 21:24	John P Hook	5
06955	Lead	SW-846 6010B	1	111175708002	05/03/2011 21:24	John P Hook	5
01657	Magnesium	SW-846 6010B	1	111175708002	05/03/2011 20:18	John P Hook	1
06958	Manganese	SW-846 6010B	1	111175708002	05/03/2011 20:18	John P Hook	1
06961	Nickel	SW-846 6010B	1	111175708002	05/03/2011 21:24	John P Hook	5
01662	Potassium	SW-846 6010B	1	111175708002	05/03/2011 21:24	John P Hook	5
06936	Selenium	SW-846 6010B	1	111175708002	05/04/2011 13:21	Joanne M Gates	5
06966	Silver	SW-846 6010B	1	111175708002	05/03/2011 21:24	John P Hook	5
01667	Sodium	SW-846 6010B	1	111175708002	05/03/2011 20:18	John P Hook	1
06925	Thallium	SW-846 6010B	1	111175708002	05/04/2011 13:21	Joanne M Gates	5

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-81_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-81_0-2'

LLI Sample # SW 6267994
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/21/2011 09:00 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-81

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06971	Vanadium	SW-846 6010B	1	111175708002	05/03/2011 21:24	John P Hook	5
06972	Zinc	SW-846 6010B	1	111175708002	05/03/2011 21:24	John P Hook	5
00159	Mercury	SW-846 7471A	1	111175711001	04/28/2011 07:26	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111175708002	04/27/2011 20:11	Annamaria Stipkovits	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111175711001	04/27/2011 23:40	Annamaria Stipkovits	1
00111	Moisture	SM20 2540 G	1	11118820008A	04/28/2011 19:48	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-83_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-83_0-2'

LLI Sample # SW 6267995
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/21/2011 09:40 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-83

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		ug/kg	ug/kg	ug/kg	
10950	Acetone	67-64-1	260	25	9	0.98
10950	Benzene	71-43-2	12	6	0.6	0.98
10950	Bromodichloromethane	75-27-4	< 6	6	1	0.98
10950	Bromoform	75-25-2	< 6	6	1	0.98
10950	Bromomethane	74-83-9	< 6	6	3	0.98
10950	2-Butanone	78-93-3	27	13	5	0.98
10950	Carbon Disulfide	75-15-0	< 6	6	1	0.98
10950	Carbon Tetrachloride	56-23-5	< 6	6	1	0.98
10950	Chlorobenzene	108-90-7	< 6	6	1	0.98
10950	Chloroethane	75-00-3	< 6	6	3	0.98
10950	Chloroform	67-66-3	< 6	6	1	0.98
10950	Chloromethane	74-87-3	< 6	6	3	0.98
10950	Cyclohexane	110-82-7	< 6	6	1	0.98
10950	1,2-Dibromo-3-chloropropane	96-12-8	< 6	6	3	0.98
10950	Dibromochloromethane	124-48-1	< 6	6	1	0.98
10950	1,2-Dibromoethane	106-93-4	< 6	6	1	0.98
10950	1,2-Dichlorobenzene	95-50-1	< 6	6	1	0.98
10950	1,3-Dichlorobenzene	541-73-1	< 6	6	1	0.98
10950	1,4-Dichlorobenzene	106-46-7	< 6	6	1	0.98
10950	Dichlorodifluoromethane	75-71-8	< 6	6	3	0.98
10950	1,1-Dichloroethane	75-34-3	< 6	6	1	0.98
10950	1,2-Dichloroethane	107-06-2	< 6	6	1	0.98
10950	1,1-Dichloroethene	75-35-4	< 6	6	1	0.98
10950	cis-1,2-Dichloroethene	156-59-2	< 6	6	1	0.98
10950	trans-1,2-Dichloroethene	156-60-5	< 6	6	1	0.98
10950	1,2-Dichloropropane	78-87-5	< 6	6	1	0.98
10950	cis-1,3-Dichloropropene	10061-01-5	< 6	6	1	0.98
10950	trans-1,3-Dichloropropene	10061-02-6	< 6	6	1	0.98
10950	Ethylbenzene	100-41-4	< 6	6	1	0.98
10950	Freon 113	76-13-1	< 13	13	3	0.98
10950	2-Hexanone	591-78-6	< 13	13	4	0.98
10950	Isopropylbenzene	98-82-8	< 6	6	1	0.98
10950	Methyl Acetate	79-20-9	< 6	6	3	0.98
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 6	6	0.6	0.98
10950	4-Methyl-2-pentanone	108-10-1	< 13	13	4	0.98
10950	Methylcyclohexane	108-87-2	< 6	6	1	0.98
10950	Methylene Chloride	75-09-2	< 6	6	3	0.98
10950	Styrene	100-42-5	< 6	6	1	0.98
10950	1,1,2,2-Tetrachloroethane	79-34-5	< 6	6	1	0.98
10950	Tetrachloroethene	127-18-4	< 6	6	1	0.98
10950	Toluene	108-88-3	9	6	1	0.98
10950	1,2,4-Trichlorobenzene	120-82-1	< 6	6	1	0.98
10950	1,1,1-Trichloroethane	71-55-6	< 6	6	1	0.98
10950	1,1,2-Trichloroethane	79-00-5	< 6	6	1	0.98
10950	Trichloroethene	79-01-6	< 6	6	1	0.98
10950	Trichlorofluoromethane	75-69-4	< 6	6	3	0.98
10950	Vinyl Chloride	75-01-4	< 6	6	1	0.98
10950	Xylene (Total)	1330-20-7	< 6	6	1	0.98

The GC/MS volatile internal standard peak areas were outside the QC limits. A re-analysis was performed, and the matrix effect

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

Sample Description: BH-10-83_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-83_0-2'

LLI Sample # SW 6267995
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/21/2011 09:40 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-83

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
was confirmed.						
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	< 220	220	43	1
10727	Acenaphthylene	208-96-8	< 220	220	43	1
10727	Acetophenone	98-86-2	< 220	220	86	1
10727	Anthracene	120-12-7	270	220	43	1
10727	Atrazine	1912-24-9	< 220	220	43	1
10727	Benzaldehyde	100-52-7	< 220	220	86	1
10727	Benzo(a)anthracene	56-55-3	730	220	43	1
10727	Benzo(a)pyrene	50-32-8	680	220	43	1
10727	Benzo(b)fluoranthene	205-99-2	890	220	43	1
10727	Benzo(g,h,i)perylene	191-24-2	590	220	43	1
10727	Benzo(k)fluoranthene	207-08-9	370	220	43	1
10727	1,1'-Biphenyl	92-52-4	< 220	220	43	1
10727	4-Bromophenyl-phenylether	101-55-3	< 220	220	43	1
10727	Butylbenzylphthalate	85-68-7	740	220	86	1
10727	Di-n-butylphthalate	84-74-2	300	220	86	1
10727	Caprolactam	105-60-2	< 220	220	43	1
10727	Carbazole	86-74-8	< 220	220	43	1
10727	4-Chloro-3-methylphenol	59-50-7	< 220	220	86	1
10727	4-Chloroaniline	106-47-8	< 220	220	86	1
10727	bis(2-Chloroethoxy)methane	111-91-1	< 220	220	43	1
10727	bis(2-Chloroethyl)ether	111-44-4	< 220	220	43	1
10727	2-Chloronaphthalene	91-58-7	< 220	220	43	1
10727	2-Chlorophenol	95-57-8	< 220	220	43	1
10727	4-Chlorophenyl-phenylether	7005-72-3	< 220	220	43	1
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	< 220	220	43	1
10727	Chrysene	218-01-9	840	220	43	1
10727	Dibenz(a,h)anthracene	53-70-3	< 220	220	43	1
10727	Dibenzofuran	132-64-9	< 220	220	43	1
10727	3,3'-Dichlorobenzidine	91-94-1	< 430	430	130	1
10727	2,4-Dichlorophenol	120-83-2	< 220	220	43	1
10727	Diethylphthalate	84-66-2	< 220	220	86	1
10727	2,4-Dimethylphenol	105-67-9	< 220	220	86	1
10727	Dimethylphthalate	131-11-3	< 220	220	86	1
10727	4,6-Dinitro-2-methylphenol	534-52-1	< 650	650	220	1
10727	2,4-Dinitrophenol	51-28-5	< 1,300	1,300	430	1
10727	2,4-Dinitrotoluene	121-14-2	< 220	220	86	1
10727	2,6-Dinitrotoluene	606-20-2	< 220	220	43	1
10727	bis(2-Ethylhexyl)phthalate	117-81-7	1,000	430	86	1
10727	Fluoranthene	206-44-0	1,200	220	43	1
10727	Fluorene	86-73-7	< 220	220	43	1
10727	Hexachlorobenzene	118-74-1	< 220	220	43	1
10727	Hexachlorobutadiene	87-68-3	< 220	220	86	1
10727	Hexachlorocyclopentadiene	77-47-4	< 650	650	220	1
10727	Hexachloroethane	67-72-1	< 220	220	43	1
10727	Indeno(1,2,3-cd)pyrene	193-39-5	440	220	43	1
10727	Isophorone	78-59-1	< 220	220	43	1
10727	2-Methylnaphthalene	91-57-6	< 220	220	43	1
10727	2-Methylphenol	95-48-7	< 220	220	86	1
10727	4-Methylphenol	106-44-5	< 220	220	86	1

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

Sample Description: BH-10-83_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-83_0-2'

LLI Sample # SW 6267995
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/21/2011 09:40 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-83

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.					
10727	Naphthalene	91-20-3	< 220	220	43	1
10727	2-Nitroaniline	88-74-4	< 220	220	43	1
10727	3-Nitroaniline	99-09-2	< 220	220	86	1
10727	4-Nitroaniline	100-01-6	< 220	220	86	1
10727	Nitrobenzene	98-95-3	< 220	220	43	1
10727	2-Nitrophenol	88-75-5	< 220	220	43	1
10727	4-Nitrophenol	100-02-7	< 650	650	220	1
10727	N-Nitroso-di-n-propylamine	621-64-7	< 220	220	43	1
10727	N-Nitrosodiphenylamine	86-30-6	< 220	220	43	1
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.					
10727	Di-n-octylphthalate	117-84-0	< 220	220	86	1
10727	Pentachlorophenol	87-86-5	< 650	650	220	1
10727	Phenanthrene	85-01-8	1,000	220	43	1
10727	Phenol	108-95-2	< 220	220	43	1
10727	Pyrene	129-00-0	1,100	220	43	1
10727	2,4,5-Trichlorophenol	95-95-4	< 220	220	86	1
10727	2,4,6-Trichlorophenol	88-06-2	< 220	220	43	1
Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	17,200	25.5	6.41	1
06944	Antimony	7440-36-0	< 2.55	2.55	1.27	1
06935	Arsenic	7440-38-2	13.7	2.55	1.21	1
06946	Barium	7440-39-3	272	0.637	0.0510	1
06947	Beryllium	7440-41-7	0.797	0.637	0.0867	1
06949	Cadmium	7440-43-9	3.98	0.637	0.178	1
01650	Calcium	7440-70-2	15,800	25.5	7.82	1
06951	Chromium	7440-47-3	86.9	1.91	0.752	1
06952	Cobalt	7440-48-4	9.93	0.637	0.242	1
06953	Copper	7440-50-8	212	1.27	0.280	1
01654	Iron	7439-89-6	28,400	25.5	6.00	1
06955	Lead	7439-92-1	402	1.91	0.765	1
01657	Magnesium	7439-95-4	7,310	12.7	3.24	1
06958	Manganese	7439-96-5	384	0.637	0.0994	1
06961	Nickel	7440-02-0	44.8	1.27	0.242	1
01662	Potassium	7440-09-7	1,820	63.7	22.9	1
06936	Selenium	7782-49-2	< 2.55	2.55	1.25	1
06966	Silver	7440-22-4	< 0.637	0.637	0.229	1
01667	Sodium	7440-23-5	160	127	47.6	1
06925	Thallium	7440-28-0	< 3.82	3.82	1.85	1
06971	Vanadium	7440-62-2	65.3	0.637	0.242	1
06972	Zinc	7440-66-6	369	2.55	0.841	1
	SW-846 7471A		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.387	0.126	0.0036	1

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

Sample Description: BH-10-83_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-83_0-2'

LLI Sample # SW 6267995
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/21/2011 09:40 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-83

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
Wet Chemistry	**SM20 2540 G**		%	%	%	
00111	Moisture	n.a.	23.1	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	X111191AA	04/29/2011 12:36	Emily R Styer	0.98
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111624232	04/21/2011 09:40	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111624232	04/21/2011 09:40	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111624232	04/21/2011 09:40	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11117SLJ026	04/30/2011 13:23	Chad A Moline	1
10809	BNA Soil Microwave	SW-846 3546	1	11117SLJ026	04/28/2011 08:45	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111175708002	05/03/2011 20:29	John P Hook	1
06944	Antimony	SW-846 6010B	1	111175708002	05/03/2011 20:29	John P Hook	1
06935	Arsenic	SW-846 6010B	1	111175708002	05/03/2011 20:29	John P Hook	1
06946	Barium	SW-846 6010B	1	111175708002	05/03/2011 20:29	John P Hook	1
06947	Beryllium	SW-846 6010B	1	111175708002	05/03/2011 20:29	John P Hook	1
06949	Cadmium	SW-846 6010B	1	111175708002	05/03/2011 20:29	John P Hook	1
01650	Calcium	SW-846 6010B	1	111175708002	05/03/2011 20:29	John P Hook	1
06951	Chromium	SW-846 6010B	1	111175708002	05/03/2011 20:29	John P Hook	1
06952	Cobalt	SW-846 6010B	1	111175708002	05/03/2011 20:29	John P Hook	1
06953	Copper	SW-846 6010B	1	111175708002	05/03/2011 20:29	John P Hook	1
01654	Iron	SW-846 6010B	1	111175708002	05/03/2011 20:29	John P Hook	1
06955	Lead	SW-846 6010B	1	111175708002	05/03/2011 20:29	John P Hook	1
01657	Magnesium	SW-846 6010B	1	111175708002	05/03/2011 20:29	John P Hook	1
06958	Manganese	SW-846 6010B	1	111175708002	05/03/2011 20:29	John P Hook	1
06961	Nickel	SW-846 6010B	1	111175708002	05/03/2011 20:29	John P Hook	1
01662	Potassium	SW-846 6010B	1	111175708002	05/03/2011 20:29	John P Hook	1
06936	Selenium	SW-846 6010B	1	111175708002	05/04/2011 13:30	Joanne M Gates	1
06966	Silver	SW-846 6010B	1	111175708002	05/03/2011 20:29	John P Hook	1
01667	Sodium	SW-846 6010B	1	111175708002	05/03/2011 20:29	John P Hook	1
06925	Thallium	SW-846 6010B	1	111175708002	05/04/2011 13:30	Joanne M Gates	1
06971	Vanadium	SW-846 6010B	1	111175708002	05/03/2011 20:29	John P Hook	1
06972	Zinc	SW-846 6010B	1	111175708002	05/03/2011 20:29	John P Hook	1
00159	Mercury	SW-846 7471A	1	111175711001	04/28/2011 07:27	Damary Valentin	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-83_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-83_0-2'

LLI Sample # SW 6267995
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/21/2011 09:40 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-83

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
05708	SW SW846 ICP Digest	SW-846 3050B	1	111175708002	04/27/2011 20:11	Annamaria Stipkovits	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111175711001	04/27/2011 23:40	Annamaria Stipkovits	1
00111	Moisture	SM20 2540 G	1	11118820008A	04/28/2011 19:48	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-57_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-57_0-2'

LLI Sample # SW 6267996
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/21/2011 11:45 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-57

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	< 15,000	15,000	5,300	607.74
10950	Benzene	71-43-2	< 3,800	3,800	380	607.74
10950	Bromodichloromethane	75-27-4	< 3,800	3,800	760	607.74
10950	Bromoform	75-25-2	< 3,800	3,800	760	607.74
10950	Bromomethane	74-83-9	< 3,800	3,800	1,500	607.74
10950	2-Butanone	78-93-3	< 7,600	7,600	3,000	607.74
10950	Carbon Disulfide	75-15-0	< 3,800	3,800	760	607.74
10950	Carbon Tetrachloride	56-23-5	< 3,800	3,800	760	607.74
10950	Chlorobenzene	108-90-7	< 3,800	3,800	760	607.74
10950	Chloroethane	75-00-3	< 3,800	3,800	1,500	607.74
10950	Chloroform	67-66-3	< 3,800	3,800	760	607.74
10950	Chloromethane	74-87-3	< 3,800	3,800	1,500	607.74
10950	Cyclohexane	110-82-7	< 3,800	3,800	760	607.74
10950	1,2-Dibromo-3-chloropropane	96-12-8	< 3,800	3,800	1,500	607.74
10950	Dibromochloromethane	124-48-1	< 3,800	3,800	760	607.74
10950	1,2-Dibromoethane	106-93-4	< 3,800	3,800	760	607.74
10950	1,2-Dichlorobenzene	95-50-1	< 3,800	3,800	760	607.74
10950	1,3-Dichlorobenzene	541-73-1	< 3,800	3,800	760	607.74
10950	1,4-Dichlorobenzene	106-46-7	< 3,800	3,800	760	607.74
10950	Dichlorodifluoromethane	75-71-8	< 3,800	3,800	1,500	607.74
10950	1,1-Dichloroethane	75-34-3	< 3,800	3,800	760	607.74
10950	1,2-Dichloroethane	107-06-2	< 3,800	3,800	760	607.74
10950	1,1-Dichloroethene	75-35-4	< 3,800	3,800	760	607.74
10950	cis-1,2-Dichloroethene	156-59-2	< 3,800	3,800	760	607.74
10950	trans-1,2-Dichloroethene	156-60-5	< 3,800	3,800	760	607.74
10950	1,2-Dichloropropane	78-87-5	< 3,800	3,800	760	607.74
10950	cis-1,3-Dichloropropene	10061-01-5	< 3,800	3,800	760	607.74
10950	trans-1,3-Dichloropropene	10061-02-6	< 3,800	3,800	760	607.74
10950	Ethylbenzene	100-41-4	5,700	3,800	760	607.74
10950	Freon 113	76-13-1	< 7,600	7,600	1,500	607.74
10950	2-Hexanone	591-78-6	< 7,600	7,600	2,300	607.74
10950	Isopropylbenzene	98-82-8	22,000	3,800	760	607.74
10950	Methyl Acetate	79-20-9	< 3,800	3,800	1,500	607.74
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 3,800	3,800	380	607.74
10950	4-Methyl-2-pentanone	108-10-1	< 7,600	7,600	2,300	607.74
10950	Methylcyclohexane	108-87-2	7,000	3,800	760	607.74
10950	Methylene Chloride	75-09-2	< 3,800	3,800	1,500	607.74
10950	Styrene	100-42-5	< 3,800	3,800	760	607.74
10950	1,1,2,2-Tetrachloroethane	79-34-5	< 3,800	3,800	760	607.74
10950	Tetrachloroethene	127-18-4	< 3,800	3,800	760	607.74
10950	Toluene	108-88-3	13,000	3,800	760	607.74
10950	1,2,4-Trichlorobenzene	120-82-1	< 3,800	3,800	760	607.74
10950	1,1,1-Trichloroethane	71-55-6	< 3,800	3,800	760	607.74
10950	1,1,2-Trichloroethane	79-00-5	< 3,800	3,800	760	607.74
10950	Trichloroethene	79-01-6	< 3,800	3,800	760	607.74
10950	Trichlorofluoromethane	75-69-4	< 3,800	3,800	1,500	607.74
10950	Vinyl Chloride	75-01-4	< 3,800	3,800	760	607.74
10950	Xylene (Total)	1330-20-7	25,000	3,800	760	607.74

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

Sample Description: BH-10-57_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-57_0-2'

LLI Sample # SW 6267996
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/21/2011 11:45 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-57

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**	**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	< 10,000	10,000	2,100	10
10727	Acenaphthylene	208-96-8	< 10,000	10,000	2,100	10
10727	Acetophenone	98-86-2	< 10,000	10,000	4,100	10
10727	Anthracene	120-12-7	< 10,000	10,000	2,100	10
10727	Atrazine	1912-24-9	< 10,000	10,000	2,100	10
10727	Benzaldehyde	100-52-7	< 10,000	10,000	4,100	10
10727	Benzo(a)anthracene	56-55-3	< 10,000	10,000	2,100	10
10727	Benzo(a)pyrene	50-32-8	< 10,000	10,000	2,100	10
10727	Benzo(b)fluoranthene	205-99-2	< 10,000	10,000	2,100	10
10727	Benzo(g,h,i)perylene	191-24-2	< 10,000	10,000	2,100	10
10727	Benzo(k)fluoranthene	207-08-9	< 10,000	10,000	2,100	10
10727	1,1'-Biphenyl	92-52-4	< 10,000	10,000	2,100	10
10727	4-Bromophenyl-phenylether	101-55-3	< 10,000	10,000	2,100	10
10727	Butylbenzylphthalate	85-68-7	< 10,000	10,000	4,100	10
10727	Di-n-butylphthalate	84-74-2	< 10,000	10,000	4,100	10
10727	Caprolactam	105-60-2	< 10,000	10,000	2,100	10
10727	Carbazole	86-74-8	< 10,000	10,000	2,100	10
10727	4-Chloro-3-methylphenol	59-50-7	< 10,000	10,000	4,100	10
10727	4-Chloroaniline	106-47-8	< 10,000	10,000	4,100	10
10727	bis(2-Chloroethoxy)methane	111-91-1	< 10,000	10,000	2,100	10
10727	bis(2-Chloroethyl)ether	111-44-4	< 10,000	10,000	2,100	10
10727	2-Chloronaphthalene	91-58-7	< 10,000	10,000	2,100	10
10727	2-Chlorophenol	95-57-8	< 10,000	10,000	2,100	10
10727	4-Chlorophenyl-phenylether	7005-72-3	< 10,000	10,000	2,100	10
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	< 10,000	10,000	2,100	10
10727	Chrysene	218-01-9	< 10,000	10,000	2,100	10
10727	Dibenz(a,h)anthracene	53-70-3	< 10,000	10,000	2,100	10
10727	Dibenzofuran	132-64-9	< 10,000	10,000	2,100	10
10727	3,3'-Dichlorobenzidine	91-94-1	< 21,000	21,000	6,200	10
10727	2,4-Dichlorophenol	120-83-2	< 10,000	10,000	2,100	10
10727	Diethylphthalate	84-66-2	< 10,000	10,000	4,100	10
10727	2,4-Dimethylphenol	105-67-9	< 10,000	10,000	4,100	10
10727	Dimethylphthalate	131-11-3	< 10,000	10,000	4,100	10
10727	4,6-Dinitro-2-methylphenol	534-52-1	< 31,000	31,000	10,000	10
10727	2,4-Dinitrophenol	51-28-5	< 62,000	62,000	21,000	10
10727	2,4-Dinitrotoluene	121-14-2	< 10,000	10,000	4,100	10
10727	2,6-Dinitrotoluene	606-20-2	< 10,000	10,000	2,100	10
10727	bis(2-Ethylhexyl)phthalate	117-81-7	< 21,000	21,000	4,100	10
10727	Fluoranthene	206-44-0	< 10,000	10,000	2,100	10
10727	Fluorene	86-73-7	< 10,000	10,000	2,100	10
10727	Hexachlorobenzene	118-74-1	< 10,000	10,000	2,100	10
10727	Hexachlorobutadiene	87-68-3	< 10,000	10,000	4,100	10
10727	Hexachlorocyclopentadiene	77-47-4	< 31,000	31,000	10,000	10
10727	Hexachloroethane	67-72-1	< 10,000	10,000	2,100	10
10727	Indeno(1,2,3-cd)pyrene	193-39-5	< 10,000	10,000	2,100	10
10727	Isophorone	78-59-1	< 10,000	10,000	2,100	10
10727	2-Methylnaphthalene	91-57-6	< 10,000	10,000	2,100	10
10727	2-Methylphenol	95-48-7	< 10,000	10,000	4,100	10
10727	4-Methylphenol	106-44-5	< 10,000	10,000	4,100	10

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

Sample Description: BH-10-57_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-57_0-2'

LLI Sample # SW 6267996
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/21/2011 11:45 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-57

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.					
10727	Naphthalene	91-20-3	< 10,000	10,000	2,100	10
10727	2-Nitroaniline	88-74-4	< 10,000	10,000	2,100	10
10727	3-Nitroaniline	99-09-2	< 10,000	10,000	4,100	10
10727	4-Nitroaniline	100-01-6	< 10,000	10,000	4,100	10
10727	Nitrobenzene	98-95-3	< 10,000	10,000	2,100	10
10727	2-Nitrophenol	88-75-5	< 10,000	10,000	2,100	10
10727	4-Nitrophenol	100-02-7	< 31,000	31,000	10,000	10
10727	N-Nitroso-di-n-propylamine	621-64-7	< 10,000	10,000	2,100	10
10727	N-Nitrosodiphenylamine	86-30-6	< 10,000	10,000	2,100	10
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.					
10727	Di-n-octylphthalate	117-84-0	< 10,000	10,000	4,100	10
10727	Pentachlorophenol	87-86-5	< 31,000	31,000	10,000	10
10727	Phenanthrene	85-01-8	< 10,000	10,000	2,100	10
10727	Phenol	108-95-2	< 10,000	10,000	2,100	10
10727	Pyrene	129-00-0	< 10,000	10,000	2,100	10
10727	2,4,5-Trichlorophenol	95-95-4	< 10,000	10,000	4,100	10
10727	2,4,6-Trichlorophenol	88-06-2	< 10,000	10,000	2,100	10
	Reporting limits were raised due to interference from the sample matrix.					
Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	15,100	24.4	6.14	1
06944	Antimony	7440-36-0	< 2.44	2.44	1.22	1
06935	Arsenic	7440-38-2	21.1	2.44	1.16	1
06946	Barium	7440-39-3	188	0.610	0.0488	1
06947	Beryllium	7440-41-7	0.742	0.610	0.0830	1
06949	Cadmium	7440-43-9	0.792	0.610	0.171	1
01650	Calcium	7440-70-2	16,200	24.4	7.48	1
06951	Chromium	7440-47-3	88.5	1.83	0.720	1
06952	Cobalt	7440-48-4	8.42	0.610	0.232	1
06953	Copper	7440-50-8	131	1.22	0.269	1
01654	Iron	7439-89-6	20,100	24.4	5.75	1
06955	Lead	7439-92-1	743	1.83	0.733	1
01657	Magnesium	7439-95-4	6,350	12.2	3.10	1
06958	Manganese	7439-96-5	596	0.610	0.0952	1
06961	Nickel	7440-02-0	40.1	1.22	0.232	1
01662	Potassium	7440-09-7	1,020	61.0	22.0	1
06936	Selenium	7782-49-2	< 2.44	2.44	1.20	1
06966	Silver	7440-22-4	< 0.610	0.610	0.220	1
01667	Sodium	7440-23-5	177	122	45.5	1
06925	Thallium	7440-28-0	< 3.66	3.66	1.77	1
06971	Vanadium	7440-62-2	91.7	0.610	0.232	1
06972	Zinc	7440-66-6	260	2.44	0.806	1
	SW-846 7471A		**mg/kg**	**mg/kg**	**mg/kg**	

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

Sample Description: BH-10-57_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-57_0-2'

LLI Sample # SW 6267996
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/21/2011 11:45 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-57

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.607	0.117	0.0034	1
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	19.7	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	Q111241AA	05/04/2011 12:33	Nicholas R Rossi	607.74
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111624232	04/21/2011 11:45	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111624232	04/21/2011 11:45	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111624232	04/21/2011 11:45	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11117SLJ026	04/30/2011 13:48	Chad A Moline	10
10809	BNA Soil Microwave	SW-846 3546	1	11117SLJ026	04/28/2011 08:45	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111175708002	05/03/2011 20:33	John P Hook	1
06944	Antimony	SW-846 6010B	1	111175708002	05/03/2011 20:33	John P Hook	1
06935	Arsenic	SW-846 6010B	1	111175708002	05/03/2011 20:33	John P Hook	1
06946	Barium	SW-846 6010B	1	111175708002	05/03/2011 20:33	John P Hook	1
06947	Beryllium	SW-846 6010B	1	111175708002	05/03/2011 20:33	John P Hook	1
06949	Cadmium	SW-846 6010B	1	111175708002	05/03/2011 20:33	John P Hook	1
01650	Calcium	SW-846 6010B	1	111175708002	05/03/2011 20:33	John P Hook	1
06951	Chromium	SW-846 6010B	1	111175708002	05/03/2011 20:33	John P Hook	1
06952	Cobalt	SW-846 6010B	1	111175708002	05/03/2011 20:33	John P Hook	1
06953	Copper	SW-846 6010B	1	111175708002	05/03/2011 20:33	John P Hook	1
01654	Iron	SW-846 6010B	1	111175708002	05/03/2011 20:33	John P Hook	1
06955	Lead	SW-846 6010B	1	111175708002	05/03/2011 20:33	John P Hook	1
01657	Magnesium	SW-846 6010B	1	111175708002	05/03/2011 20:33	John P Hook	1
06958	Manganese	SW-846 6010B	1	111175708002	05/03/2011 20:33	John P Hook	1
06961	Nickel	SW-846 6010B	1	111175708002	05/03/2011 20:33	John P Hook	1
01662	Potassium	SW-846 6010B	1	111175708002	05/03/2011 20:33	John P Hook	1
06936	Selenium	SW-846 6010B	1	111175708002	05/04/2011 13:34	Joanne M Gates	1
06966	Silver	SW-846 6010B	1	111175708002	05/03/2011 20:33	John P Hook	1
01667	Sodium	SW-846 6010B	1	111175708002	05/03/2011 20:33	John P Hook	1
06925	Thallium	SW-846 6010B	1	111175708002	05/04/2011 13:34	Joanne M Gates	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-57_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259434 BH-10-57_0-2'

LLI Sample # SW 6267996
LLI Group # 1243734
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/21/2011 11:45 by SS

Submitted: 04/25/2011 15:50
Reported: 05/05/2011 18:45

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

10-57

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06971	Vanadium	SW-846 6010B	1	111175708002	05/03/2011 20:33	John P Hook	1
06972	Zinc	SW-846 6010B	1	111175708002	05/03/2011 20:33	John P Hook	1
00159	Mercury	SW-846 7471A	1	111175711001	04/28/2011 07:30	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111175708002	04/27/2011 20:11	Annamaria Stipkovits	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111175711001	04/27/2011 23:40	Annamaria Stipkovits	1
00111	Moisture	SM20 2540 G	1	11118820008A	04/28/2011 19:48	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1243734
Reported: 05/05/11 at 06:45 PM

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

Laboratory Compliance Quality Control

Analysis Name	Blank Result	Blank LOQ**	Blank MDL	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: A111182AA	Sample number(s): 6267982-6267989								
Benzene	< 5	5.	0.5	ug/kg	92	91	80-120	2	30
1,2-Dibromoethane	< 5	5.	1	ug/kg	93	87	80-120	7	30
1,2-Dichloroethane	< 5	5.	1	ug/kg	92	87	71-129	6	30
Ethylbenzene	< 5	5.	1	ug/kg	89	89	80-120	0	30
Isopropylbenzene	< 5	5.	1	ug/kg	90	89	76-120	1	30
Methyl Tertiary Butyl Ether	< 5	5.	0.5	ug/kg	94	87	74-121	8	30
Toluene	< 5	5.	1	ug/kg	91	91	80-120	0	30
1,2,4-Trimethylbenzene	< 5	5.	1	ug/kg	90	90	79-120	0	30
1,3,5-Trimethylbenzene	< 5	5.	1	ug/kg	91	91	78-120	0	30
Xylene (Total)	< 5	5.	1	ug/kg	89	89	80-120	0	30
Batch number: Q111241AA	Sample number(s): 6267996								
Acetone	< 1,000	1,000.	350	ug/kg	72	70	32-209	3	30
Benzene	< 250	250.	25	ug/kg	108	108	80-120	0	30
Bromodichloromethane	< 250	250.	50	ug/kg	102	102	78-120	0	30
Bromoform	< 250	250.	50	ug/kg	92	91	70-120	1	30
Bromomethane	< 250	250.	100	ug/kg	106	109	32-162	2	30
2-Butanone	< 500	500.	200	ug/kg	83	81	46-153	2	30
Carbon Disulfide	< 250	250.	50	ug/kg	101	100	67-122	1	30
Carbon Tetrachloride	< 250	250.	50	ug/kg	104	105	69-122	1	30
Chlorobenzene	< 250	250.	50	ug/kg	103	103	80-120	0	30
Chloroethane	< 250	250.	100	ug/kg	113	115	37-154	1	30
Chloroform	< 250	250.	50	ug/kg	105	105	80-120	0	30
Chloromethane	< 250	250.	100	ug/kg	91	89	54-132	1	30
Cyclohexane	< 250	250.	50	ug/kg	97	102	62-121	4	30
1,2-Dibromo-3-chloropropane	< 250	250.	100	ug/kg	92	89	58-120	3	30
Dibromochloromethane	< 250	250.	50	ug/kg	99	99	77-120	0	30
1,2-Dibromoethane	< 250	250.	50	ug/kg	104	102	80-120	2	30
1,2-Dichlorobenzene	< 250	250.	50	ug/kg	98	99	79-120	1	30
1,3-Dichlorobenzene	< 250	250.	50	ug/kg	99	100	78-120	1	30
1,4-Dichlorobenzene	< 250	250.	50	ug/kg	99	100	79-120	1	30
Dichlorodifluoromethane	< 250	250.	100	ug/kg	63	66	20-120	4	30
1,1-Dichloroethane	< 250	250.	50	ug/kg	109	110	80-120	0	30
1,2-Dichloroethane	< 250	250.	50	ug/kg	106	106	71-129	0	30
1,1-Dichloroethene	< 250	250.	50	ug/kg	108	109	73-123	1	30
cis-1,2-Dichloroethene	< 250	250.	50	ug/kg	106	107	80-120	1	30
trans-1,2-Dichloroethene	< 250	250.	50	ug/kg	107	106	79-120	0	30
1,2-Dichloropropane	< 250	250.	50	ug/kg	104	103	80-120	1	30
cis-1,3-Dichloropropene	< 250	250.	50	ug/kg	102	103	80-120	1	30
trans-1,3-Dichloropropene	< 250	250.	50	ug/kg	100	98	77-120	1	30
Ethylbenzene	< 250	250.	50	ug/kg	104	105	80-120	1	30
Freon 113	< 500	500.	100	ug/kg	94	99	61-126	6	30
2-Hexanone	< 500	500.	150	ug/kg	74	74	45-155	0	30
Isopropylbenzene	< 250	250.	50	ug/kg	104	106	76-120	1	30
Methyl Acetate	< 250	250.	100	ug/kg	101	97	61-152	3	30
Methyl Tertiary Butyl Ether	< 250	250.	25	ug/kg	105	105	74-121	0	30

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

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1243734
Reported: 05/05/11 at 06:45 PM

Analysis Name	Blank Result	Blank LOQ**	Blank MDL	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
4-Methyl-2-pentanone	< 500	500.	150	ug/kg	98	97	61-134	1	30
Methylcyclohexane	< 250	250.	50	ug/kg	93	98	57-138	5	30
Methylene Chloride	< 250	250.	100	ug/kg	107	106	76-124	0	30
Styrene	< 250	250.	50	ug/kg	105	104	76-120	1	30
1,1,2,2-Tetrachloroethane	< 250	250.	50	ug/kg	98	98	71-123	0	30
Tetrachloroethene	< 250	250.	50	ug/kg	104	104	77-120	0	30
Toluene	< 250	250.	50	ug/kg	106	105	80-120	1	30
1,2,4-Trichlorobenzene	< 250	250.	50	ug/kg	83	86	68-120	3	30
1,1,1-Trichloroethane	< 250	250.	50	ug/kg	106	107	71-125	0	30
1,1,2-Trichloroethane	< 250	250.	50	ug/kg	101	99	80-120	2	30
Trichloroethene	< 250	250.	50	ug/kg	105	106	80-120	1	30
Trichlorofluoromethane	< 250	250.	100	ug/kg	94	97	58-133	3	30
Vinyl Chloride	< 250	250.	50	ug/kg	92	91	53-120	2	30
Xylene (Total)	< 250	250.	50	ug/kg	105	106	80-120	0	30
Batch number: X111191AA	Sample number(s): 6267990-6267992,6267995								
Acetone	< 20	20.	7	ug/kg	188		32-209		
Benzene	< 5	5.	0.5	ug/kg	95		80-120		
Bromodichloromethane	< 5	5.	1	ug/kg	90		78-120		
Bromoform	< 5	5.	1	ug/kg	94		70-120		
Bromomethane	< 5	5.	2	ug/kg	74		32-162		
2-Butanone	< 10	10.	4	ug/kg	109		46-153		
Carbon Disulfide	< 5	5.	1	ug/kg	79		67-122		
Carbon Tetrachloride	< 5	5.	1	ug/kg	91		69-122		
Chlorobenzene	< 5	5.	1	ug/kg	99		80-120		
Chloroethane	< 5	5.	2	ug/kg	74		37-154		
Chloroform	< 5	5.	1	ug/kg	95		80-120		
Chloromethane	< 5	5.	2	ug/kg	85		54-132		
Cyclohexane	< 5	5.	1	ug/kg	84		62-121		
1,2-Dibromo-3-chloropropane	< 5	5.	2	ug/kg	102		58-120		
Dibromochloromethane	< 5	5.	1	ug/kg	95		77-120		
1,2-Dibromoethane	< 5	5.	1	ug/kg	101		80-120		
1,2-Dichlorobenzene	< 5	5.	1	ug/kg	96		79-120		
1,3-Dichlorobenzene	< 5	5.	1	ug/kg	95		78-120		
1,4-Dichlorobenzene	< 5	5.	1	ug/kg	100		79-120		
Dichlorodifluoromethane	< 5	5.	2	ug/kg	74		20-120		
1,1-Dichloroethane	< 5	5.	1	ug/kg	95		80-120		
1,2-Dichloroethane	< 5	5.	1	ug/kg	95		71-129		
1,1-Dichloroethene	< 5	5.	1	ug/kg	91		73-123		
cis-1,2-Dichloroethene	< 5	5.	1	ug/kg	98		80-120		
trans-1,2-Dichloroethene	< 5	5.	1	ug/kg	96		79-120		
1,2-Dichloropropane	< 5	5.	1	ug/kg	93		80-120		
cis-1,3-Dichloropropene	< 5	5.	1	ug/kg	89		80-120		
trans-1,3-Dichloropropene	< 5	5.	1	ug/kg	86		77-120		
Ethylbenzene	< 5	5.	1	ug/kg	98		80-120		
Freon 113	< 10	10.	2	ug/kg	87		61-126		
2-Hexanone	< 10	10.	3	ug/kg	105		45-155		
Isopropylbenzene	< 5	5.	1	ug/kg	101		76-120		
Methyl Acetate	< 5	5.	2	ug/kg	132		61-152		
Methyl Tertiary Butyl Ether	< 5	5.	0.5	ug/kg	89		74-121		
4-Methyl-2-pentanone	< 10	10.	3	ug/kg	105		61-134		
Methylcyclohexane	< 5	5.	1	ug/kg	92		57-138		
Methylene Chloride	< 5	5.	2	ug/kg	93		76-124		
Styrene	< 5	5.	1	ug/kg	95		76-120		
1,1,2,2-Tetrachloroethane	< 5	5.	1	ug/kg	99		71-123		
Tetrachloroethene	< 5	5.	1	ug/kg	100		77-120		
Toluene	< 5	5.	1	ug/kg	97		80-120		
1,2,4-Trichlorobenzene	< 5	5.	1	ug/kg	93		68-120		

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

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1243734
Reported: 05/05/11 at 06:45 PM

Analysis Name	Blank Result	Blank LOQ**	Blank MDL	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
1,1,1-Trichloroethane	< 5	5.	1	ug/kg	91		71-125		
1,1,2-Trichloroethane	< 5	5.	1	ug/kg	94		80-120		
Trichloroethene	< 5	5.	1	ug/kg	95		80-120		
Trichlorofluoromethane	< 5	5.	2	ug/kg	82		58-133		
1,2,4-Trimethylbenzene	< 5	5.	1	ug/kg	96		79-120		
1,3,5-Trimethylbenzene	< 5	5.	1	ug/kg	97		78-120		
Vinyl Chloride	< 5	5.	1	ug/kg	85		53-120		
Xylene (Total)	< 5	5.	1	ug/kg	101		80-120		
Batch number: X111231AA	Sample number(s): 6267993-6267994								
Acetone	< 20	20.	7	ug/kg	98	85	32-209	14	30
Benzene	< 5	5.	0.5	ug/kg	100	99	80-120	1	30
Bromodichloromethane	< 5	5.	1	ug/kg	93	92	78-120	2	30
Bromoform	< 5	5.	1	ug/kg	94	86	70-120	8	30
Bromomethane	< 5	5.	2	ug/kg	82	85	32-162	3	30
2-Butanone	< 10	10.	4	ug/kg	97	79	46-153	21	30
Carbon Disulfide	< 5	5.	1	ug/kg	88	86	67-122	2	30
Carbon Tetrachloride	< 5	5.	1	ug/kg	99	97	69-122	2	30
Chlorobenzene	< 5	5.	1	ug/kg	101	98	80-120	3	30
Chloroethane	< 5	5.	2	ug/kg	79	83	37-154	5	30
Chloroform	< 5	5.	1	ug/kg	98	97	80-120	1	30
Chloromethane	< 5	5.	2	ug/kg	89	88	54-132	2	30
Cyclohexane	< 5	5.	1	ug/kg	92	89	62-121	4	30
1,2-Dibromo-3-chloropropane	< 5	5.	2	ug/kg	88	74	58-120	17	30
Dibromochloromethane	< 5	5.	1	ug/kg	97	91	77-120	6	30
1,2-Dibromoethane	< 5	5.	1	ug/kg	99	91	80-120	9	30
1,2-Dichlorobenzene	< 5	5.	1	ug/kg	97	97	79-120	1	30
1,3-Dichlorobenzene	< 5	5.	1	ug/kg	95	93	78-120	2	30
1,4-Dichlorobenzene	< 5	5.	1	ug/kg	95	97	79-120	3	30
Dichlorodifluoromethane	< 5	5.	2	ug/kg	86	83	20-120	3	30
1,1-Dichloroethane	< 5	5.	1	ug/kg	96	98	80-120	3	30
1,2-Dichloroethane	< 5	5.	1	ug/kg	97	93	71-129	5	30
1,1-Dichloroethene	< 5	5.	1	ug/kg	99	97	73-123	2	30
cis-1,2-Dichloroethene	< 5	5.	1	ug/kg	101	100	80-120	1	30
trans-1,2-Dichloroethene	< 5	5.	1	ug/kg	101	99	79-120	2	30
1,2-Dichloropropane	< 5	5.	1	ug/kg	95	94	80-120	2	30
cis-1,3-Dichloropropene	< 5	5.	1	ug/kg	91	90	80-120	2	30
trans-1,3-Dichloropropene	< 5	5.	1	ug/kg	90	86	77-120	5	30
Ethylbenzene	< 5	5.	1	ug/kg	99	97	80-120	2	30
Freon 113	< 10	10.	2	ug/kg	99	95	61-126	4	30
2-Hexanone	< 10	10.	3	ug/kg	89	74	45-155	19	30
Isopropylbenzene	< 5	5.	1	ug/kg	103	100	76-120	3	30
Methyl Acetate	< 5	5.	2	ug/kg	100	86	61-152	16	30
Methyl Tertiary Butyl Ether	< 5	5.	0.5	ug/kg	90	86	74-121	5	30
4-Methyl-2-pentanone	< 10	10.	3	ug/kg	94	78	61-134	19	30
Methylcyclohexane	< 5	5.	1	ug/kg	101	96	57-138	5	30
Methylene Chloride	< 5	5.	2	ug/kg	98	97	76-124	1	30
Styrene	< 5	5.	1	ug/kg	96	93	76-120	3	30
1,1,2,2-Tetrachloroethane	< 5	5.	1	ug/kg	88	82	71-123	8	30
Tetrachloroethene	< 5	5.	1	ug/kg	106	102	77-120	3	30
Toluene	< 5	5.	1	ug/kg	100	96	80-120	4	30
1,2,4-Trichlorobenzene	< 5	5.	1	ug/kg	91	90	68-120	1	30
1,1,1-Trichloroethane	< 5	5.	1	ug/kg	93	91	71-125	2	30
1,1,2-Trichloroethane	< 5	5.	1	ug/kg	93	90	80-120	3	30
Trichloroethene	< 5	5.	1	ug/kg	101	97	80-120	4	30
Trichlorofluoromethane	< 5	5.	2	ug/kg	92	89	58-133	3	30
Vinyl Chloride	< 5	5.	1	ug/kg	91	90	53-120	1	30
Xylene (Total)	< 5	5.	1	ug/kg	102	100	80-120	3	30

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

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1243734
Reported: 05/05/11 at 06:45 PM

Analysis Name	Blank Result	Blank LOQ**	Blank MDL	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 11116SLD026	Sample number(s): 6267982-6267987								
Anthracene	< 170	170.	33	ug/kg	92		83-111		
Benzo(a)anthracene	< 170	170.	33	ug/kg	94		82-111		
Benzo(a)pyrene	< 170	170.	33	ug/kg	80		63-138		
Benzo(b)fluoranthene	< 170	170.	33	ug/kg	88		61-133		
Benzo(g,h,i)perylene	< 170	170.	33	ug/kg	83		63-130		
Chrysene	< 170	170.	33	ug/kg	92		81-111		
Fluorene	< 170	170.	33	ug/kg	95		81-117		
Naphthalene	< 170	170.	33	ug/kg	91		83-112		
Phenanthrene	< 170	170.	33	ug/kg	88		83-109		
Pyrene	< 170	170.	33	ug/kg	91		80-121		
Batch number: 11117SLJ026	Sample number(s): 6267992-6267996								
Acenaphthene	< 170	170.	33	ug/kg	99		83-111		
Acenaphthylene	< 170	170.	33	ug/kg	105		68-120		
Acetophenone	< 170	170.	67	ug/kg	95		70-106		
Anthracene	< 170	170.	33	ug/kg	98		83-111		
Atrazine	< 170	170.	33	ug/kg	96		69-122		
Benzaldehyde	< 170	170.	67	ug/kg	56		10-74		
Benzo(a)anthracene	< 170	170.	33	ug/kg	97		82-111		
Benzo(a)pyrene	< 170	170.	33	ug/kg	97		63-138		
Benzo(b)fluoranthene	< 170	170.	33	ug/kg	95		61-133		
Benzo(g,h,i)perylene	< 170	170.	33	ug/kg	93		63-130		
Benzo(k)fluoranthene	< 170	170.	33	ug/kg	100		71-135		
1,1'-Biphenyl	< 170	170.	33	ug/kg	97		82-106		
4-Bromophenyl-phenylether	< 170	170.	33	ug/kg	94		79-117		
Butylbenzylphthalate	< 170	170.	67	ug/kg	99		83-122		
Di-n-butylphthalate	< 170	170.	67	ug/kg	96		79-112		
Caprolactam	< 170	170.	33	ug/kg	94		65-113		
Carbazole	< 170	170.	33	ug/kg	95		83-111		
4-Chloro-3-methylphenol	< 170	170.	67	ug/kg	99		74-119		
4-Chloroaniline	< 170	170.	67	ug/kg	58		10-97		
bis(2-Chloroethoxy)methane	< 170	170.	33	ug/kg	99		82-113		
bis(2-Chloroethyl)ether	< 170	170.	33	ug/kg	101		77-115		
2-Chloronaphthalene	< 170	170.	33	ug/kg	88		59-139		
2-Chlorophenol	< 170	170.	33	ug/kg	103		83-119		
4-Chlorophenyl-phenylether	< 170	170.	33	ug/kg	98		79-110		
2,2'-oxybis(1-Chloropropane)	< 170	170.	33	ug/kg	100		67-130		
Chrysene	< 170	170.	33	ug/kg	96		81-111		
Dibenz(a,h)anthracene	< 170	170.	33	ug/kg	96		67-129		
Dibenzofuran	< 170	170.	33	ug/kg	100		85-110		
3,3'-Dichlorobenzidine	< 330	330.	100	ug/kg	36		35-94		
2,4-Dichlorophenol	< 170	170.	33	ug/kg	100		87-117		
Diethylphthalate	< 170	170.	67	ug/kg	98		82-113		
2,4-Dimethylphenol	< 170	170.	67	ug/kg	101		83-120		
Dimethylphthalate	< 170	170.	67	ug/kg	98		85-111		
4,6-Dinitro-2-methylphenol	< 500	500.	170	ug/kg	84		60-113		
2,4-Dinitrophenol	< 1,000	1,000.	330	ug/kg	80		51-124		
2,4-Dinitrotoluene	< 170	170.	67	ug/kg	101		80-116		
2,6-Dinitrotoluene	< 170	170.	33	ug/kg	100		79-115		
bis(2-Ethylhexyl)phthalate	< 330	330.	67	ug/kg	95		80-119		
Fluoranthene	< 170	170.	33	ug/kg	89		80-113		
Fluorene	< 170	170.	33	ug/kg	100		81-117		
Hexachlorobenzene	< 170	170.	33	ug/kg	97		79-115		
Hexachlorobutadiene	< 170	170.	67	ug/kg	92		70-112		
Hexachlorocyclopentadiene	< 500	500.	170	ug/kg	90		64-127		
Hexachloroethane	< 170	170.	33	ug/kg	91		76-109		

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

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1243734
Reported: 05/05/11 at 06:45 PM

Analysis Name	Blank Result	Blank LOQ**	Blank MDL	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Indeno(1,2,3-cd)pyrene	< 170	170.	33	ug/kg	95		64-128		
Isophorone	< 170	170.	33	ug/kg	97		72-107		
2-Methylnaphthalene	< 170	170.	33	ug/kg	93		79-110		
2-Methylphenol	< 170	170.	67	ug/kg	102		80-119		
4-Methylphenol	< 170	170.	67	ug/kg	98		74-116		
Naphthalene	< 170	170.	33	ug/kg	97		83-112		
2-Nitroaniline	< 170	170.	33	ug/kg	98		83-118		
3-Nitroaniline	< 170	170.	67	ug/kg	96		66-114		
4-Nitroaniline	< 170	170.	67	ug/kg	76		52-92		
Nitrobenzene	< 170	170.	33	ug/kg	96		78-122		
2-Nitrophenol	< 170	170.	33	ug/kg	99		81-114		
4-Nitrophenol	< 500	500.	170	ug/kg	86		57-131		
N-Nitroso-di-n-propylamine	< 170	170.	33	ug/kg	97		70-113		
N-Nitrosodiphenylamine	< 170	170.	33	ug/kg	98		86-112		
Di-n-octylphthalate	< 170	170.	67	ug/kg	101		65-141		
Pentachlorophenol	< 500	500.	170	ug/kg	89		50-133		
Phenanthrene	< 170	170.	33	ug/kg	94		83-109		
Phenol	< 170	170.	33	ug/kg	103		74-115		
Pyrene	< 170	170.	33	ug/kg	94		80-121		
2,4,5-Trichlorophenol	< 170	170.	67	ug/kg	99		84-109		
2,4,6-Trichlorophenol	< 170	170.	33	ug/kg	99		88-114		
Batch number: 11118SLE026	Sample number(s): 6267988-6267991								
Anthracene	< 170	170.	33	ug/kg	97		83-111		
Benzo(a)anthracene	< 170	170.	33	ug/kg	98		82-111		
Benzo(a)pyrene	< 170	170.	33	ug/kg	103		63-138		
Benzo(b)fluoranthene	< 170	170.	33	ug/kg	110		61-133		
Benzo(g,h,i)perylene	< 170	170.	33	ug/kg	106		63-130		
Chrysene	< 170	170.	33	ug/kg	97		81-111		
Fluorene	< 170	170.	33	ug/kg	101		81-117		
Naphthalene	< 170	170.	33	ug/kg	94		83-112		
Phenanthrene	< 170	170.	33	ug/kg	95		83-109		
Pyrene	< 170	170.	33	ug/kg	97		80-121		
Batch number: 111171026001A	Sample number(s): 6267982-6267991								
Lead	< 0.198	0.198	0.0103	mg/kg	92		83-110		
Batch number: 111175708002	Sample number(s): 6267992-6267996								
Aluminum	< 20.0	20.0	5.03	mg/kg	98		61-110		
Antimony	< 2.00	2.00	1.00	mg/kg	101		38-150		
Arsenic	< 2.00	2.00	0.950	mg/kg	99		90-110		
Barium	< 0.500	0.500	0.0400	mg/kg	105		90-117		
Beryllium	< 0.500	0.500	0.0680	mg/kg	101		87-110		
Cadmium	< 0.500	0.500	0.140	mg/kg	100		90-114		
Calcium	< 20.0	20.0	6.13	mg/kg	102		88-110		
Chromium	< 1.50	1.50	0.590	mg/kg	102		85-110		
Cobalt	< 0.500	0.500	0.190	mg/kg	101		90-114		
Copper	< 1.00	1.00	0.220	mg/kg	103		83-112		
Iron	< 20.0	20.0	4.71	mg/kg	102		61-110		
Lead	< 1.50	1.50	0.600	mg/kg	98		80-120		
Magnesium	< 10.0	10.0	2.54	mg/kg	102		82-110		
Manganese	< 0.500	0.500	0.0780	mg/kg	105		89-112		
Nickel	< 1.00	1.00	0.190	mg/kg	100		90-114		
Potassium	< 50.0	50.0	18.0	mg/kg	104		78-110		
Selenium	< 2.00	2.00	0.980	mg/kg	100		57-110		
Silver	< 0.500	0.500	0.180	mg/kg	103		86-111		
Sodium	< 100	100.	37.3	mg/kg	99		87-110		
Thallium	< 3.00	3.00	1.45	mg/kg	105		90-116		

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

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1243734
Reported: 05/05/11 at 06:45 PM

Analysis Name	Blank Result	Blank LOQ**	Blank MDL	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Vanadium	< 0.500	0.500	0.190	mg/kg	99		79-110		
Zinc	< 2.00	2.00	0.660	mg/kg	96		90-110		
Batch number: 111175711001	Sample number(s): 6267992-6267996								
Mercury	< 0.0972	0.0972	0.0028	mg/kg	95		88-123		
Batch number: 11118820008A	Sample number(s): 6267982-6267996								
Moisture					100		99-101		

Sample Matrix Quality Control

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

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: X111191AA	Sample number(s): 6267990-6267992,6267995 UNSPK: P266108								
Acetone	145	92	15-210	67*	30				
Benzene	62	107	55-143	14	30				
Bromodichloromethane	85	92	53-136	27	30				
Bromoform	58	87	38-124	6	30				
Bromomethane	74	76	42-168	31*	30				
2-Butanone	94	98	37-163	29	30				
Carbon Disulfide	76	75	48-146	32*	30				
Carbon Tetrachloride	75	94	45-153	12	30				
Chlorobenzene	69	101	49-135	4	30				
Chloroethane	101	72	39-152	66*	30				
Chloroform	83	95	61-142	21	30				
Chloromethane	86	105	51-163	14	30				
Cyclohexane	62	95	57-151	8	30				
1,2-Dibromo-3-chloropropane	104	90	30-139	47*	30				
Dibromochloromethane	75	96	51-128	10	30				
1,2-Dibromoethane	78	103	54-129	6	30				
1,2-Dichlorobenzene	37	86	36-133	50*	30				
1,3-Dichlorobenzene	39	88	34-134	45*	30				
1,4-Dichlorobenzene	33*	93	35-136	67*	30				
Dichlorodifluoromethane	75	91	26-151	15	30				
1,1-Dichloroethane	99	95	63-142	38*	30				
1,2-Dichloroethane	55685 (2)	-747 (2)	68-131	197*	30				
1,1-Dichloroethene	86	92	61-149	27	30				
cis-1,2-Dichloroethene	199*	95	60-136	99*	30				
trans-1,2-Dichloroethene	89	94	59-142	28	30				
1,2-Dichloropropane	87	95	62-135	25	30				
cis-1,3-Dichloropropene	80	94	51-131	18	30				
trans-1,3-Dichloropropene	81	93	49-129	20	30				
Ethylbenzene	92	101	44-141	26	30				
Freon 113	70	88	56-156	11	30				
2-Hexanone	82	106	32-160	9	30				
Isopropylbenzene	163*	64	38-144	89*	30				
Methyl Acetate	158	99	48-161	77*	30				
Methyl Tertiary Butyl Ether	77	85	55-129	24	30				
4-Methyl-2-pentanone	81	98	46-139	15	30				
Methylcyclohexane	60	88	39-168	3	30				

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

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1243734
Reported: 05/05/11 at 06:45 PM

Sample Matrix Quality Control

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

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Methylene Chloride	117	72	61-141	69*	30				
Styrene	60	86	35-134	2	30				
1,1,2,2-Tetrachloroethane	78	108	40-152	3	30				
Tetrachloroethene	89	103	42-149	19	30				
Toluene	160*	115	50-146	63*	30				
1,2,4-Trichlorobenzene	20	44	10-136	41*	30				
1,1,1-Trichloroethane	79	95	64-142	16	30				
1,1,2-Trichloroethane	115	119	54-139	30	30				
Trichloroethene	2544*	101	53-144	189*	30				
Trichlorofluoromethane	85	101	47-163	17	30				
1,2,4-Trimethylbenzene	88	89	37-149	29	30				
1,3,5-Trimethylbenzene	63	97	38-150	9	30				
Vinyl Chloride	288*	111	50-154	114*	30				
Xylene (Total)	87	103	44-136	18	30				
Batch number: 11116SLD026	Sample number(s): 6267982-6267987 UNSPK: P265762								
Anthracene	108	104	40-147	3	30				
Benzo(a)anthracene	107	95	32-150	8	30				
Benzo(a)pyrene	98	82	57-129	11	30				
Benzo(b)fluoranthene	92	88	53-131	3	30				
Benzo(g,h,i)perylene	114	86	60-123	13	30				
Chrysene	122*	117*	76-114	3	30				
Fluorene	99	94	46-137	5	30				
Naphthalene	175*	174*	52-132	1	30				
Phenanthrene	127	132	34-147	1	30				
Pyrene	125*	123	76-124	1	30				
Batch number: 11117SLJ026	Sample number(s): 6267992-6267996 UNSPK: P267094								
Acenaphthene	89	92	51-135	3	30				
Acenaphthylene	93	95	47-137	2	30				
Acetophenone	96	97	38-136	2	30				
Anthracene	90	91	40-147	1	30				
Atrazine	73	75	52-124	3	30				
Benzaldehyde	71	80	10-85	11	30				
Benzo(a)anthracene	91	91	32-150	0	30				
Benzo(a)pyrene	89	87	57-129	2	30				
Benzo(b)fluoranthene	87	87	53-131	0	30				
Benzo(g,h,i)perylene	93	94	60-123	1	30				
Benzo(k)fluoranthene	91	90	61-131	2	30				
1,1'-Biphenyl	87	88	51-127	1	30				
4-Bromophenyl-phenylether	88	90	58-136	2	30				
Butylbenzylphthalate	91	96	42-155	5	30				
Di-n-butylphthalate	91	92	55-131	1	30				
Caprolactam	87	86	36-137	1	30				
Carbazole	90	90	36-148	0	30				
4-Chloro-3-methylphenol	95	98	33-144	3	30				
4-Chloroaniline	47	55	11-114	16	30				
bis(2-Chloroethoxy)methane	91	94	60-118	3	30				
bis(2-Chloroethyl)ether	98	97	45-139	1	30				
2-Chloronaphthalene	84	81	43-149	3	30				
2-Chlorophenol	100	106	53-141	6	30				
4-Chlorophenyl-phenylether	89	92	57-127	3	30				
2,2'-oxybis(1-Chloropropane)	94	96	51-124	2	30				

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

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1243734
Reported: 05/05/11 at 06:45 PM

Sample Matrix Quality Control

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

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Chrysene	90	93	76-114	3	30				
Dibenz(a,h)anthracene	91	92	37-151	1	30				
Dibenzofuran	90	93	38-148	3	30				
3,3'-Dichlorobenzidine	0*	0*	10-143	0	30				
2,4-Dichlorophenol	93	98	48-141	5	30				
Diethylphthalate	88	93	52-130	5	30				
2,4-Dimethylphenol	95	97	27-143	2	30				
Dimethylphthalate	89	90	49-134	2	30				
4,6-Dinitro-2-methylphenol	84	87	10-148	3	30				
2,4-Dinitrophenol	93	100	20-143	7	30				
2,4-Dinitrotoluene	91	91	27-147	1	30				
2,6-Dinitrotoluene	91	94	44-140	3	30				
bis(2-Ethylhexyl)phthalate	92	99	38-151	8	30				
Fluoranthene	85	86	48-122	1	30				
Fluorene	91	92	46-137	2	30				
Hexachlorobenzene	90	89	53-137	1	30				
Hexachlorobutadiene	83	82	52-124	0	30				
Hexachlorocyclopentadiene	72	77	10-153	7	30				
Hexachloroethane	81	84	71-104	4	30				
Indeno(1,2,3-cd)pyrene	91	92	61-123	1	30				
Isophorone	91	92	54-122	1	30				
2-Methylnaphthalene	87	88	34-139	2	30				
2-Methylphenol	99	104	30-145	4	30				
4-Methylphenol	98	101	36-149	2	30				
Naphthalene	88	91	52-132	3	30				
2-Nitroaniline	90	95	46-146	5	30				
3-Nitroaniline	69	72	34-134	5	30				
4-Nitroaniline	63	66	26-124	4	30				
Nitrobenzene	89	92	37-139	2	30				
2-Nitrophenol	93	96	25-151	3	30				
4-Nitrophenol	80	81	15-149	1	30				
N-Nitroso-di-n-propylamine	93	95	46-128	3	30				
N-Nitrosodiphenylamine	87	91	33-148	4	30				
Di-n-octylphthalate	92	92	43-149	1	30				
Pentachlorophenol	94	94	23-145	0	30				
Phenanthrene	89	90	34-147	1	30				
Phenol	99	104	39-151	5	30				
Pyrene	88	91	76-124	3	30				
2,4,5-Trichlorophenol	93	93	25-143	0	30				
2,4,6-Trichlorophenol	91	94	41-142	3	30				
Batch number: 11118SLE026	Sample number(s): 6267988-6267991 UNSPK: 6267988								
Anthracene	108	694*	40-147	133*	30				
Benzo(a)anthracene	131	1575*	32-150	149*	30				
Benzo(a)pyrene	140*	1628*	57-129	148*	30				
Benzo(b)fluoranthene	159*	2292*	53-131	155*	30				
Benzo(g,h,i)perylene	118	839*	60-123	129*	30				
Chrysene	122*	1441*	76-114	146*	30				
Fluorene	98	310*	46-137	99*	30				
Naphthalene	139*	428*	52-132	89*	30				
Phenanthrene	161*	2138*	34-147	154*	30				
Pyrene	154*	2829*	76-124	157*	30				

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

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1243734
Reported: 05/05/11 at 06:45 PM

Sample Matrix Quality Control

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

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: 111171026001A	Sample number(s): 6267982-6267991 UNSPK: 6267982 BKG: 6267982								
Lead	-1433 (2)	-224 (2)	75-125	7	20	524	487	7	20
Batch number: 111175708002	Sample number(s): 6267992-6267996 UNSPK: 6267992 BKG: 6267992								
Aluminum	1848 (2)	1822 (2)	90-110	0	20	13,600	14,200	4	20
Antimony	69*	68*	75-125	0	20	< 1.96	< 1.96	6 (1)	20
Arsenic	110	88	75-125	5	20	53.2	57.4	8	20
Barium	101	92	75-125	5	20	128	130	2	20
Beryllium	111	109	83-111	0	20	0.743	0.828	11 (1)	20
Cadmium	99	93	75-125	5	20	< 0.490	< 0.490	17 (1)	20
Calcium	978 (2)	8224 (2)	75-125	107*	20	8,620	8,790	2	20
Chromium	440*	128*	75-125	64*	20	39.5	46.1	15	20
Cobalt	96	91	78-113	4	20	7.09	7.64	7	20
Copper	128*	102	75-125	7	20	53.6	72.4	30*	20
Iron	5057 (2)	3370 (2)	75-125	6	20	22,600	24,500	8	20
Lead	265 (2)	107 (2)	75-125	12	20	166	187	11	20
Magnesium	959 (2)	291 (2)	75-125	28*	20	3,440	3,680	7	20
Manganese	3118 (2)	79 (2)	75-125	125*	20	403	417	3	20
Nickel	100	93	75-125	5	20	22.0	24.2	10	20
Potassium	171*	179*	75-125	3	20	1,410	1,480	4	20
Selenium	101	100	75-125	0	20	< 1.96	< 1.96	0 (1)	20
Silver	114	110	75-125	2	20	< 0.490	< 0.490	0 (1)	20
Sodium	108	107	75-125	1	20	254	285	11 (1)	20
Thallium	95	87	75-125	6	20	< 2.94	< 2.94	11 (1)	20
Vanadium	226*	97	75-125	47*	20	54.6	56.6	4	20
Zinc	125	96	75-125	6	20	164	165	1	20
Batch number: 111175711001	Sample number(s): 6267992-6267996 UNSPK: 6267992 BKG: 6267992								
Mercury	93	96	80-120	4	20	0.158	0.177	12 (1)	20
Batch number: 11118820008A	Sample number(s): 6267982-6267996 BKG: 6267991								
Moisture						17.3	17.0	2	15

Surrogate Quality Control

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

Analysis Name: TCL(4.3)by 8260(soil)
Batch number: A111182AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6267982	107	96	130*	80
6267983	94	101	110	77
6267984	99	102	100	86

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

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1243734
Reported: 05/05/11 at 06:45 PM

Surrogate Quality Control

6267985	100	101	100	89
6267986	102	103	105	84
6267987	99	100	109	79
6267988	105	102	122	74
6267989	102	102	118	75
Blank	99	100	99	94
LCS	100	99	100	100
LCSD	99	98	101	99
Limits:	71-114	70-109	70-123	70-111

Analysis Name: TCL(4.3)by 8260(soil)
Batch number: Q111241AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6267996	73	70	72	89
Blank	98	102	98	98
LCS	96	98	97	96
LCSD	99	101	99	97
Limits:	71-114	70-109	70-123	70-111

Analysis Name: TCL(4.3)by 8260(soil)
Batch number: X111191AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6267990	98	99	99	83
6267991	110	111*	129*	69*
6267992	103	104	110	75
6267995	98	103	105	79
Blank	102	104	91	92
LCS	101	106	101	98
MS	94	70	107	90
MSD	97	98	103	93
Limits:	71-114	70-109	70-123	70-111

Analysis Name: TCL(4.3)by 8260(soil)
Batch number: X111231AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6267993	101	106	91	94
6267994	105	107	91	93
Blank	103	103	91	94
LCS	102	106	100	97
LCSD	101	103	99	96
Limits:	71-114	70-109	70-123	70-111

Analysis Name: PAH 8270 (microwave)
Batch number: 11116SLD026

	Nitrobenzene-d5	2-Fluorobiphenyl	Terphenyl-d14
6267982	93	81	66
6267983	89	100	96
6267984	89	102	99
6267985	93	89	88

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

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1243734
Reported: 05/05/11 at 06:45 PM

Surrogate Quality Control

6267986	89	85	89
6267987	91	95	98
Blank	93	96	92
LCS	96	97	89
MS	101	101	88
MSD	111	102	90
Limits:	55-121	56-121	43-124

Analysis Name: TCL 8270 (microwave)
Batch number: 11117SLJ026

	Phenol-d6	2-Fluorophenol	2,4,6-Tribromophenol	Nitrobenzene-d5	2-Fluorobiphenyl	Terphenyl-d14
6267992	87	88	74	85	87	72
6267993	91	93	75	86	91	79
6267994	85	83	63	82	83	67
6267995	82	84	64	78	81	67
6267996	96	78	61	99	87	117
Blank	86	87	85	80	82	79
LCS	100	99	90	89	91	85
MS	98	95	84	82	82	80
MSD	101	100	85	84	84	85
Limits:	42-130	39-136	28-139	55-121	56-121	43-124

Analysis Name: PAH 8270 (microwave)
Batch number: 11118SLE026

	Nitrobenzene-d5	2-Fluorobiphenyl	Terphenyl-d14
6267988	95	101	95
6267989	91	100	81
6267990	96	99	96
6267991	119	129*	147*
Blank	90	93	94
LCS	91	101	93
MS	100	111	94
MSD	100	102	87
Limits:	55-121	56-121	43-124

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

Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1243734 Sample # 626798Z-96

COC # 259434

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

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

Project Name/#: PHILA REF AOI-10 PWSID #:

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

Sampler: S. SYKES Quote #:

Name of state where samples were collected: PA

For Lab Use Only

FSC:

SCR#:

Preservation Codes

H=HCl T=Thiosulfate

N=HNO_3 B=NaOH

S=H_2SO_4 O=Other

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

(2) Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water (Potable ☐ NPDES ☐)	Other	Total # of Containers	(5) Analyses Requested / Preservation Codes ★	Remarks
BH-10-67_0-2'	4/21/11	1100	X		X			4	X	
BH-10-66_0-2'	4/21/11	1115	X		X			4	X	★ See attached list for analyses
BH-10-78_0-2'	4/21/11	1400	X		X			4	X	
BH-10-79_0-2'	4/21/11	1430	X		X			4	X	
BH-10-80_0-2'	4/21/11	1500	X		X			4	X	temp 1.8-2.4°C
BH-10-53_0-2'	4/22/11	830	X		X			4	X	
BH-10-54_0-2'	4/22/11	900	X		X			4	X	
BH-10-62_0-2'	4/22/11	930	X		X			4	X	
BH-10-61_0-2'	4/22/11	945	X		X			4	X	
BH-10-60_0-2'	4/22/11	1000	X		X			4	X	

(7) **Turnaround Time Requested** (TAT) (please circle): Normal Rush

(Rush TAT is subject to Lancaster Laboratories approval and surcharge.)

Date results are needed:

Rush results requested by (please circle): Phone Fax E-mail

Phone #: Fax #:

E-mail address:

(8) **Data Package Options** (please circle if required)

Type I (validation/NJ Reg)
Type II (Tier II)
Type III (Reduced NJ)
Type IV (CLP SOW)
Type VI (Raw Data Only)

TX TRRP-13
MA MCP CT RCP

SDG Complete? Yes No

Site-specific QC (MS/MSD/Dup)? Yes No

(If yes, indicate QC sample and submit triplicate volume.)

Internal COC Required? Yes / No

Relinquished by:	Date	Time	Received by:	Date	Time
[signature] / AQT	4/22/11	1330	Sample Fridge	4/22/11	1330
[signature] / AQT	4/24/11	1020	[signature]	4/25/11	1020
[signature]	4/25/11	1550			
			[signature]	4/25/11	1550

(9)

Lancaster Laboratories, Inc., 2425 New Holland Pike, Lancaster, PA 17601 (717) 656-2300 Fax: (717) 656-6766

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

Issued by Dept. 6042 Management 2102.05

Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1243734 Sample # 6267982-96

COC # 253841

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

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

Project Name/#: PHILA REF AOI-10 PWSID #:

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

Sampler: S. SYKES Quote #:

Name of state where samples were collected: PA

For Lab Use Only
FSC:
SCR#: 100271

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

(2) Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	(4) Matrix: Soil (Potable / NPDES)	Water	Other	Total # of Containers	(5) Analyses Requested / Preservation Codes: TCL 8260	TCL 8270	TAL metals	Remarks	(6) Temperature of samples upon receipt (if requested)
BH-10-75_0-2'	4/19/11	1600	X		X			4	X	X	X	temp 1.8-2.4°C	
BH-10-82_0-2'	4/20/11	1515	X		X			4	X	X	X		
BH-10-81_0-2'	4/21/11	900	X		X			4	X	X	X		
BH-10-83_0-2'	4/21/11	940	X		X			4	X	X	X		
BH-10-57_0-2'	4/21/11	1145	X		X			4	X	X	X		

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

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

SDG Complete? Yes No

(9)

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]			[signature]	4/4/11	1605
[signature]	4/4/11	958			
[signature]	4/20/11	1800	Sample Fridge	4/20/11	1800
[signature]	4/25/11	1020	[signature]	4/25/11	1020
[signature]	4/25/11	1550	[signature]	4/25/11	1550

acct 10132 grp 1243734

626782-96

So. 1

Table 1b
Constituents of Concern for Soil
AOI 10 Work Plan for Site Characterization
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

METALS	CAS No.
Lead (total)	7439-92-1

VOLATILE ORGANIC COMPOUNDS	CAS No.
1,2-Dichloroethane	107-06-2
1,2,4-Trimethylbenzene	95-63-6
1,3,5-Trimethylbenzene	108-67-8
Benzene	71-43-2
Cumene	98-82-8
Ethylbenzene	100-41-4
Ethylene dibromide	106-93-4
Methyl tertiary butyl ether	1634-04-4
Toluene	108-88-3
Xylenes (total)	1330-20-7

SEMI-VOLATILE ORGANIC COMPOUNDS	CAS No.
Anthracene	120-12-7
Benzo(a)anthracene	56-55-3
Benzo (g,h,i) perylene	191-24-2
Benzo(a)pyrene	50-32-8
Benzo(b)fluoranthene	205-99-2
Chrysene	218-01-9
Fluorene	86-73-7
Naphthalene	91-20-3
Phenanthrene	85-01-8
Pyrene	129-00-0

Notes:

1. Constituents are from Pennsylvania Corrective Action Process (CAP) Regulation Amendments effective December 1, 2001; provided in Chapter VI, Section E (pgs. 29-30) of PADEP Document, *Closure Requirements for Underground Storage Tank Systems,* effective April 1, 1998 and the March 18, 2008 revised PADEP Petroleum Short List.
2. Select soil samples to be collected within the CAMU and delineation soil samples will be analyzed for full TCL VOCs, TCL SVOCs, and TAL metals.

Explanation of Symbols and Abbreviations

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

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
ug	microgram(s)	**mg**	milligram(s)
ml	milliliter(s)	**l**	liter(s)
m3	cubic meter(s)	**ul**	microliter(s)

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

> greater than

J estimated value – The result is ≥ the Method Detection Limit (MDL) and < the Limit of Quantitation (LOQ).

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

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

U.S. EPA CLP Data Qualifiers:

Organic Qualifiers

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

Inorganic Qualifiers

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

Analytical test results meet all requirements of NELAC unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

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

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

Lancaster Laboratories

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

Analysis Report

ANALYTICAL RESULTS

Prepared by:

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

Prepared for:

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

May 02, 2011

Project: SUN: Philadelphia Refinery AOI-10

Submittal Date: 04/21/2011
Group Number: 1243395
PO Number: PHILADELPHIA
State of Sample Origin: PA

Client Sample Description	Lancaster Labs (LLI) #
BH-10-42_0-2' Grab Soil	6265762
BH-10-49_0-2' Grab Soil	6265763
BH-10-47_0-2' Grab Soil	6265764
BH-10-50_0-2' Grab Soil	6265765
W-29_0-2' Grab Soil	6265766
W-28_0-2' Grab Soil	6265767
W-34_0-2' Grab Soil	6265768
BH-10-76_0-2' Grab Soil	6265769
W-33_0-2' Grab Soil	6265770

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

ELECTRONIC COPY TO	Langan	Attn: Dennis Webster
ELECTRONIC COPY TO	SUN: Aquaterra Tech.	Attn: Tiffani Doerr
ELECTRONIC COPY TO	LLI	Attn: EDD Group
ELECTRONIC COPY TO	Langan	Attn: Kristen Ward
ELECTRONIC COPY TO	Aquaterra Tech	Attn: Loretta Belfiglio

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

Questions? Contact your Client Services Representative
Jessica A Oknefski at (717) 656-2300 Ext. 1815

Respectfully Submitted,

Robin C. Runkle
Senior Specialist

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-42_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259436 BH-10-42_0-2'

LLI Sample # SW 6265762
LLI Group # 1243395
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/19/2011 10:00 by SS

Submitted: 04/21/2011 16:00
Reported: 05/02/2011 18:03

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

BH104

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	< 7	7	0.7	1.1
10950	1,2-Dibromoethane	106-93-4	< 7	7	1	1.1
10950	1,2-Dichloroethane	107-06-2	< 7	7	1	1.1
10950	Ethylbenzene	100-41-4	< 7	7	1	1.1
10950	Isopropylbenzene	98-82-8	< 7	7	1	1.1
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 7	7	0.7	1.1
10950	Toluene	108-88-3	< 7	7	1	1.1
10950	1,2,4-Trimethylbenzene	95-63-6	< 7	7	1	1.1
10950	1,3,5-Trimethylbenzene	108-67-8	< 7	7	1	1.1
10950	Xylene (Total)	1330-20-7	< 7	7	1	1.1
	The GC/MS volatile internal standard peak areas were outside the QC limits. A re-analysis was performed, and the matrix effect was confirmed.					
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	1,200	980	200	1
10724	Benzo(a)anthracene	56-55-3	1,400	980	200	1
10724	Benzo(a)pyrene	50-32-8	1,300	980	200	1
10724	Benzo(b)fluoranthene	205-99-2	1,500	980	200	1
10724	Benzo(g,h,i)perylene	191-24-2	2,200	980	200	1
10724	Chrysene	218-01-9	2,600	980	200	1
10724	Fluorene	86-73-7	< 980	980	200	1
10724	Naphthalene	91-20-3	2,800	980	200	1
10724	Phenanthrene	85-01-8	2,900	980	200	1
10724	Pyrene	129-00-0	2,500	980	200	1
	Reporting limits were raised due to interference from the sample matrix.					
Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	249	1.16	0.0602	10
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	15.3	0.50	0.50	1
	"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.					

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-42_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259436 BH-10-42_0-2'

LLI Sample # SW 6265762
LLI Group # 1243395
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/19/2011 10:00 by SS

Submitted: 04/21/2011 16:00
Reported: 05/02/2011 18:03

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

BH104

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	X111172AA	04/28/2011 02:57	Kristen D Pelliccia	1.1
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111224213	04/19/2011 10:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111224213	04/19/2011 10:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111224213	04/19/2011 10:00	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11116SLD026	04/28/2011 13:18	Matthew S Woods	1
10814	BNA Soil Microwave PAH	SW-846 3546	1	11116SLD026	04/27/2011 09:00	Kerrie A Freeburn	1
06135	Lead	SW-846 6020	1	111131026001A	04/30/2011 13:25	David K Beck	10
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111131026001	04/23/2011 11:01	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11117820006A	04/27/2011 17:11	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-49_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259436 BH-10-49_0-2'

LLI Sample # SW 6265763
LLI Group # 1243395
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/19/2011 10:30 by SS

Submitted: 04/21/2011 16:00
Reported: 05/02/2011 18:03

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

BH109

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	7	7	0.7	0.93
10950	1,2-Dibromoethane	106-93-4	< 7	7	1	0.93
10950	1,2-Dichloroethane	107-06-2	< 7	7	1	0.93
10950	Ethylbenzene	100-41-4	< 7	7	1	0.93
10950	Isopropylbenzene	98-82-8	< 7	7	1	0.93
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 7	7	0.7	0.93
10950	Toluene	108-88-3	< 7	7	1	0.93
10950	1,2,4-Trimethylbenzene	95-63-6	< 7	7	1	0.93
10950	1,3,5-Trimethylbenzene	108-67-8	< 7	7	1	0.93
10950	Xylene (Total)	1330-20-7	< 7	7	1	0.93
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	< 240	240	47	1
10724	Benzo(a)anthracene	56-55-3	< 240	240	47	1
10724	Benzo(a)pyrene	50-32-8	< 240	240	47	1
10724	Benzo(b)fluoranthene	205-99-2	< 240	240	47	1
10724	Benzo(g,h,i)perylene	191-24-2	< 240	240	47	1
10724	Chrysene	218-01-9	< 240	240	47	1
10724	Fluorene	86-73-7	< 240	240	47	1
10724	Naphthalene	91-20-3	< 240	240	47	1
10724	Phenanthrene	85-01-8	< 240	240	47	1
10724	Pyrene	129-00-0	< 240	240	47	1
Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	340	1.38	0.0716	10
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	29.5	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	X111181AA	04/29/2011 00:16	Kristen D Pelliccia	0.93
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111224213	04/19/2011 10:30	Client Supplied	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-49_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259436 BH-10-49_0-2'

LLI Sample # SW 6265763
LLI Group # 1243395
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/19/2011 10:30 by SS

Submitted: 04/21/2011 16:00
Reported: 05/02/2011 18:03

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

BH109

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111224213	04/19/2011 10:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111224213	04/19/2011 10:30	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11116SLD026	04/28/2011 16:51	Matthew S Woods	1
10814	BNA Soil Microwave PAH	SW-846 3546	1	11116SLD026	04/27/2011 09:00	Kerrie A Freeburn	1
06135	Lead	SW-846 6020	1	111131026001A	04/30/2011 13:36	David K Beck	10
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111131026001	04/23/2011 11:01	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11117820006A	04/27/2011 17:11	Scott W Freisher	1

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-47_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259436 BH-10-47_0-2'

LLI Sample # SW 6265764
LLI Group # 1243395
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/19/2011 11:00 by SS

Submitted: 04/21/2011 16:00
Reported: 05/02/2011 18:03

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

BH107

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	< 5	5	0.5	0.82
10950	1,2-Dibromoethane	106-93-4	< 5	5	1	0.82
10950	1,2-Dichloroethane	107-06-2	< 5	5	1	0.82
10950	Ethylbenzene	100-41-4	< 5	5	1	0.82
10950	Isopropylbenzene	98-82-8	< 5	5	1	0.82
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 5	5	0.5	0.82
10950	Toluene	108-88-3	< 5	5	1	0.82
10950	1,2,4-Trimethylbenzene	95-63-6	< 5	5	1	0.82
10950	1,3,5-Trimethylbenzene	108-67-8	< 5	5	1	0.82
10950	Xylene (Total)	1330-20-7	< 5	5	1	0.82
	The GC/MS volatile internal standard peak areas were outside the QC limits. A re-analysis was performed, and the matrix effect was confirmed.					
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	250	200	40	1
10724	Benzo(a)anthracene	56-55-3	670	200	40	1
10724	Benzo(a)pyrene	50-32-8	820	200	40	1
10724	Benzo(b)fluoranthene	205-99-2	830	200	40	1
10724	Benzo(g,h,i)perylene	191-24-2	770	200	40	1
10724	Chrysene	218-01-9	730	200	40	1
10724	Fluorene	86-73-7	< 200	200	40	1
10724	Naphthalene	91-20-3	290	200	40	1
10724	Phenanthrene	85-01-8	540	200	40	1
10724	Pyrene	129-00-0	810	200	40	1
Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	233	1.18	0.0615	10
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	17.1	0.50	0.50	1
	"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.					

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-47_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259436 BH-10-47_0-2'

LLI Sample # SW 6265764
LLI Group # 1243395
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/19/2011 11:00 by SS

Submitted: 04/21/2011 16:00
Reported: 05/02/2011 18:03

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

BH107

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	X111172AA	04/28/2011 01:25	Kristen D Pelliccia	0.82
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111224213	04/19/2011 11:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111224213	04/19/2011 11:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111224213	04/19/2011 11:00	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11116SLD026	04/28/2011 17:17	Matthew S Woods	1
10814	BNA Soil Microwave PAH	SW-846 3546	1	11116SLD026	04/27/2011 09:00	Kerrie A Freeburn	1
06135	Lead	SW-846 6020	1	111131026001A	04/30/2011 13:38	David K Beck	10
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111131026001	04/23/2011 11:01	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11117820006A	04/27/2011 17:11	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-50_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259436 BH-10-50_0-2'

LLI Sample # SW 6265765
LLI Group # 1243395
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/19/2011 11:30 by SS

Submitted: 04/21/2011 16:00
Reported: 05/02/2011 18:03

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

BH105

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	< 5	5	0.5	0.8
10950	1,2-Dibromoethane	106-93-4	< 5	5	0.9	0.8
10950	1,2-Dichloroethane	107-06-2	< 5	5	0.9	0.8
10950	Ethylbenzene	100-41-4	< 5	5	0.9	0.8
10950	Isopropylbenzene	98-82-8	< 5	5	0.9	0.8
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 5	5	0.5	0.8
10950	Toluene	108-88-3	< 5	5	0.9	0.8
10950	1,2,4-Trimethylbenzene	95-63-6	< 5	5	0.9	0.8
10950	1,3,5-Trimethylbenzene	108-67-8	< 5	5	0.9	0.8
10950	Xylene (Total)	1330-20-7	< 5	5	0.9	0.8
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	1,400	190	37	1
10724	Benzo(a)anthracene	56-55-3	1,900	190	37	1
10724	Benzo(a)pyrene	50-32-8	1,300	190	37	1
10724	Benzo(b)fluoranthene	205-99-2	1,500	190	37	1
10724	Benzo(g,h,i)perylene	191-24-2	780	190	37	1
10724	Chrysene	218-01-9	1,700	190	37	1
10724	Fluorene	86-73-7	640	190	37	1
10724	Naphthalene	91-20-3	740	190	37	1
10724	Phenanthrene	85-01-8	4,700	1,900	370	10
10724	Pyrene	129-00-0	3,300	190	37	1
Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	84.7	0.556	0.0289	5
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	11.8	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	X111181AA	04/29/2011 01:01	Kristen D Pelliccia	0.8
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111224213	04/19/2011 11:30	Client Supplied	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-50_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259436 BH-10-50_0-2'

LLI Sample # SW 6265765
LLI Group # 1243395
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/19/2011 11:30 by SS

Submitted: 04/21/2011 16:00
Reported: 05/02/2011 18:03

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

BH105

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111224213	04/19/2011 11:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111224213	04/19/2011 11:30	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11116SLD026	04/28/2011 17:44	Matthew S Woods	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11116SLD026	04/29/2011 13:41	Matthew S Woods	10
10814	BNA Soil Microwave PAH	SW-846 3546	1	11116SLD026	04/27/2011 09:00	Kerrie A Freeburn	1
06135	Lead	SW-846 6020	1	111131026001A	04/30/2011 13:44	David K Beck	5
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111131026001	04/23/2011 11:01	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11117820006A	04/27/2011 17:11	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-29_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259436 W-29_0-2'

LLI Sample # SW 6265766
LLI Group # 1243395
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/19/2011 11:45 by SS

Submitted: 04/21/2011 16:00
Reported: 05/02/2011 18:03

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

W2902

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	< 5	5	0.5	0.95
10950	1,2-Dibromoethane	106-93-4	< 5	5	1	0.95
10950	1,2-Dichloroethane	107-06-2	< 5	5	1	0.95
10950	Ethylbenzene	100-41-4	< 5	5	1	0.95
10950	Isopropylbenzene	98-82-8	< 5	5	1	0.95
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 5	5	0.5	0.95
10950	Toluene	108-88-3	6	5	1	0.95
10950	1,2,4-Trimethylbenzene	95-63-6	< 5	5	1	0.95
10950	1,3,5-Trimethylbenzene	108-67-8	< 5	5	1	0.95
10950	Xylene (Total)	1330-20-7	< 5	5	1	0.95
	The GC/MS volatile internal standard peak areas were outside the QC limits. A re-analysis was performed, and the matrix effect was confirmed.					
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	830	190	38	1
10724	Benzo(a)anthracene	56-55-3	900	190	38	1
10724	Benzo(a)pyrene	50-32-8	840	190	38	1
10724	Benzo(b)fluoranthene	205-99-2	970	190	38	1
10724	Benzo(g,h,i)perylene	191-24-2	760	190	38	1
10724	Chrysene	218-01-9	1,100	190	38	1
10724	Fluorene	86-73-7	< 190	190	38	1
10724	Naphthalene	91-20-3	1,300	190	38	1
10724	Phenanthrene	85-01-8	1,400	190	38	1
10724	Pyrene	129-00-0	1,500	190	38	1
Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	259	1.11	0.0575	10
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	13.9	0.50	0.50	1
	"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.					

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-29_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259436 W-29_0-2'

LLI Sample # SW 6265766
LLI Group # 1243395
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/19/2011 11:45 by SS

Submitted: 04/21/2011 16:00
Reported: 05/02/2011 18:03

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

W2902

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	X111172AA	04/28/2011 02:11	Kristen D Pelliccia	0.95
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111224213	04/19/2011 11:45	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111224213	04/19/2011 11:45	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111224213	04/19/2011 11:45	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11116SLD026	04/28/2011 18:10	Matthew S Woods	1
10814	BNA Soil Microwave PAH	SW-846 3546	1	11116SLD026	04/27/2011 09:00	Kerrie A Freeburn	1
06135	Lead	SW-846 6020	1	111131026001A	04/30/2011 13:45	David K Beck	10
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111131026001	04/23/2011 11:01	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11117820006A	04/27/2011 17:11	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-28_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259436 W-28_0-2'

LLI Sample # SW 6265767
LLI Group # 1243395
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/19/2011 14:00 by SS

Submitted: 04/21/2011 16:00
Reported: 05/02/2011 18:03

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

W2802

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	< 300	300	30	50.09
10950	1,2-Dibromoethane	106-93-4	< 300	300	60	50.09
10950	1,2-Dichloroethane	107-06-2	< 300	300	60	50.09
10950	Ethylbenzene	100-41-4	< 300	300	60	50.09
10950	Isopropylbenzene	98-82-8	< 300	300	60	50.09
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 300	300	30	50.09
10950	Toluene	108-88-3	< 300	300	60	50.09
10950	1,2,4-Trimethylbenzene	95-63-6	1,600	300	60	50.09
10950	1,3,5-Trimethylbenzene	108-67-8	430	300	60	50.09
10950	Xylene (Total)	1330-20-7	540	300	60	50.09
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	570	200	40	1
10724	Benzo(a)anthracene	56-55-3	630	200	40	1
10724	Benzo(a)pyrene	50-32-8	390	200	40	1
10724	Benzo(b)fluoranthene	205-99-2	270	200	40	1
10724	Benzo(g,h,i)perylene	191-24-2	220	200	40	1
10724	Chrysene	218-01-9	1,400	200	40	1
10724	Fluorene	86-73-7	970	200	40	1
10724	Naphthalene	91-20-3	670	200	40	1
10724	Phenanthrene	85-01-8	1,900	200	40	1
10724	Pyrene	129-00-0	1,400	200	40	1
Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	181	0.574	0.0298	5
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	17.0	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	R111173AA	04/28/2011 07:35	Stephanie A Selis	50.09
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111224213	04/19/2011 14:00	Client Supplied	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-28_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259436 W-28_0-2'

LLI Sample # SW 6265767
LLI Group # 1243395
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/19/2011 14:00 by SS

Submitted: 04/21/2011 16:00
Reported: 05/02/2011 18:03

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

W2802

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111224213	04/19/2011 14:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111224213	04/19/2011 14:00	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11116SLD026	04/28/2011 18:37	Matthew S Woods	1
10814	BNA Soil Microwave PAH	SW-846 3546	1	11116SLD026	04/27/2011 09:00	Kerrie A Freeburn	1
06135	Lead	SW-846 6020	1	111131026001A	04/30/2011 13:47	David K Beck	5
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111131026001	04/23/2011 11:01	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11117820006A	04/27/2011 17:11	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-34_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259436 W-34_0-2'

LLI Sample # SW 6265768
LLI Group # 1243395
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/20/2011 08:30 by SS

Submitted: 04/21/2011 16:00
Reported: 05/02/2011 18:03

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

W3402

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	< 5	5	0.5	0.89
10950	1,2-Dibromoethane	106-93-4	< 5	5	1	0.89
10950	1,2-Dichloroethane	107-06-2	< 5	5	1	0.89
10950	Ethylbenzene	100-41-4	< 5	5	1	0.89
10950	Isopropylbenzene	98-82-8	< 5	5	1	0.89
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 5	5	0.5	0.89
10950	Toluene	108-88-3	< 5	5	1	0.89
10950	1,2,4-Trimethylbenzene	95-63-6	< 5	5	1	0.89
10950	1,3,5-Trimethylbenzene	108-67-8	< 5	5	1	0.89
10950	Xylene (Total)	1330-20-7	< 5	5	1	0.89
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	< 190	190	39	1
10724	Benzo(a)anthracene	56-55-3	550	190	39	1
10724	Benzo(a)pyrene	50-32-8	540	190	39	1
10724	Benzo(b)fluoranthene	205-99-2	620	190	39	1
10724	Benzo(g,h,i)perylene	191-24-2	470	190	39	1
10724	Chrysene	218-01-9	600	190	39	1
10724	Fluorene	86-73-7	< 190	190	39	1
10724	Naphthalene	91-20-3	< 190	190	39	1
10724	Phenanthrene	85-01-8	590	190	39	1
10724	Pyrene	129-00-0	860	190	39	1
Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	561	2.35	0.122	20
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	14.9	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	X111181AA	04/29/2011 01:47	Kristen D Pelliccia	0.89
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111224213	04/20/2011 08:30	Client Supplied	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-34_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259436 W-34_0-2'

LLI Sample # SW 6265768
LLI Group # 1243395
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/20/2011 08:30 by SS

Submitted: 04/21/2011 16:00
Reported: 05/02/2011 18:03

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

W3402

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111224213	04/20/2011 08:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111224213	04/20/2011 08:30	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11116SLD026	04/28/2011 19:03	Matthew S Woods	1
10814	BNA Soil Microwave PAH	SW-846 3546	1	11116SLD026	04/27/2011 09:00	Kerrie A Freeburn	1
06135	Lead	SW-846 6020	1	111131026001A	04/30/2011 13:49	David K Beck	20
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111131026001	04/23/2011 11:01	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11117820006A	04/27/2011 17:11	Scott W Freisher	1

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-76_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259436 BH-10-76_0-2'

LLI Sample # SW 6265769
LLI Group # 1243395
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/20/2011 10:30 by SS

Submitted: 04/21/2011 16:00
Reported: 05/02/2011 18:03

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

BH176

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	< 5	5	0.5	0.89
10950	1,2-Dibromoethane	106-93-4	< 5	5	1	0.89
10950	1,2-Dichloroethane	107-06-2	< 5	5	1	0.89
10950	Ethylbenzene	100-41-4	< 5	5	1	0.89
10950	Isopropylbenzene	98-82-8	< 5	5	1	0.89
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 5	5	0.5	0.89
10950	Toluene	108-88-3	< 5	5	1	0.89
10950	1,2,4-Trimethylbenzene	95-63-6	< 5	5	1	0.89
10950	1,3,5-Trimethylbenzene	108-67-8	< 5	5	1	0.89
10950	Xylene (Total)	1330-20-7	< 5	5	1	0.89
	The GC/MS volatile internal standard peak areas were outside the QC limits. A re-analysis was performed, and the matrix effect was confirmed.					
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	260	200	40	1
10724	Benzo(a)anthracene	56-55-3	1,400	200	40	1
10724	Benzo(a)pyrene	50-32-8	1,800	200	40	1
10724	Benzo(b)fluoranthene	205-99-2	1,500	200	40	1
10724	Benzo(g,h,i)perylene	191-24-2	2,000	200	40	1
10724	Chrysene	218-01-9	1,600	200	40	1
10724	Fluorene	86-73-7	< 200	200	40	1
10724	Naphthalene	91-20-3	340	200	40	1
10724	Phenanthrene	85-01-8	740	200	40	1
10724	Pyrene	129-00-0	990	200	40	1
Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	1,990	11.9	0.621	100
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	17.1	0.50	0.50	1
	"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.					

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-76_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259436 BH-10-76_0-2'

LLI Sample # SW 6265769
LLI Group # 1243395
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/20/2011 10:30 by SS

Submitted: 04/21/2011 16:00
Reported: 05/02/2011 18:03

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

BH176

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	A111172AA	04/28/2011 07:34	Laura M Krieger	0.89
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111224213	04/20/2011 10:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111224213	04/20/2011 10:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111224213	04/20/2011 10:30	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11116SLD026	04/28/2011 19:30	Matthew S Woods	1
10814	BNA Soil Microwave PAH	SW-846 3546	1	11116SLD026	04/27/2011 09:00	Kerrie A Freeburn	1
06135	Lead	SW-846 6020	1	111131026001A	04/30/2011 13:51	David K Beck	100
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111131026001	04/23/2011 11:01	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11117820006A	04/27/2011 17:11	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-33_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259436 W-33_0-2'

LLI Sample # SW 6265770
LLI Group # 1243395
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/20/2011 11:15 by SS

Submitted: 04/21/2011 16:00
Reported: 05/02/2011 18:03

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

W3301

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	11	5	0.5	0.87
10950	1,2-Dibromoethane	106-93-4	< 5	5	1	0.87
10950	1,2-Dichloroethane	107-06-2	< 5	5	1	0.87
10950	Ethylbenzene	100-41-4	< 5	5	1	0.87
10950	Isopropylbenzene	98-82-8	< 5	5	1	0.87
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 5	5	0.5	0.87
10950	Toluene	108-88-3	11	5	1	0.87
10950	1,2,4-Trimethylbenzene	95-63-6	< 5	5	1	0.87
10950	1,3,5-Trimethylbenzene	108-67-8	< 5	5	1	0.87
10950	Xylene (Total)	1330-20-7	6	5	1	0.87
	The GC/MS volatile internal standard peak areas were outside the QC limits. A re-analysis was performed, and the matrix effect was confirmed.					
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	< 190	190	39	1
10724	Benzo(a)anthracene	56-55-3	< 190	190	39	1
10724	Benzo(a)pyrene	50-32-8	200	190	39	1
10724	Benzo(b)fluoranthene	205-99-2	< 190	190	39	1
10724	Benzo(g,h,i)perylene	191-24-2	360	190	39	1
10724	Chrysene	218-01-9	< 190	190	39	1
10724	Fluorene	86-73-7	< 190	190	39	1
10724	Naphthalene	91-20-3	< 190	190	39	1
10724	Phenanthrene	85-01-8	240	190	39	1
10724	Pyrene	129-00-0	260	190	39	1
Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	297	1.15	0.0596	10
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	14.4	0.50	0.50	1
	"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.					

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-33_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259436 W-33_0-2'

LLI Sample # SW 6265770
LLI Group # 1243395
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/20/2011 11:15 by SS

Submitted: 04/21/2011 16:00
Reported: 05/02/2011 18:03

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

W3301

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	A111172AA	04/28/2011 07:56	Laura M Krieger	0.87
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111224213	04/20/2011 11:15	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111224213	04/20/2011 11:15	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111224213	04/20/2011 11:15	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11116SLD026	04/28/2011 19:56	Matthew S Woods	1
10814	BNA Soil Microwave PAH	SW-846 3546	1	11116SLD026	04/27/2011 09:00	Kerrie A Freeburn	1
06135	Lead	SW-846 6020	1	111131026001A	04/30/2011 13:53	David K Beck	10
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111131026001	04/23/2011 11:01	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11117820006A	04/27/2011 17:11	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1243395
Reported: 05/02/11 at 06:03 PM

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

Laboratory Compliance Quality Control

Analysis Name	Blank Result	Blank LOQ**	Blank MDL	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: A111172AA	Sample number(s): 6265769-6265770								
Benzene	< 5	5.	0.5	ug/kg	103		80-120		
1,2-Dibromoethane	< 5	5.	1	ug/kg	103		80-120		
1,2-Dichloroethane	< 5	5.	1	ug/kg	105		71-129		
Ethylbenzene	< 5	5.	1	ug/kg	101		80-120		
Isopropylbenzene	< 5	5.	1	ug/kg	101		76-120		
Methyl Tertiary Butyl Ether	< 5	5.	0.5	ug/kg	105		74-121		
Toluene	< 5	5.	1	ug/kg	101		80-120		
1,2,4-Trimethylbenzene	< 5	5.	1	ug/kg	99		79-120		
1,3,5-Trimethylbenzene	< 5	5.	1	ug/kg	101		78-120		
Xylene (Total)	< 5	5.	1	ug/kg	99		80-120		
Batch number: R111173AA	Sample number(s): 6265767								
Benzene	< 250	250.	25	ug/kg	103	101	80-120	2	30
1,2-Dibromoethane	< 250	250.	50	ug/kg	101	100	80-120	1	30
1,2-Dichloroethane	< 250	250.	50	ug/kg	99	96	71-129	3	30
Ethylbenzene	< 250	250.	50	ug/kg	97	96	80-120	0	30
Isopropylbenzene	< 250	250.	50	ug/kg	95	92	76-120	3	30
Methyl Tertiary Butyl Ether	< 250	250.	25	ug/kg	100	99	74-121	0	30
Toluene	< 250	250.	50	ug/kg	102	100	80-120	2	30
1,2,4-Trimethylbenzene	< 250	250.	50	ug/kg	93	93	79-120	0	30
1,3,5-Trimethylbenzene	< 250	250.	50	ug/kg	96	95	78-120	1	30
Xylene (Total)	< 250	250.	50	ug/kg	100	98	80-120	2	30
Batch number: X111172AA	Sample number(s): 6265762,6265764,6265766								
Benzene	< 5	5.	0.5	ug/kg	95	96	80-120	2	30
1,2-Dibromoethane	< 5	5.	1	ug/kg	97	98	80-120	1	30
1,2-Dichloroethane	< 5	5.	1	ug/kg	94	94	71-129	0	30
Ethylbenzene	< 5	5.	1	ug/kg	94	96	80-120	1	30
Isopropylbenzene	< 5	5.	1	ug/kg	96	97	76-120	1	30
Methyl Tertiary Butyl Ether	< 5	5.	0.5	ug/kg	87	89	74-121	2	30
Toluene	< 5	5.	1	ug/kg	95	96	80-120	1	30
1,2,4-Trimethylbenzene	< 5	5.	1	ug/kg	91	93	79-120	2	30
1,3,5-Trimethylbenzene	< 5	5.	1	ug/kg	93	95	78-120	2	30
Xylene (Total)	< 5	5.	1	ug/kg	98	99	80-120	1	30
Batch number: X111181AA	Sample number(s): 6265763,6265765,6265768								
Benzene	< 5	5.	0.5	ug/kg	98	96	80-120	2	30
1,2-Dibromoethane	< 5	5.	1	ug/kg	100	102	80-120	2	30
1,2-Dichloroethane	< 5	5.	1	ug/kg	97	98	71-129	1	30
Ethylbenzene	< 5	5.	1	ug/kg	97	97	80-120	0	30
Isopropylbenzene	< 5	5.	1	ug/kg	100	99	76-120	1	30
Methyl Tertiary Butyl Ether	< 5	5.	0.5	ug/kg	87	90	74-121	3	30
Toluene	< 5	5.	1	ug/kg	97	95	80-120	2	30
1,2,4-Trimethylbenzene	< 5	5.	1	ug/kg	94	94	79-120	0	30
1,3,5-Trimethylbenzene	< 5	5.	1	ug/kg	97	95	78-120	2	30
Xylene (Total)	< 5	5.	1	ug/kg	100	100	80-120	0	30

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

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1243395
Reported: 05/02/11 at 06:03 PM

Analysis Name	Blank Result	Blank LOQ**	Blank MDL	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 11116SLD026	Sample number(s): 6265762-6265770								
Anthracene	< 170	170.	33	ug/kg	92		83-111		
Benzo(a)anthracene	< 170	170.	33	ug/kg	94		82-111		
Benzo(a)pyrene	< 170	170.	33	ug/kg	80		63-138		
Benzo(b)fluoranthene	< 170	170.	33	ug/kg	88		61-133		
Benzo(g,h,i)perylene	< 170	170.	33	ug/kg	83		63-130		
Chrysene	< 170	170.	33	ug/kg	92		81-111		
Fluorene	< 170	170.	33	ug/kg	95		81-117		
Naphthalene	< 170	170.	33	ug/kg	91		83-112		
Phenanthrene	< 170	170.	33	ug/kg	88		83-109		
Pyrene	< 170	170.	33	ug/kg	91		80-121		
Batch number: 111131026001A	Sample number(s): 6265762-6265770								
Lead	< 0.196	0.196	0.0102	mg/kg	95		83-110		
Batch number: 11117820006A	Sample number(s): 6265762-6265770								
Moisture					100		99-101		

Sample Matrix Quality Control

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

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: A111172AA	Sample number(s): 6265769-6265770 UNSPK: P264746								
Benzene	116	97	55-143	23	30				
1,2-Dibromoethane	145*	94	54-129	47*	30				
1,2-Dichloroethane	114	90	68-131	28	30				
Ethylbenzene	101	89	44-141	17	30				
Isopropylbenzene	77	78	38-144	3	30				
Methyl Tertiary Butyl Ether	111	92	55-129	23	30				
Toluene	138	101	50-146	36*	30				
1,2,4-Trimethylbenzene	126	98	37-149	30	30				
1,3,5-Trimethylbenzene	124	103	38-150	24	30				
Xylene (Total)	95	86	44-136	15	30				
Batch number: 11116SLD026	Sample number(s): 6265762-6265770 UNSPK: 6265762								
Anthracene	108	104	40-147	3	30				
Benzo(a)anthracene	107	95	32-150	8	30				
Benzo(a)pyrene	98	82	57-129	11	30				
Benzo(b)fluoranthene	92	88	53-131	3	30				
Benzo(g,h,i)perylene	114	86	60-123	13	30				
Chrysene	122*	117*	76-114	3	30				
Fluorene	99	94	46-137	5	30				
Naphthalene	175*	174*	52-132	1	30				
Phenanthrene	127	132	34-147	1	30				
Pyrene	125*	123	76-124	1	30				
Batch number: 111131026001A	Sample number(s): 6265762-6265770 UNSPK: 6265762 BKG: 6265762								
Lead	-160 (2)	-1430 (2)	75-125	19	20	211	191	10	20

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

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1243395
Reported: 05/02/11 at 06:03 PM

Sample Matrix Quality Control

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

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: 11117820006A	Sample number(s): 6265762-6265770					BKG: P265760			
Moisture						32.1	32.6	2	15

Surrogate Quality Control

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

Analysis Name: TCL(4.3)by 8260(soil)
Batch number: A111172AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6265769	105	106	119	72
6265770	101	104	109	79
Blank	101	105	99	96
LCS	101	103	101	101
MS	110	112*	126*	75
MSD	100	105	110	84
Limits:	71-114	70-109	70-123	70-111

Analysis Name: TCL(4.3)by 8260(soil)
Batch number: R111173AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6265767	82	86	78	78
Blank	100	105	97	91
LCS	98	99	97	93
LCSD	94	98	94	90
Limits:	71-114	70-109	70-123	70-111

Analysis Name: TCL(4.3)by 8260(soil)
Batch number: X111172AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6265762	112	110*	122	69*
6265764	98	100	99	81
6265766	98	99	101	87
Blank	102	105	92	97
LCS	101	99	101	98
LCSD	101	98	100	98
Limits:	71-114	70-109	70-123	70-111

Analysis Name: TCL(4.3)by 8260(soil)
Batch number: X111181AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6265763	102	103	99	85

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

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1243395
Reported: 05/02/11 at 06:03 PM

Surrogate Quality Control

6265765	102	106	97	89
6265768	102	105	95	87
Blank	104	105	91	92
LCS	102	99	100	98
LCSD	102	99	101	99
Limits:	71-114	70-109	70-123	70-111

Analysis Name: PAH 8270 (microwave)
Batch number: 11116SLD026

	Nitrobenzene-d5	2-Fluorobiphenyl	Terphenyl-d14
6265762	107	101	89
6265763	97	104	86
6265764	92	91	83
6265765	96	102	89
6265766	89	88	82
6265767	106	98	104
6265768	84	88	78
6265769	97	102	91
6265770	93	100	93
Blank	93	96	92
LCS	96	97	89
MS	101	101	88
MSD	111	102	90
Limits:	55-121	56-121	43-124

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

Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1243395 Sample # 62605762-70

COC # 259436

Please print. Instructions on reverse side correspond with circled numbers. 2-5°c

(1)
Client: SUN- AQUATERRA Acct. #:
Project Name/#: PHILA REF AOI-10 PWSID #:
Project Manager: T. DOERR P.O.#:
Sampler: S. SYKES Quote #:
Name of state where samples were collected: PA

For Lab Use Only
FSC:
SCR#:

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

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

(2) Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix: Soil	Water (Potable / NPDES)	Other	(4) Total # of Containers	(5) Analyses Requested / Preservation Codes ★	Remarks
BH-10-42_0-2'	4/19/11	1000	X		X			4	X	★ See attatched form for list of analyses
BH-10-49_0-2'		1030	X		X			4	X	
BH-10-47_0-2'		1100	X		X			4	X	
BH-10-50_0-2'		1130	X		X			4	X	
W-29_0-2'		1145	X		X			4	X	
W-28_0-2'		1400	X		X			4	X	
W-34_0-2'	4/20/11	830	X		X			4	X	
BH-10-76_0-2'		1030	X		X			4	X	
W-33_0-2'		1115	X		X			4	X	

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

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

Relinquished by:	Date	Time	Received by:	Date	Time
[signature] /AQT	4/20/11	1800	Sample Fridge	4/20/11	1800
[signature]	4/20/11	0947	[signature]	4/20/11	0947
[signature]	4/21/11	1600			
			[signature]	4-21-11	1600

(9)

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

Issued by Dept. 6042 Management
2102.05

10132|1243395|6265762-70
2.5°C

☆ Soil

Table 1b
Constituents of Concern for Soil
AOI 10 Work Plan for Site Characterization
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

METALS	CAS No.
Lead (total)	7439-92-1

VOLATILE ORGANIC COMPOUNDS	CAS No.
1,2-Dichloroethane	107-06-2
1,2,4-Trimethylbenzene	95-63-6
1,3,5-Trimethylbenzene	108-67-8
Benzene	71-43-2
Cumene	98-82-8
Ethylbenzene	100-41-4
Ethylene dibromide	106-93-4
Methyl tertiary butyl ether	1634-04-4
Toluene	108-88-3
Xylenes (total)	1330-20-7

SEMI-VOLATILE ORGANIC COMPOUNDS	CAS No.
Anthracene	120-12-7
Benzo(a)anthracene	56-55-3
Benzo (g,h,i) perylene	191-24-2
Benzo(a)pyrene	50-32-8
Benzo(b)fluoranthene	205-99-2
Chrysene	218-01-9
Fluorene	86-73-7
Naphthalene	91-20-3
Phenanthrene	85-01-8
Pyrene	129-00-0

Notes:
1. Constituents are from Pennsylvania Corrective Action Process (CAP) Regulation Amendments effective December 1, 2001; provided in Chapter VI, Section E (pgs. 29-30) of PADEP Document, *Closure Requirements for Underground Storage Tank Systems*, effective April 1, 1998 and the March 18, 2008 revised PADEP Petroleum Short List.
2. Select soil samples to be collected within the CAMU and delineation soil samples will be analyzed for full TCL VOCs, TCL SVOCs, and TAL metals.

Explanation of Symbols and Abbreviations

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

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
ug	microgram(s)	**mg**	milligram(s)
ml	milliliter(s)	**l**	liter(s)
m3	cubic meter(s)	**ul**	microliter(s)

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

> greater than

J estimated value – The result is ≥ the Method Detection Limit (MDL) and < the Limit of Quantitation (LOQ).

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

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

U.S. EPA CLP Data Qualifiers:

Organic Qualifiers

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

Inorganic Qualifiers

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

Analytical test results meet all requirements of NELAC unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

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

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

Lancaster Laboratories

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

Analysis Report

ANALYTICAL RESULTS

Prepared by:

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

Prepared for:

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

April 27, 2011

Project: SUN: Philadelphia Refinery AOI-10

Submittal Date: 04/19/2011
Group Number: 1242849
PO Number: PHILADELPHIA
State of Sample Origin: PA

Client Sample Description	Lancaster Labs (LLI) #
W-31@0'-2' Grab Soil	6262297
W-30@0'-2' Grab Soil	6262298

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

ELECTRONIC COPY TO	Langan	Attn: Dennis Webster
ELECTRONIC COPY TO	SUN: Aquaterra Tech.	Attn: Tiffani Doerr
ELECTRONIC COPY TO	LLI	Attn: EDD Group
ELECTRONIC COPY TO	Langan	Attn: Kristen Ward
ELECTRONIC COPY TO	Aquaterra Tech	Attn: Loretta Belfiglio

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

Questions? Contact your Client Services Representative
Jessica A Oknefski at (717) 656-2300 Ext. 1815

Respectfully Submitted,

Robin C. Runkle
Senior Specialist

Lancaster Laboratories

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

Analysis Report

Sample Description: W-31@0'-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259437 W-31@0'-2'

LLI Sample # SW 6262297
LLI Group # 1242849
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/15/2011 08:30 by TD

Submitted: 04/19/2011 14:50
Reported: 04/27/2011 17:23

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

31-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	89	J	37	370	63.87
10950	1,2-Dibromoethane	106-93-4	N.D.		75	370	63.87
10950	1,2-Dichloroethane	107-06-2	N.D.		75	370	63.87
10950	Ethylbenzene	100-41-4	76	J	75	370	63.87
10950	Isopropylbenzene	98-82-8	400		75	370	63.87
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		37	370	63.87
10950	Toluene	108-88-3	94	J	75	370	63.87
10950	1,2,4-Trimethylbenzene	95-63-6	92	J	75	370	63.87
10950	1,3,5-Trimethylbenzene	108-67-8	86	J	75	370	63.87
10950	Xylene (Total)	1330-20-7	140	J	75	370	63.87
	Reporting limits were raised due to interference from the sample matrix.						
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	490	J	390	1,900	10
10724	Benzo(a)anthracene	56-55-3	780	J	390	1,900	10
10724	Benzo(a)pyrene	50-32-8	590	J	390	1,900	10
10724	Benzo(b)fluoranthene	205-99-2	540	J	390	1,900	10
10724	Benzo(g,h,i)perylene	191-24-2	N.D.		390	1,900	10
10724	Chrysene	218-01-9	2,600		390	1,900	10
10724	Fluorene	86-73-7	N.D.		390	1,900	10
10724	Naphthalene	91-20-3	N.D.		390	1,900	10
10724	Phenanthrene	85-01-8	510	J	390	1,900	10
10724	Pyrene	129-00-0	2,200		390	1,900	10
	Reporting limits were raised due to interference from the sample matrix.						
Metals	**SW-846 6020**		**mg/kg**		**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	955		0.152	2.93	25
Wet Chemistry	**SM20 2540 G**		**%**		**%**	**%**	
00111	Moisture	n.a.	14.6		0.50	0.50	1
	"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.						

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	R111161AA	04/26/2011 07:39	Stephanie A Selis	63.87

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-31@0'-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259437 W-31@0'-2'

LLI Sample # SW 6262297
LLI Group # 1242849
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/15/2011 08:30 by TD

Submitted: 04/19/2011 14:50
Reported: 04/27/2011 17:23

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

31-02

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/15/2011 08:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/15/2011 08:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/15/2011 08:30	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11110SLF026	04/21/2011 19:19	Linda M Hartenstine	10
10814	BNA Soil Microwave PAH	SW-846 3546	1	11110SLF026	04/21/2011 09:30	Kerrie A Freeburn	1
06135	Lead	SW-846 6020	1	111111026002A	04/25/2011 07:47	Choon Y Tian	25
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111111026002	04/21/2011 13:00	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820001B	04/22/2011 18:08	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-30@0'-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259437 W-30@0'-2'

LLI Sample # SW 6262298
LLI Group # 1242849
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/15/2011 11:30 by TD

Submitted: 04/19/2011 14:50
Reported: 04/27/2011 17:23

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

30-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	12	J	1	13	1.45
10950	1,2-Dibromoethane	106-93-4	N.D.		3	13	1.45
10950	1,2-Dichloroethane	107-06-2	N.D.		3	13	1.45
10950	Ethylbenzene	100-41-4	N.D.		3	13	1.45
10950	Isopropylbenzene	98-82-8	N.D.		3	13	1.45
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		1	13	1.45
10950	Toluene	108-88-3	4	J	3	13	1.45
10950	1,2,4-Trimethylbenzene	95-63-6	4	J	3	13	1.45
10950	1,3,5-Trimethylbenzene	108-67-8	3	J	3	13	1.45
10950	Xylene (Total)	1330-20-7	N.D.		3	13	1.45
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	N.D.		57	290	1
10724	Benzo(a)anthracene	56-55-3	70	J	57	290	1
10724	Benzo(a)pyrene	50-32-8	N.D.		57	290	1
10724	Benzo(b)fluoranthene	205-99-2	N.D.		57	290	1
10724	Benzo(g,h,i)perylene	191-24-2	N.D.		57	290	1
10724	Chrysene	218-01-9	400		57	290	1
10724	Fluorene	86-73-7	N.D.		57	290	1
10724	Naphthalene	91-20-3	110	J	57	290	1
10724	Phenanthrene	85-01-8	350		57	290	1
10724	Pyrene	129-00-0	280	J	57	290	1
Metals	**SW-846 6020**		**mg/kg**		**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	1,990		0.431	8.29	50
Wet Chemistry	**SM20 2540 G**		**%**		**%**	**%**	
00111	Moisture	n.a.	42.0		0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	X111161AA	04/26/2011 09:25	Holly Berry	1.45
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/15/2011 11:30	Client Supplied	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: W-30@0'-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259437 W-30@0'-2'

LLI Sample # SW 6262298
LLI Group # 1242849
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/15/2011 11:30 by TD

Submitted: 04/19/2011 14:50
Reported: 04/27/2011 17:23

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

30-02

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/15/2011 11:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/15/2011 11:30	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11110SLF026	04/22/2011 00:07	Linda M Hartenstine	1
10814	BNA Soil Microwave PAH	SW-846 3546	1	11110SLF026	04/21/2011 09:30	Kerrie A Freeburn	1
06135	Lead	SW-846 6020	1	111111026002A	04/25/2011 08:06	Choon Y Tian	50
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111111026002	04/21/2011 13:00	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820001B	04/22/2011 18:08	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1242849
Reported: 04/27/11 at 05:23 PM

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

Laboratory Compliance Quality Control

Analysis Name	Blank Result	Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: R111161AA	Sample number(s): 6262297								
Benzene	N.D.	25.	250	ug/kg	101	105	80-120	5	30
1,2-Dibromoethane	N.D.	50.	250	ug/kg	100	105	80-120	5	30
1,2-Dichloroethane	N.D.	50.	250	ug/kg	99	103	71-129	3	30
Ethylbenzene	N.D.	50.	250	ug/kg	91	95	80-120	4	30
Isopropylbenzene	N.D.	50.	250	ug/kg	89	92	76-120	4	30
Methyl Tertiary Butyl Ether	N.D.	25.	250	ug/kg	101	105	74-121	4	30
Toluene	N.D.	50.	250	ug/kg	95	98	80-120	4	30
1,2,4-Trimethylbenzene	N.D.	50.	250	ug/kg	88	91	79-120	3	30
1,3,5-Trimethylbenzene	N.D.	50.	250	ug/kg	88	92	78-120	4	30
Xylene (Total)	N.D.	50.	250	ug/kg	94	98	80-120	4	30
Batch number: X111161AA	Sample number(s): 6262298								
Benzene	N.D.	0.5	5	ug/kg	100	100	80-120	0	30
1,2-Dibromoethane	N.D.	1.	5	ug/kg	99	94	80-120	5	30
1,2-Dichloroethane	N.D.	1.	5	ug/kg	99	97	71-129	3	30
Ethylbenzene	N.D.	1.	5	ug/kg	99	100	80-120	2	30
Isopropylbenzene	N.D.	1.	5	ug/kg	101	103	76-120	2	30
Methyl Tertiary Butyl Ether	N.D.	0.5	5	ug/kg	92	86	74-121	6	30
Toluene	N.D.	1.	5	ug/kg	99	99	80-120	0	30
1,2,4-Trimethylbenzene	N.D.	1.	5	ug/kg	95	97	79-120	2	30
1,3,5-Trimethylbenzene	N.D.	1.	5	ug/kg	98	100	78-120	2	30
Xylene (Total)	N.D.	1.	5	ug/kg	101	102	80-120	1	30
Batch number: 11110SLF026	Sample number(s): 6262297-6262298								
Anthracene	N.D.	33.	170	ug/kg	94		83-111		
Benzo(a)anthracene	N.D.	33.	170	ug/kg	93		82-111		
Benzo(a)pyrene	N.D.	33.	170	ug/kg	77		63-138		
Benzo(b)fluoranthene	N.D.	33.	170	ug/kg	81		61-133		
Benzo(g,h,i)perylene	N.D.	33.	170	ug/kg	87		63-130		
Chrysene	N.D.	33.	170	ug/kg	97		81-111		
Fluorene	N.D.	33.	170	ug/kg	99		81-117		
Naphthalene	N.D.	33.	170	ug/kg	92		83-112		
Phenanthrene	N.D.	33.	170	ug/kg	93		83-109		
Pyrene	N.D.	33.	170	ug/kg	101		80-121		
Batch number: 111111026002A	Sample number(s): 6262297-6262298								
Lead	N.D.	0.0102	0.196	mg/kg	98		83-110		
Batch number: 11112820001B	Sample number(s): 6262297-6262298								
Moisture					100		99-101		

Sample Matrix Quality Control

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

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1242849
Reported: 04/27/11 at 05:23 PM
Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: 11110SLF026	Sample number(s): 6262297-6262298 UNSPK: 6262297								
Anthracene	70	36*	40-147	44*	30				
Benzo(a)anthracene	80	36	32-150	45*	30				
Benzo(a)pyrene	47*	35*	57-129	17	30				
Benzo(b)fluoranthene	73	35*	53-131	47*	30				
Benzo(g,h,i)perylene	80	58*	60-123	33*	30				
Chrysene	106	29*	76-114	39*	30				
Fluorene	86	61	46-137	35*	30				
Naphthalene	95	73	52-132	27	30				
Phenanthrene	70	45	34-147	30	30				
Pyrene	58*	22*	76-124	23	30				
Batch number: 111111026002A	Sample number(s): 6262297-6262298 UNSPK: 6262297 BKG: 6262297								
Lead	-5739 (2)	-6952 (2)	75-125	5	20	816	601	30*	20
Batch number: 11112820001B	Sample number(s): 6262297-6262298 BKG: P262286								
Moisture						41.8	42.2	1	15

Surrogate Quality Control

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

Analysis Name: TCL(4.3)by 8260(soil)
Batch number: R111161AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6262297	87	91	86	85
Blank	86	91	80	78
LCS	96	102	90	89
LCSD	99	104	92	90
Limits:	71-114	70-109	70-123	70-111

Analysis Name: TCL(4.3)by 8260(soil)
Batch number: X111161AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6262298	105	105	103	87
Blank	104	100	91	92
LCS	103	106	100	98
LCSD	101	103	102	98
Limits:	71-114	70-109	70-123	70-111

Analysis Name: PAH 8270 (microwave)
Batch number: 11110SLF026

	Nitrobenzene-d5	2-Fluorobiphenyl	Terphenyl-d14
6262297	99	84	78

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

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1242849
Reported: 04/27/11 at 05:23 PM

Surrogate Quality Control

6262298	87	98	81
Blank	97	97	102
LCS	91	100	99
MS	99	87	79
MSD	76	52*	48
Limits:	55-121	56-121	43-124

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

Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1242849 Sample # 6262297-98 **COC #** 259437

Please print. Instructions on reverse side correspond with circled numbers. 0.8-2.1°C

(1) Client: Aquatera Acct. #:

Project Name#: Sun Philly Rd AOI-10 PWSID #:

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

Sampler: T. DOERR Quote #:

Name of state where samples were collected: PA

For Lab Use Only
FSC:
SCR#:

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

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

(2) Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix: Soil	Water (Potable / NPDES)	Other	(4) Total # of Containers	(5) Analyses Requested / Preservation Codes: 8260B: BTEX, MTBE, EDB, EDC, Cumene, TMB's	Total Lead (Ultra)	8270C: Anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, naphthalene, phenanthrene, pyrene	Remarks
W-31 @ 0'-2'	4-15-11	0830	X		X			4	X	X	X	
W-30 @ 0'-2'	4-15-11	1130	X		X			4	X	X	X	

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

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

(9)

Relinquished by:	Date	Time	Received by:	Date	Time
	4/15/11	1500	Aquatera Ridge	4/15/11	1500
	4/19/11	0925	D Ryerson	4/19/11	0925
D Ryerson	4/19/11	1458			

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

Issued by Dept. 6042 Management
2102.05

Explanation of Symbols and Abbreviations

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

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
ug	microgram(s)	**mg**	milligram(s)
ml	milliliter(s)	**l**	liter(s)
m3	cubic meter(s)	**ul**	microliter(s)

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

> greater than

J estimated value – The result is ≥ the Method Detection Limit (MDL) and < the Limit of Quantitation (LOQ).

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

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

U.S. EPA CLP Data Qualifiers:

Organic Qualifiers

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

Inorganic Qualifiers

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

Analytical test results meet all requirements of NELAC unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

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

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

Lancaster Laboratories

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

Analysis Report

ANALYTICAL RESULTS

Prepared by:

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

Prepared for:

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

May 05, 2011

Project: SUN: Philadelphia Refinery AOI-10

Submittal Date: 04/19/2011
Group Number: 1242848
PO Number: PHILADELPHIA
State of Sample Origin: PA

Client Sample Description	Lancaster Labs (LLI) #
BH-10-69-WC_0-2' Grab Soil	6262260
BH-10-69-WC_5-8' Grab Soil	6262261
BH-10-69-WC_15.5-16' Grab Soil	6262262
BH-10-46-WC_0-2' Grab Soil	6262263
BH-10-46-WC_5-8' Grab Soil	6262264
BH-10-46-WC_17-18' Grab Soil	6262265
BH-10-44-WC_0-2' Grab Soil	6262266
BH-10-44-WC_10-12' Grab Soil	6262267
BH-10-44-WC_24-26' Grab Soil	6262268
BH-10-45-WC_0-2' Grab Soil	6262269
BH-10-45-WC_5-8' Grab Soil	6262270
BH-10-45-WC_18-20' Grab Soil	6262271
BH-10-55-WC_0-2' Grab Soil	6262272
BH-10-55-WC_5-8' Grab Soil	6262273
BH-10-55-WC_20-22' Grab Soil	6262274
BH-10-56-WC_0-2' Grab Soil	6262275
BH-10-56-WC_10-12' Grab Soil	6262276
BH-10-56-WC_22-24' Grab Soil	6262277
BH-10-77-WC_0-2' Grab Soil	6262278
BH-10-77-WC_10-12' Grab Soil	6262279
BH-10-77-WC_20-22' Grab Soil	6262280
BH-10-63-WC_0-2' Grab Soil	6262281
BH-10-63-WC_12-14' Grab Soil	6262282
BH-10-63-WC_21-23' Grab Soil	6262283
BH-10-64-WC_0-2' Grab Soil	6262284
BH-10-64-WC_11-13' Grab Soil	6262285
BH-10-64-WC_24-26' Grab Soil	6262286
BH-10-77-WC_6.5-7' Grab Soil	6262287
BH-10-43_0-2' Grab Soil	6262288

Lancaster Laboratories

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

Analysis Report

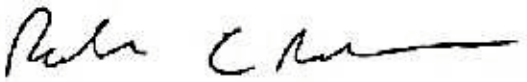
BH-10-48_0-2' Grab Soil	6262289
BH-10-51_0-2' Grab Soil	6262290
BH-10-52_0-2' Grab Soil	6262291
BH-10-68_0-2' Grab Soil	6262292
BH-10-65_0-2' Grab Soil	6262293
BH-10-58_0-2' Grab Soil	6262294
BH-10-65_6-8' Grab Soil	6262295
BH-10-65_14-16' Grab Soil	6262296

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

ELECTRONIC COPY TO	Langan	Attn: Dennis Webster
ELECTRONIC COPY TO	SUN: Aquaterra Tech.	Attn: Tiffani Doerr
ELECTRONIC COPY TO	LLI	Attn: EDD Group
ELECTRONIC COPY TO	Langan	Attn: Kristen Ward
ELECTRONIC COPY TO	Aquaterra Tech	Attn: Loretta Belfiglio

Questions? Contact your Client Services Representative
Jessica A Oknefski at (717) 656-2300 Ext. 1815

Respectfully Submitted,



Robin C. Runkle
Senior Specialist

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-69-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-69-WC_0-2'

LLI Sample # SW 6262260
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 08:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

69-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	81		8	24	1.02
10950	Benzene	71-43-2	4	J	0.6	6	1.02
10950	Bromodichloromethane	75-27-4	N.D.		1	6	1.02
10950	Bromoform	75-25-2	N.D.		1	6	1.02
10950	Bromomethane	74-83-9	N.D.		2	6	1.02
10950	2-Butanone	78-93-3	N.D.		5	12	1.02
10950	Carbon Disulfide	75-15-0	N.D.		1	6	1.02
10950	Carbon Tetrachloride	56-23-5	N.D.		1	6	1.02
10950	Chlorobenzene	108-90-7	N.D.		1	6	1.02
10950	Chloroethane	75-00-3	N.D.		2	6	1.02
10950	Chloroform	67-66-3	N.D.		1	6	1.02
10950	Chloromethane	74-87-3	N.D.		2	6	1.02
10950	Cyclohexane	110-82-7	N.D.		1	6	1.02
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		2	6	1.02
10950	Dibromochloromethane	124-48-1	N.D.		1	6	1.02
10950	1,2-Dibromoethane	106-93-4	N.D.		1	6	1.02
10950	1,2-Dichlorobenzene	95-50-1	N.D.		1	6	1.02
10950	1,3-Dichlorobenzene	541-73-1	N.D.		1	6	1.02
10950	1,4-Dichlorobenzene	106-46-7	N.D.		1	6	1.02
10950	Dichlorodifluoromethane	75-71-8	N.D.		2	6	1.02
10950	1,1-Dichloroethane	75-34-3	N.D.		1	6	1.02
10950	1,2-Dichloroethane	107-06-2	N.D.		1	6	1.02
10950	1,1-Dichloroethene	75-35-4	N.D.		1	6	1.02
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		1	6	1.02
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		1	6	1.02
10950	1,2-Dichloropropane	78-87-5	N.D.		1	6	1.02
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		1	6	1.02
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		1	6	1.02
10950	Ethylbenzene	100-41-4	3	J	1	6	1.02
10950	Freon 113	76-13-1	N.D.		2	12	1.02
10950	2-Hexanone	591-78-6	N.D.		4	12	1.02
10950	Isopropylbenzene	98-82-8	N.D.		1	6	1.02
10950	Methyl Acetate	79-20-9	N.D.		2	6	1.02
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.6	6	1.02
10950	4-Methyl-2-pentanone	108-10-1	N.D.		4	12	1.02
10950	Methylcyclohexane	108-87-2	3	J	1	6	1.02
10950	Methylene Chloride	75-09-2	N.D.		2	6	1.02
10950	Styrene	100-42-5	N.D.		1	6	1.02
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		1	6	1.02
10950	Tetrachloroethene	127-18-4	N.D.		1	6	1.02
10950	Toluene	108-88-3	17		1	6	1.02
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		1	6	1.02
10950	1,1,1-Trichloroethane	71-55-6	N.D.		1	6	1.02
10950	1,1,2-Trichloroethane	79-00-5	N.D.		1	6	1.02
10950	Trichloroethene	79-01-6	N.D.		1	6	1.02
10950	Trichlorofluoromethane	75-69-4	N.D.		2	6	1.02
10950	Vinyl Chloride	75-01-4	N.D.		1	6	1.02
10950	Xylene (Total)	1330-20-7	16		1	6	1.02

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

Sample Description: BH-10-69-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-69-WC_0-2'

LLI Sample # SW 6262260
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 08:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

69-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**		**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	N.D.		39	200	1
10727	Acenaphthylene	208-96-8	N.D.		39	200	1
10727	Acetophenone	98-86-2	N.D.		79	200	1
10727	Anthracene	120-12-7	N.D.		39	200	1
10727	Atrazine	1912-24-9	N.D.		39	200	1
10727	Benzaldehyde	100-52-7	N.D.		79	200	1
10727	Benzo(a)anthracene	56-55-3	N.D.		39	200	1
10727	Benzo(a)pyrene	50-32-8	N.D.		39	200	1
10727	Benzo(b)fluoranthene	205-99-2	N.D.		39	200	1
10727	Benzo(g,h,i)perylene	191-24-2	N.D.		39	200	1
10727	Benzo(k)fluoranthene	207-08-9	N.D.		39	200	1
10727	1,1'-Biphenyl	92-52-4	N.D.		39	200	1
10727	4-Bromophenyl-phenylether	101-55-3	N.D.		39	200	1
10727	Butylbenzylphthalate	85-68-7	N.D.		79	200	1
10727	Di-n-butylphthalate	84-74-2	N.D.		79	200	1
10727	Caprolactam	105-60-2	N.D.		39	200	1
10727	Carbazole	86-74-8	N.D.		39	200	1
10727	4-Chloro-3-methylphenol	59-50-7	N.D.		79	200	1
10727	4-Chloroaniline	106-47-8	N.D.		79	200	1
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.		39	200	1
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.		39	200	1
10727	2-Chloronaphthalene	91-58-7	N.D.		39	200	1
10727	2-Chlorophenol	95-57-8	N.D.		39	200	1
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.		39	200	1
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.		39	200	1
10727	Chrysene	218-01-9	N.D.		39	200	1
10727	Dibenz(a,h)anthracene	53-70-3	N.D.		39	200	1
10727	Dibenzofuran	132-64-9	N.D.		39	200	1
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.		120	390	1
10727	2,4-Dichlorophenol	120-83-2	N.D.		39	200	1
10727	Diethylphthalate	84-66-2	N.D.		79	200	1
10727	2,4-Dimethylphenol	105-67-9	N.D.		79	200	1
10727	Dimethylphthalate	131-11-3	N.D.		79	200	1
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.		200	590	1
10727	2,4-Dinitrophenol	51-28-5	N.D.		390	1,200	1
10727	2,4-Dinitrotoluene	121-14-2	N.D.		79	200	1
10727	2,6-Dinitrotoluene	606-20-2	N.D.		39	200	1
10727	bis(2-Ethylhexyl)phthalate	117-81-7	N.D.		79	390	1
10727	Fluoranthene	206-44-0	N.D.		39	200	1
10727	Fluorene	86-73-7	N.D.		39	200	1
10727	Hexachlorobenzene	118-74-1	N.D.		39	200	1
10727	Hexachlorobutadiene	87-68-3	N.D.		79	200	1
10727	Hexachlorocyclopentadiene	77-47-4	N.D.		200	590	1
10727	Hexachloroethane	67-72-1	N.D.		39	200	1
10727	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.		39	200	1
10727	Isophorone	78-59-1	N.D.		39	200	1
10727	2-Methylnaphthalene	91-57-6	85	J	39	200	1
10727	2-Methylphenol	95-48-7	N.D.		79	200	1
10727	4-Methylphenol	106-44-5	N.D.		79	200	1

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

Sample Description: BH-10-69-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-69-WC_0-2'

LLI Sample # SW 6262260
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 08:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

69-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	55	J	39	200	1
10727	2-Nitroaniline	88-74-4	N.D.		39	200	1
10727	3-Nitroaniline	99-09-2	N.D.		79	200	1
10727	4-Nitroaniline	100-01-6	N.D.		79	200	1
10727	Nitrobenzene	98-95-3	N.D.		39	200	1
10727	2-Nitrophenol	88-75-5	N.D.		39	200	1
10727	4-Nitrophenol	100-02-7	N.D.		200	590	1
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		39	200	1
10727	N-Nitrosodiphenylamine	86-30-6	N.D.		39	200	1
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		79	200	1
10727	Pentachlorophenol	87-86-5	N.D.		200	590	1
10727	Phenanthrene	85-01-8	N.D.		39	200	1
10727	Phenol	108-95-2	N.D.		39	200	1
10727	Pyrene	129-00-0	N.D.		39	200	1
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		79	200	1
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		39	200	1
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	17,000		5.70	22.7	1
06944	Antimony	7440-36-0	N.D.		1.13	2.27	1
06935	Arsenic	7440-38-2	7.90		1.08	2.27	1
06946	Barium	7440-39-3	80.8		0.0453	0.566	1
06947	Beryllium	7440-41-7	1.60		0.0770	0.566	1
06949	Cadmium	7440-43-9	N.D.		0.159	0.566	1
01650	Calcium	7440-70-2	37,200		6.94	22.7	1
06951	Chromium	7440-47-3	20.9		0.668	1.70	1
06952	Cobalt	7440-48-4	10.9		0.215	0.566	1
06953	Copper	7440-50-8	25.3		0.249	1.13	1
01654	Iron	7439-89-6	29,300		5.33	22.7	1
06955	Lead	7439-92-1	21.2		0.680	1.70	1
01657	Magnesium	7439-95-4	23,700		2.88	11.3	1
06958	Manganese	7439-96-5	804		0.0883	0.566	1
06961	Nickel	7440-02-0	17.7		0.215	1.13	1
01662	Potassium	7440-09-7	1,200		20.4	56.6	1
06936	Selenium	7782-49-2	1.94	J	1.11	2.27	1
06966	Silver	7440-22-4	N.D.		0.204	0.566	1
01667	Sodium	7440-23-5	70.7	J	42.2	113	1
06925	Thallium	7440-28-0	N.D.		1.64	3.40	1
06971	Vanadium	7440-62-2	33.1		0.215	0.566	1
06972	Zinc	7440-66-6	72.0		0.747	2.27	1
	SW-846 7471A		**mg/kg**		**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.0447	J	0.0032	0.111	1

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

Sample Description: BH-10-69-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-69-WC_0-2'

LLI Sample # SW 6262260
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 08:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

69-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM20 2540 G**		%	%	%	
00111	Moisture	n.a.	15.1	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	X111131AA	04/23/2011 03:16	Stephanie A Selis	1.02
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/12/2011 08:15	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/12/2011 08:15	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/12/2011 08:15	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLA026	04/21/2011 13:34	Brian K Graham	1
10809	BNA Soil Microwave	SW-846 3546	1	11110SLA026	04/20/2011 15:40	Kelli M Barto	1
01643	Aluminum	SW-846 6010B	1	111115708001	04/24/2011 10:12	Damary Valentin	1
06944	Antimony	SW-846 6010B	1	111115708001	04/24/2011 10:12	Damary Valentin	1
06935	Arsenic	SW-846 6010B	1	111115708001	04/24/2011 10:12	Damary Valentin	1
06946	Barium	SW-846 6010B	1	111115708001	04/24/2011 10:12	Damary Valentin	1
06947	Beryllium	SW-846 6010B	1	111115708001	04/24/2011 10:12	Damary Valentin	1
06949	Cadmium	SW-846 6010B	1	111115708001	04/27/2011 00:51	John W Yanzuk II	1
01650	Calcium	SW-846 6010B	1	111115708001	04/24/2011 10:12	Damary Valentin	1
06951	Chromium	SW-846 6010B	1	111115708001	04/24/2011 10:12	Damary Valentin	1
06952	Cobalt	SW-846 6010B	1	111115708001	04/24/2011 10:12	Damary Valentin	1
06953	Copper	SW-846 6010B	1	111115708001	04/27/2011 00:51	John W Yanzuk II	1
01654	Iron	SW-846 6010B	1	111115708001	04/24/2011 10:12	Damary Valentin	1
06955	Lead	SW-846 6010B	1	111115708001	04/27/2011 22:26	John W Yanzuk II	1
01657	Magnesium	SW-846 6010B	1	111115708001	04/24/2011 10:12	Damary Valentin	1
06958	Manganese	SW-846 6010B	1	111115708001	04/24/2011 10:12	Damary Valentin	1
06961	Nickel	SW-846 6010B	1	111115708001	04/24/2011 10:12	Damary Valentin	1
01662	Potassium	SW-846 6010B	1	111115708001	04/24/2011 10:12	Damary Valentin	1
06936	Selenium	SW-846 6010B	1	111115708001	04/24/2011 10:12	Damary Valentin	1
06966	Silver	SW-846 6010B	1	111115708001	04/24/2011 10:12	Damary Valentin	1
01667	Sodium	SW-846 6010B	1	111115708001	04/24/2011 10:12	Damary Valentin	1
06925	Thallium	SW-846 6010B	1	111115708001	04/24/2011 10:12	Damary Valentin	1
06971	Vanadium	SW-846 6010B	1	111115708001	04/24/2011 10:12	Damary Valentin	1
06972	Zinc	SW-846 6010B	1	111115708001	04/24/2011 10:12	Damary Valentin	1
00159	Mercury	SW-846 7471A	1	111115711001	04/22/2011 06:33	Damary Valentin	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-69-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-69-WC_0-2'

LLI Sample # SW 6262260
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 08:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

69-02

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
05708	SW SW846 ICP Digest	SW-846 3050B	1	111115708001	04/21/2011 12:14	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111115711001	04/21/2011 13:53	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820002A	04/22/2011 18:41	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-69-WC_5-8' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-69-WC_5-8'

LLI Sample # SW 6262261
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 08:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

69-58

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	N.D.		4,700	14,000	547.02
10950	Benzene	71-43-2	900	J	340	3,400	547.02
10950	Bromodichloromethane	75-27-4	N.D.		680	3,400	547.02
10950	Bromoform	75-25-2	N.D.		680	3,400	547.02
10950	Bromomethane	74-83-9	N.D.		1,400	3,400	547.02
10950	2-Butanone	78-93-3	N.D.		2,700	6,800	547.02
10950	Carbon Disulfide	75-15-0	N.D.		680	3,400	547.02
10950	Carbon Tetrachloride	56-23-5	N.D.		680	3,400	547.02
10950	Chlorobenzene	108-90-7	N.D.		680	3,400	547.02
10950	Chloroethane	75-00-3	N.D.		1,400	3,400	547.02
10950	Chloroform	67-66-3	N.D.		680	3,400	547.02
10950	Chloromethane	74-87-3	N.D.		1,400	3,400	547.02
10950	Cyclohexane	110-82-7	1,700	J	680	3,400	547.02
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		1,400	3,400	547.02
10950	Dibromochloromethane	124-48-1	N.D.		680	3,400	547.02
10950	1,2-Dibromoethane	106-93-4	N.D.		680	3,400	547.02
10950	1,2-Dichlorobenzene	95-50-1	N.D.		680	3,400	547.02
10950	1,3-Dichlorobenzene	541-73-1	N.D.		680	3,400	547.02
10950	1,4-Dichlorobenzene	106-46-7	N.D.		680	3,400	547.02
10950	Dichlorodifluoromethane	75-71-8	N.D.		1,400	3,400	547.02
10950	1,1-Dichloroethane	75-34-3	N.D.		680	3,400	547.02
10950	1,2-Dichloroethane	107-06-2	N.D.		680	3,400	547.02
10950	1,1-Dichloroethene	75-35-4	N.D.		680	3,400	547.02
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		680	3,400	547.02
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		680	3,400	547.02
10950	1,2-Dichloropropane	78-87-5	N.D.		680	3,400	547.02
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		680	3,400	547.02
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		680	3,400	547.02
10950	Ethylbenzene	100-41-4	1,300	J	680	3,400	547.02
10950	Freon 113	76-13-1	N.D.		1,400	6,800	547.02
10950	2-Hexanone	591-78-6	N.D.		2,000	6,800	547.02
10950	Isopropylbenzene	98-82-8	N.D.		680	3,400	547.02
10950	Methyl Acetate	79-20-9	N.D.		1,400	3,400	547.02
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		340	3,400	547.02
10950	4-Methyl-2-pentanone	108-10-1	N.D.		2,000	6,800	547.02
10950	Methylcyclohexane	108-87-2	3,100	J	680	3,400	547.02
10950	Methylene Chloride	75-09-2	N.D.		1,400	3,400	547.02
10950	Styrene	100-42-5	N.D.		680	3,400	547.02
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		680	3,400	547.02
10950	Tetrachloroethene	127-18-4	N.D.		680	3,400	547.02
10950	Toluene	108-88-3	1,100	J	680	3,400	547.02
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		680	3,400	547.02
10950	1,1,1-Trichloroethane	71-55-6	N.D.		680	3,400	547.02
10950	1,1,2-Trichloroethane	79-00-5	N.D.		680	3,400	547.02
10950	Trichloroethene	79-01-6	N.D.		680	3,400	547.02
10950	Trichlorofluoromethane	75-69-4	N.D.		1,400	3,400	547.02
10950	Vinyl Chloride	75-01-4	N.D.		680	3,400	547.02
10950	Xylene (Total)	1330-20-7	4,900		680	3,400	547.02

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

Sample Description: BH-10-69-WC_5-8' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-69-WC_5-8'

LLI Sample # SW 6262261
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 08:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

69-58

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**	**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	N.D.	2,000	10,000	10
10727	Acenaphthylene	208-96-8	N.D.	2,000	10,000	10
10727	Acetophenone	98-86-2	N.D.	4,100	10,000	10
10727	Anthracene	120-12-7	N.D.	2,000	10,000	10
10727	Atrazine	1912-24-9	N.D.	2,000	10,000	10
10727	Benzaldehyde	100-52-7	N.D.	4,100	10,000	10
10727	Benzo(a)anthracene	56-55-3	N.D.	2,000	10,000	10
10727	Benzo(a)pyrene	50-32-8	N.D.	2,000	10,000	10
10727	Benzo(b)fluoranthene	205-99-2	N.D.	2,000	10,000	10
10727	Benzo(g,h,i)perylene	191-24-2	N.D.	2,000	10,000	10
10727	Benzo(k)fluoranthene	207-08-9	N.D.	2,000	10,000	10
10727	1,1'-Biphenyl	92-52-4	N.D.	2,000	10,000	10
10727	4-Bromophenyl-phenylether	101-55-3	N.D.	2,000	10,000	10
10727	Butylbenzylphthalate	85-68-7	N.D.	4,100	10,000	10
10727	Di-n-butylphthalate	84-74-2	N.D.	4,100	10,000	10
10727	Caprolactam	105-60-2	N.D.	2,000	10,000	10
10727	Carbazole	86-74-8	N.D.	2,000	10,000	10
10727	4-Chloro-3-methylphenol	59-50-7	N.D.	4,100	10,000	10
10727	4-Chloroaniline	106-47-8	N.D.	4,100	10,000	10
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.	2,000	10,000	10
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.	2,000	10,000	10
10727	2-Chloronaphthalene	91-58-7	N.D.	2,000	10,000	10
10727	2-Chlorophenol	95-57-8	N.D.	2,000	10,000	10
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.	2,000	10,000	10
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.	2,000	10,000	10
10727	Chrysene	218-01-9	10,000	2,000	10,000	10
10727	Dibenz(a,h)anthracene	53-70-3	N.D.	2,000	10,000	10
10727	Dibenzofuran	132-64-9	N.D.	2,000	10,000	10
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.	6,100	20,000	10
10727	2,4-Dichlorophenol	120-83-2	N.D.	2,000	10,000	10
10727	Diethylphthalate	84-66-2	N.D.	4,100	10,000	10
10727	2,4-Dimethylphenol	105-67-9	N.D.	4,100	10,000	10
10727	Dimethylphthalate	131-11-3	N.D.	4,100	10,000	10
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.	10,000	31,000	10
10727	2,4-Dinitrophenol	51-28-5	N.D.	20,000	61,000	10
10727	2,4-Dinitrotoluene	121-14-2	N.D.	4,100	10,000	10
10727	2,6-Dinitrotoluene	606-20-2	N.D.	2,000	10,000	10
10727	bis(2-Ethylhexyl)phthalate	117-81-7	N.D.	4,100	20,000	10
10727	Fluoranthene	206-44-0	N.D.	2,000	10,000	10
10727	Fluorene	86-73-7	N.D.	2,000	10,000	10
10727	Hexachlorobenzene	118-74-1	N.D.	2,000	10,000	10
10727	Hexachlorobutadiene	87-68-3	N.D.	4,100	10,000	10
10727	Hexachlorocyclopentadiene	77-47-4	N.D.	10,000	31,000	10
10727	Hexachloroethane	67-72-1	N.D.	2,000	10,000	10
10727	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.	2,000	10,000	10
10727	Isophorone	78-59-1	N.D.	2,000	10,000	10
10727	2-Methylnaphthalene	91-57-6	21,000	2,000	10,000	10
10727	2-Methylphenol	95-48-7	N.D.	4,100	10,000	10
10727	4-Methylphenol	106-44-5	N.D.	4,100	10,000	10

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

Sample Description: BH-10-69-WC_5-8' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-69-WC_5-8'

LLI Sample # SW 6262261
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 08:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

69-58

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	7,300	J	2,000	10,000	10
10727	2-Nitroaniline	88-74-4	N.D.		2,000	10,000	10
10727	3-Nitroaniline	99-09-2	N.D.		4,100	10,000	10
10727	4-Nitroaniline	100-01-6	N.D.		4,100	10,000	10
10727	Nitrobenzene	98-95-3	N.D.		2,000	10,000	10
10727	2-Nitrophenol	88-75-5	N.D.		2,000	10,000	10
10727	4-Nitrophenol	100-02-7	N.D.		10,000	31,000	10
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		2,000	10,000	10
10727	N-Nitrosodiphenylamine	86-30-6	N.D.		2,000	10,000	10
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		4,100	10,000	10
10727	Pentachlorophenol	87-86-5	N.D.		10,000	31,000	10
10727	Phenanthrene	85-01-8	7,100	J	2,000	10,000	10
10727	Phenol	108-95-2	N.D.		2,000	10,000	10
10727	Pyrene	129-00-0	4,900	J	2,000	10,000	10
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		4,100	10,000	10
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		2,000	10,000	10
	Reporting limits were raised due to interference from the sample matrix.						
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	9,620		6.10	24.3	1
06944	Antimony	7440-36-0	N.D.		1.21	2.43	1
06935	Arsenic	7440-38-2	7.18		1.15	2.43	1
06946	Barium	7440-39-3	157		0.0485	0.607	1
06947	Beryllium	7440-41-7	0.158	J	0.0825	0.607	1
06949	Cadmium	7440-43-9	N.D.		0.170	0.607	1
01650	Calcium	7440-70-2	14,000		7.44	24.3	1
06951	Chromium	7440-47-3	32.5		0.716	1.82	1
06952	Cobalt	7440-48-4	1.28		0.231	0.607	1
06953	Copper	7440-50-8	192		0.267	1.21	1
01654	Iron	7439-89-6	6,060		5.71	24.3	1
06955	Lead	7439-92-1	98.2		0.728	1.82	1
01657	Magnesium	7439-95-4	2,510		3.08	12.1	1
06958	Manganese	7439-96-5	32.1		0.0946	0.607	1
06961	Nickel	7440-02-0	11.4		0.231	1.21	1
01662	Potassium	7440-09-7	448		21.8	60.7	1
06936	Selenium	7782-49-2	N.D.		1.19	2.43	1
06966	Silver	7440-22-4	N.D.		0.218	0.607	1
01667	Sodium	7440-23-5	61.7	J	45.3	121	1
06925	Thallium	7440-28-0	N.D.		1.76	3.64	1
06971	Vanadium	7440-62-2	36.6		0.231	0.607	1
06972	Zinc	7440-66-6	29.4		0.801	2.43	1
	SW-846 7471A		**mg/kg**		**mg/kg**	**mg/kg**	

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-69-WC_5-8' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-69-WC_5-8'

LLI Sample # SW 6262261
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 08:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

69-58

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**		**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.101	J	0.0033	0.115	1
Wet Chemistry	**SM20 2540 G**		**%**		**%**	**%**	
00111	Moisture	n.a.	19.2		0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	Q111121AA	04/22/2011 07:59	Stephanie A Selis	547.02
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/12/2011 08:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/12/2011 08:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/12/2011 08:30	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLA026	04/21/2011 17:19	Brian K Graham	10
10809	BNA Soil Microwave	SW-846 3546	1	11110SLA026	04/20/2011 15:40	Kelli M Barto	1
01643	Aluminum	SW-846 6010B	1	111115708001	04/24/2011 11:15	Damary Valentin	1
06944	Antimony	SW-846 6010B	1	111115708001	04/24/2011 11:15	Damary Valentin	1
06935	Arsenic	SW-846 6010B	1	111115708001	04/24/2011 11:15	Damary Valentin	1
06946	Barium	SW-846 6010B	1	111115708001	04/24/2011 11:15	Damary Valentin	1
06947	Beryllium	SW-846 6010B	1	111115708001	04/24/2011 11:15	Damary Valentin	1
06949	Cadmium	SW-846 6010B	1	111115708001	04/27/2011 02:07	John W Yanzuk II	1
01650	Calcium	SW-846 6010B	1	111115708001	04/24/2011 11:15	Damary Valentin	1
06951	Chromium	SW-846 6010B	1	111115708001	04/24/2011 11:15	Damary Valentin	1
06952	Cobalt	SW-846 6010B	1	111115708001	04/24/2011 11:15	Damary Valentin	1
06953	Copper	SW-846 6010B	1	111115708001	04/27/2011 02:07	John W Yanzuk II	1
01654	Iron	SW-846 6010B	1	111115708001	04/24/2011 11:15	Damary Valentin	1
06955	Lead	SW-846 6010B	1	111115708001	04/27/2011 23:34	John W Yanzuk II	1
01657	Magnesium	SW-846 6010B	1	111115708001	04/24/2011 11:15	Damary Valentin	1
06958	Manganese	SW-846 6010B	1	111115708001	04/24/2011 11:15	Damary Valentin	1
06961	Nickel	SW-846 6010B	1	111115708001	04/24/2011 11:15	Damary Valentin	1
01662	Potassium	SW-846 6010B	1	111115708001	04/24/2011 11:15	Damary Valentin	1
06936	Selenium	SW-846 6010B	1	111115708001	04/24/2011 11:15	Damary Valentin	1
06966	Silver	SW-846 6010B	1	111115708001	04/24/2011 11:15	Damary Valentin	1
01667	Sodium	SW-846 6010B	1	111115708001	04/24/2011 11:15	Damary Valentin	1
06925	Thallium	SW-846 6010B	1	111115708001	04/24/2011 11:15	Damary Valentin	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-69-WC_5-8' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-69-WC_5-8'

LLI Sample # SW 6262261
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 08:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

69-58

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06971	Vanadium	SW-846 6010B	1	111115708001	04/24/2011 11:15	Damary Valentin	1
06972	Zinc	SW-846 6010B	1	111115708001	04/24/2011 11:15	Damary Valentin	1
00159	Mercury	SW-846 7471A	1	111115711001	04/22/2011 06:35	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111115708001	04/21/2011 12:14	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111115711001	04/21/2011 13:53	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820002A	04/22/2011 18:41	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-69-WC_15.5-16' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-69-WC_15.5-16'

LLI Sample # SW 6262262
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 09:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

69-15

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	N.D.		840	2,400	72.26
10950	Benzene	71-43-2	120	J	60	600	72.26
10950	Bromodichloromethane	75-27-4	N.D.		120	600	72.26
10950	Bromoform	75-25-2	N.D.		120	600	72.26
10950	Bromomethane	74-83-9	N.D.		240	600	72.26
10950	2-Butanone	78-93-3	N.D.		480	1,200	72.26
10950	Carbon Disulfide	75-15-0	N.D.		120	600	72.26
10950	Carbon Tetrachloride	56-23-5	N.D.		120	600	72.26
10950	Chlorobenzene	108-90-7	N.D.		120	600	72.26
10950	Chloroethane	75-00-3	N.D.		240	600	72.26
10950	Chloroform	67-66-3	N.D.		120	600	72.26
10950	Chloromethane	74-87-3	N.D.		240	600	72.26
10950	Cyclohexane	110-82-7	500	J	120	600	72.26
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		240	600	72.26
10950	Dibromochloromethane	124-48-1	N.D.		120	600	72.26
10950	1,2-Dibromoethane	106-93-4	N.D.		120	600	72.26
10950	1,2-Dichlorobenzene	95-50-1	N.D.		120	600	72.26
10950	1,3-Dichlorobenzene	541-73-1	N.D.		120	600	72.26
10950	1,4-Dichlorobenzene	106-46-7	N.D.		120	600	72.26
10950	Dichlorodifluoromethane	75-71-8	N.D.		240	600	72.26
10950	1,1-Dichloroethane	75-34-3	N.D.		120	600	72.26
10950	1,2-Dichloroethane	107-06-2	N.D.		120	600	72.26
10950	1,1-Dichloroethene	75-35-4	N.D.		120	600	72.26
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		120	600	72.26
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		120	600	72.26
10950	1,2-Dichloropropane	78-87-5	N.D.		120	600	72.26
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		120	600	72.26
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		120	600	72.26
10950	Ethylbenzene	100-41-4	310	J	120	600	72.26
10950	Freon 113	76-13-1	N.D.		240	1,200	72.26
10950	2-Hexanone	591-78-6	N.D.		360	1,200	72.26
10950	Isopropylbenzene	98-82-8	620		120	600	72.26
10950	Methyl Acetate	79-20-9	480	J	240	600	72.26
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		60	600	72.26
10950	4-Methyl-2-pentanone	108-10-1	N.D.		360	1,200	72.26
10950	Methylcyclohexane	108-87-2	4,500		120	600	72.26
10950	Methylene Chloride	75-09-2	N.D.		240	600	72.26
10950	Styrene	100-42-5	N.D.		120	600	72.26
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		120	600	72.26
10950	Tetrachloroethene	127-18-4	N.D.		120	600	72.26
10950	Toluene	108-88-3	900		120	600	72.26
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		120	600	72.26
10950	1,1,1-Trichloroethane	71-55-6	N.D.		120	600	72.26
10950	1,1,2-Trichloroethane	79-00-5	N.D.		120	600	72.26
10950	Trichloroethene	79-01-6	N.D.		120	600	72.26
10950	Trichlorofluoromethane	75-69-4	N.D.		240	600	72.26
10950	Vinyl Chloride	75-01-4	N.D.		120	600	72.26
10950	Xylene (Total)	1330-20-7	890		120	600	72.26

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

Sample Description: BH-10-69-WC_15.5-16' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-69-WC_15.5-16'

LLI Sample # SW 6262262
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 09:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

69-15

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**		**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	32,000		540	2,700	10
10727	Acenaphthylene	208-96-8	3,900		540	2,700	10
10727	Acetophenone	98-86-2	N.D.		1,100	2,700	10
10727	Anthracene	120-12-7	21,000		540	2,700	10
10727	Atrazine	1912-24-9	N.D.		540	2,700	10
10727	Benzaldehyde	100-52-7	N.D.		1,100	2,700	10
10727	Benzo(a)anthracene	56-55-3	17,000		540	2,700	10
10727	Benzo(a)pyrene	50-32-8	11,000		540	2,700	10
10727	Benzo(b)fluoranthene	205-99-2	13,000		540	2,700	10
10727	Benzo(g,h,i)perylene	191-24-2	5,300		540	2,700	10
10727	Benzo(k)fluoranthene	207-08-9	4,700		540	2,700	10
10727	1,1'-Biphenyl	92-52-4	3,800		540	2,700	10
10727	4-Bromophenyl-phenylether	101-55-3	N.D.		540	2,700	10
10727	Butylbenzylphthalate	85-68-7	N.D.		1,100	2,700	10
10727	Di-n-butylphthalate	84-74-2	N.D.		1,100	2,700	10
10727	Caprolactam	105-60-2	N.D.		540	2,700	10
10727	Carbazole	86-74-8	1,500	J	540	2,700	10
10727	4-Chloro-3-methylphenol	59-50-7	N.D.		1,100	2,700	10
10727	4-Chloroaniline	106-47-8	N.D.		1,100	2,700	10
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.		540	2,700	10
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.		540	2,700	10
10727	2-Chloronaphthalene	91-58-7	N.D.		540	2,700	10
10727	2-Chlorophenol	95-57-8	N.D.		540	2,700	10
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.		540	2,700	10
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.		540	2,700	10
10727	Chrysene	218-01-9	17,000		540	2,700	10
10727	Dibenz(a,h)anthracene	53-70-3	2,000	J	540	2,700	10
10727	Dibenzofuran	132-64-9	9,300		540	2,700	10
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.		1,600	5,400	10
10727	2,4-Dichlorophenol	120-83-2	N.D.		540	2,700	10
10727	Diethylphthalate	84-66-2	N.D.		1,100	2,700	10
10727	2,4-Dimethylphenol	105-67-9	N.D.		1,100	2,700	10
10727	Dimethylphthalate	131-11-3	N.D.		1,100	2,700	10
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.		2,700	8,200	10
10727	2,4-Dinitrophenol	51-28-5	N.D.		5,400	16,000	10
10727	2,4-Dinitrotoluene	121-14-2	N.D.		1,100	2,700	10
10727	2,6-Dinitrotoluene	606-20-2	N.D.		540	2,700	10
10727	bis(2-Ethylhexyl)phthalate	117-81-7	4,500	J	1,100	5,400	10
10727	Fluoranthene	206-44-0	39,000		540	2,700	10
10727	Fluorene	86-73-7	22,000		540	2,700	10
10727	Hexachlorobenzene	118-74-1	N.D.		540	2,700	10
10727	Hexachlorobutadiene	87-68-3	N.D.		1,100	2,700	10
10727	Hexachlorocyclopentadiene	77-47-4	N.D.		2,700	8,200	10
10727	Hexachloroethane	67-72-1	N.D.		540	2,700	10
10727	Indeno(1,2,3-cd)pyrene	193-39-5	4,800		540	2,700	10
10727	Isophorone	78-59-1	N.D.		540	2,700	10
10727	2-Methylnaphthalene	91-57-6	28,000		540	2,700	10
10727	2-Methylphenol	95-48-7	N.D.		1,100	2,700	10
10727	4-Methylphenol	106-44-5	6,400		1,100	2,700	10

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

Sample Description: BH-10-69-WC_15.5-16' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-69-WC_15.5-16'

LLI Sample # SW 6262262
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 09:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

69-15

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.					
10727	Naphthalene	91-20-3	52,000	540	2,700	10
10727	2-Nitroaniline	88-74-4	N.D.	540	2,700	10
10727	3-Nitroaniline	99-09-2	N.D.	1,100	2,700	10
10727	4-Nitroaniline	100-01-6	N.D.	1,100	2,700	10
10727	Nitrobenzene	98-95-3	N.D.	540	2,700	10
10727	2-Nitrophenol	88-75-5	N.D.	540	2,700	10
10727	4-Nitrophenol	100-02-7	N.D.	2,700	8,200	10
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.	540	2,700	10
10727	N-Nitrosodiphenylamine	86-30-6	N.D.	540	2,700	10
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.					
10727	Di-n-octylphthalate	117-84-0	N.D.	1,100	2,700	10
10727	Pentachlorophenol	87-86-5	N.D.	2,700	8,200	10
10727	Phenanthrene	85-01-8	66,000	2,700	14,000	50
10727	Phenol	108-95-2	N.D.	540	2,700	10
10727	Pyrene	129-00-0	42,000	540	2,700	10
10727	2,4,5-Trichlorophenol	95-95-4	N.D.	1,100	2,700	10
10727	2,4,6-Trichlorophenol	88-06-2	N.D.	540	2,700	10
	Reporting limits were raised due to interference from the sample matrix.					
	Bis(2-ethylhexyl)phthalate was detected in the method blank at a concentration of 120 ug/kg. The blank value was not subtracted from the analytical result.					
Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	19,100	8.15	32.4	1
06944	Antimony	7440-36-0	N.D.	1.62	3.24	1
06935	Arsenic	7440-38-2	21.7	1.54	3.24	1
06946	Barium	7440-39-3	308	0.0648	0.810	1
06947	Beryllium	7440-41-7	1.70	0.110	0.810	1
06949	Cadmium	7440-43-9	1.67	0.227	0.810	1
01650	Calcium	7440-70-2	3,760	9.93	32.4	1
06951	Chromium	7440-47-3	71.4	0.956	2.43	1
06952	Cobalt	7440-48-4	22.0	0.308	0.810	1
06953	Copper	7440-50-8	129	0.357	1.62	1
01654	Iron	7439-89-6	27,200	7.63	32.4	1
06955	Lead	7439-92-1	417	0.972	2.43	1
01657	Magnesium	7439-95-4	3,990	4.12	16.2	1
06958	Manganese	7439-96-5	533	0.126	0.810	1
06961	Nickel	7440-02-0	41.3	0.308	1.62	1
01662	Potassium	7440-09-7	2,060	29.2	81.0	1
06936	Selenium	7782-49-2	2.46 J	1.59	3.24	1
06966	Silver	7440-22-4	0.757 J	0.292	0.810	1
01667	Sodium	7440-23-5	203	60.4	162	1
06925	Thallium	7440-28-0	N.D.	2.35	4.86	1
06971	Vanadium	7440-62-2	40.9	0.308	0.810	1

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

Sample Description: BH-10-69-WC_15.5-16' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-69-WC_15.5-16'

LLI Sample # SW 6262262
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 09:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

69-15

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
06972	Zinc	7440-66-6	544	1.07	3.24	1
	SW-846 7471A		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	1.03	0.0045	0.158	1
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	39.5	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	Q111121AA	04/22/2011 08:22	Stephanie A Selis	72.26
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/12/2011 09:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/12/2011 09:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/12/2011 09:00	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLA026	04/21/2011 17:44	Brian K Graham	10
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLA026	04/22/2011 07:11	Brian K Graham	50
10809	BNA Soil Microwave	SW-846 3546	1	11110SLA026	04/20/2011 15:40	Kelli M Barto	1
01643	Aluminum	SW-846 6010B	1	111115708001	04/24/2011 11:18	Damary Valentin	1
06944	Antimony	SW-846 6010B	1	111115708001	04/24/2011 11:18	Damary Valentin	1
06935	Arsenic	SW-846 6010B	1	111115708001	04/24/2011 11:18	Damary Valentin	1
06946	Barium	SW-846 6010B	1	111115708001	04/24/2011 11:18	Damary Valentin	1
06947	Beryllium	SW-846 6010B	1	111115708001	04/24/2011 11:18	Damary Valentin	1
06949	Cadmium	SW-846 6010B	1	111115708001	04/27/2011 02:18	John W Yanzuk II	1
01650	Calcium	SW-846 6010B	1	111115708001	04/24/2011 11:18	Damary Valentin	1
06951	Chromium	SW-846 6010B	1	111115708001	04/24/2011 11:18	Damary Valentin	1
06952	Cobalt	SW-846 6010B	1	111115708001	04/24/2011 11:18	Damary Valentin	1
06953	Copper	SW-846 6010B	1	111115708001	04/27/2011 02:18	John W Yanzuk II	1
01654	Iron	SW-846 6010B	1	111115708001	04/24/2011 11:18	Damary Valentin	1
06955	Lead	SW-846 6010B	1	111115708001	04/27/2011 23:44	John W Yanzuk II	1
01657	Magnesium	SW-846 6010B	1	111115708001	04/24/2011 11:18	Damary Valentin	1
06958	Manganese	SW-846 6010B	1	111115708001	04/24/2011 11:18	Damary Valentin	1
06961	Nickel	SW-846 6010B	1	111115708001	04/24/2011 11:18	Damary Valentin	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-69-WC_15.5-16' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-69-WC_15.5-16'

LLI Sample # SW 6262262
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 09:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

69-15

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
01662	Potassium	SW-846 6010B	1	111115708001	04/24/2011 11:18	Damary Valentin	1
06936	Selenium	SW-846 6010B	1	111115708001	04/24/2011 11:18	Damary Valentin	1
06966	Silver	SW-846 6010B	1	111115708001	04/24/2011 11:18	Damary Valentin	1
01667	Sodium	SW-846 6010B	1	111115708001	04/24/2011 11:18	Damary Valentin	1
06925	Thallium	SW-846 6010B	1	111115708001	04/24/2011 11:18	Damary Valentin	1
06971	Vanadium	SW-846 6010B	1	111115708001	04/24/2011 11:18	Damary Valentin	1
06972	Zinc	SW-846 6010B	1	111115708001	04/24/2011 11:18	Damary Valentin	1
00159	Mercury	SW-846 7471A	1	111115711001	04/22/2011 06:36	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111115708001	04/21/2011 12:14	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111115711001	04/21/2011 13:53	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820002A	04/22/2011 18:41	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-46-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-46-WC_0-2'

LLI Sample # SW 6262263
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 09:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

46-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	210		6	16	0.68
10950	Benzene	71-43-2	12		0.4	4	0.68
10950	Bromodichloromethane	75-27-4	N.D.		0.8	4	0.68
10950	Bromoform	75-25-2	N.D.		0.8	4	0.68
10950	Bromomethane	74-83-9	N.D.		2	4	0.68
10950	2-Butanone	78-93-3	29		3	8	0.68
10950	Carbon Disulfide	75-15-0	2	J	0.8	4	0.68
10950	Carbon Tetrachloride	56-23-5	N.D.		0.8	4	0.68
10950	Chlorobenzene	108-90-7	N.D.		0.8	4	0.68
10950	Chloroethane	75-00-3	N.D.		2	4	0.68
10950	Chloroform	67-66-3	N.D.		0.8	4	0.68
10950	Chloromethane	74-87-3	N.D.		2	4	0.68
10950	Cyclohexane	110-82-7	14		0.8	4	0.68
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		2	4	0.68
10950	Dibromochloromethane	124-48-1	N.D.		0.8	4	0.68
10950	1,2-Dibromoethane	106-93-4	N.D.		0.8	4	0.68
10950	1,2-Dichlorobenzene	95-50-1	N.D.		0.8	4	0.68
10950	1,3-Dichlorobenzene	541-73-1	N.D.		0.8	4	0.68
10950	1,4-Dichlorobenzene	106-46-7	N.D.		0.8	4	0.68
10950	Dichlorodifluoromethane	75-71-8	N.D.		2	4	0.68
10950	1,1-Dichloroethane	75-34-3	N.D.		0.8	4	0.68
10950	1,2-Dichloroethane	107-06-2	N.D.		0.8	4	0.68
10950	1,1-Dichloroethene	75-35-4	N.D.		0.8	4	0.68
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		0.8	4	0.68
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		0.8	4	0.68
10950	1,2-Dichloropropane	78-87-5	N.D.		0.8	4	0.68
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		0.8	4	0.68
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		0.8	4	0.68
10950	Ethylbenzene	100-41-4	24		0.8	4	0.68
10950	Freon 113	76-13-1	N.D.		2	8	0.68
10950	2-Hexanone	591-78-6	N.D.		2	8	0.68
10950	Isopropylbenzene	98-82-8	5		0.8	4	0.68
10950	Methyl Acetate	79-20-9	N.D.		2	4	0.68
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.4	4	0.68
10950	4-Methyl-2-pentanone	108-10-1	N.D.		2	8	0.68
10950	Methylcyclohexane	108-87-2	44		0.8	4	0.68
10950	Methylene Chloride	75-09-2	N.D.		2	4	0.68
10950	Styrene	100-42-5	N.D.		0.8	4	0.68
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		0.8	4	0.68
10950	Tetrachloroethene	127-18-4	N.D.		0.8	4	0.68
10950	Toluene	108-88-3	73		0.8	4	0.68
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		0.8	4	0.68
10950	1,1,1-Trichloroethane	71-55-6	N.D.		0.8	4	0.68
10950	1,1,2-Trichloroethane	79-00-5	N.D.		0.8	4	0.68
10950	Trichloroethene	79-01-6	N.D.		0.8	4	0.68
10950	Trichlorofluoromethane	75-69-4	N.D.		2	4	0.68
10950	Vinyl Chloride	75-01-4	N.D.		0.8	4	0.68
10950	Xylene (Total)	1330-20-7	120		0.8	4	0.68

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

Sample Description: BH-10-46-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-46-WC_0-2'

LLI Sample # SW 6262263
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 09:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

46-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**	**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	N.D.	380	1,900	10
10727	Acenaphthylene	208-96-8	N.D.	380	1,900	10
10727	Acetophenone	98-86-2	N.D.	760	1,900	10
10727	Anthracene	120-12-7	N.D.	380	1,900	10
10727	Atrazine	1912-24-9	N.D.	380	1,900	10
10727	Benzaldehyde	100-52-7	N.D.	760	1,900	10
10727	Benzo(a)anthracene	56-55-3	N.D.	380	1,900	10
10727	Benzo(a)pyrene	50-32-8	N.D.	380	1,900	10
10727	Benzo(b)fluoranthene	205-99-2	N.D.	380	1,900	10
10727	Benzo(g,h,i)perylene	191-24-2	N.D.	380	1,900	10
10727	Benzo(k)fluoranthene	207-08-9	N.D.	380	1,900	10
10727	1,1'-Biphenyl	92-52-4	N.D.	380	1,900	10
10727	4-Bromophenyl-phenylether	101-55-3	N.D.	380	1,900	10
10727	Butylbenzylphthalate	85-68-7	N.D.	760	1,900	10
10727	Di-n-butylphthalate	84-74-2	N.D.	760	1,900	10
10727	Caprolactam	105-60-2	N.D.	380	1,900	10
10727	Carbazole	86-74-8	N.D.	380	1,900	10
10727	4-Chloro-3-methylphenol	59-50-7	N.D.	760	1,900	10
10727	4-Chloroaniline	106-47-8	N.D.	760	1,900	10
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.	380	1,900	10
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.	380	1,900	10
10727	2-Chloronaphthalene	91-58-7	N.D.	380	1,900	10
10727	2-Chlorophenol	95-57-8	N.D.	380	1,900	10
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.	380	1,900	10
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.	380	1,900	10
10727	Chrysene	218-01-9	N.D.	380	1,900	10
10727	Dibenz(a,h)anthracene	53-70-3	N.D.	380	1,900	10
10727	Dibenzofuran	132-64-9	N.D.	380	1,900	10
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.	1,100	3,800	10
10727	2,4-Dichlorophenol	120-83-2	N.D.	380	1,900	10
10727	Diethylphthalate	84-66-2	N.D.	760	1,900	10
10727	2,4-Dimethylphenol	105-67-9	N.D.	760	1,900	10
10727	Dimethylphthalate	131-11-3	N.D.	760	1,900	10
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.	1,900	5,700	10
10727	2,4-Dinitrophenol	51-28-5	N.D.	3,800	11,000	10
10727	2,4-Dinitrotoluene	121-14-2	N.D.	760	1,900	10
10727	2,6-Dinitrotoluene	606-20-2	N.D.	380	1,900	10
10727	bis(2-Ethylhexyl)phthalate	117-81-7	N.D.	760	3,800	10
10727	Fluoranthene	206-44-0	N.D.	380	1,900	10
10727	Fluorene	86-73-7	N.D.	380	1,900	10
10727	Hexachlorobenzene	118-74-1	N.D.	380	1,900	10
10727	Hexachlorobutadiene	87-68-3	N.D.	760	1,900	10
10727	Hexachlorocyclopentadiene	77-47-4	N.D.	1,900	5,700	10
10727	Hexachloroethane	67-72-1	N.D.	380	1,900	10
10727	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.	380	1,900	10
10727	Isophorone	78-59-1	N.D.	380	1,900	10
10727	2-Methylnaphthalene	91-57-6	N.D.	380	1,900	10
10727	2-Methylphenol	95-48-7	N.D.	760	1,900	10
10727	4-Methylphenol	106-44-5	N.D.	760	1,900	10

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

Sample Description: BH-10-46-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-46-WC_0-2'

LLI Sample # SW 6262263
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 09:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

46-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	N.D.		380	1,900	10
10727	2-Nitroaniline	88-74-4	N.D.		380	1,900	10
10727	3-Nitroaniline	99-09-2	N.D.		760	1,900	10
10727	4-Nitroaniline	100-01-6	N.D.		760	1,900	10
10727	Nitrobenzene	98-95-3	N.D.		380	1,900	10
10727	2-Nitrophenol	88-75-5	N.D.		380	1,900	10
10727	4-Nitrophenol	100-02-7	N.D.		1,900	5,700	10
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		380	1,900	10
10727	N-Nitrosodiphenylamine	86-30-6	N.D.		380	1,900	10
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		760	1,900	10
10727	Pentachlorophenol	87-86-5	N.D.		1,900	5,700	10
10727	Phenanthrene	85-01-8	N.D.		380	1,900	10
10727	Phenol	108-95-2	N.D.		380	1,900	10
10727	Pyrene	129-00-0	N.D.		380	1,900	10
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		760	1,900	10
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		380	1,900	10
	Reporting limits were raised due to interference from the sample matrix.						
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	24,600		5.54	22.0	1
06944	Antimony	7440-36-0	N.D.		1.10	2.20	1
06935	Arsenic	7440-38-2	8.36		1.05	2.20	1
06946	Barium	7440-39-3	103		0.0440	0.551	1
06947	Beryllium	7440-41-7	1.40		0.0749	0.551	1
06949	Cadmium	7440-43-9	N.D.		0.154	0.551	1
01650	Calcium	7440-70-2	13,100		6.75	22.0	1
06951	Chromium	7440-47-3	45.3		0.650	1.65	1
06952	Cobalt	7440-48-4	11.8		0.209	0.551	1
06953	Copper	7440-50-8	37.1		0.242	1.10	1
01654	Iron	7439-89-6	34,100		25.9	110	5
06955	Lead	7439-92-1	48.5		0.661	1.65	1
01657	Magnesium	7439-95-4	8,710		2.80	11.0	1
06958	Manganese	7439-96-5	861		0.0859	0.551	1
06961	Nickel	7440-02-0	27.3		0.209	1.10	1
01662	Potassium	7440-09-7	1,350		19.8	55.1	1
06936	Selenium	7782-49-2	N.D.		1.08	2.20	1
06966	Silver	7440-22-4	N.D.		0.198	0.551	1
01667	Sodium	7440-23-5	72.1	J	41.1	110	1
06925	Thallium	7440-28-0	N.D.		1.60	3.30	1
06971	Vanadium	7440-62-2	50.3		0.209	0.551	1
06972	Zinc	7440-66-6	67.7		0.727	2.20	1
	SW-846 7471A		**mg/kg**		**mg/kg**	**mg/kg**	

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-46-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-46-WC_0-2'

LLI Sample # SW 6262263
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 09:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

46-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.0540 J	0.0031	0.109	1
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	13.5	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	X111151AA	04/25/2011 19:16	Sara E Johnson	0.68
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/12/2011 09:15	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/12/2011 09:15	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/12/2011 09:15	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLA026	04/21/2011 18:09	Brian K Graham	10
10809	BNA Soil Microwave	SW-846 3546	1	11110SLA026	04/20/2011 15:40	Kelli M Barto	1
01643	Aluminum	SW-846 6010B	1	111115708001	04/24/2011 11:22	Damary Valentin	1
06944	Antimony	SW-846 6010B	1	111115708001	04/24/2011 11:22	Damary Valentin	1
06935	Arsenic	SW-846 6010B	1	111115708001	04/24/2011 11:22	Damary Valentin	1
06946	Barium	SW-846 6010B	1	111115708001	04/24/2011 11:22	Damary Valentin	1
06947	Beryllium	SW-846 6010B	1	111115708001	04/24/2011 11:22	Damary Valentin	1
06949	Cadmium	SW-846 6010B	1	111115708001	04/27/2011 02:22	John W Yanzuk II	1
01650	Calcium	SW-846 6010B	1	111115708001	04/24/2011 11:22	Damary Valentin	1
06951	Chromium	SW-846 6010B	1	111115708001	04/24/2011 11:22	Damary Valentin	1
06952	Cobalt	SW-846 6010B	1	111115708001	04/24/2011 11:22	Damary Valentin	1
06953	Copper	SW-846 6010B	1	111115708001	04/27/2011 02:22	John W Yanzuk II	1
01654	Iron	SW-846 6010B	1	111115708001	04/27/2011 23:51	John W Yanzuk II	5
06955	Lead	SW-846 6010B	1	111115708001	04/27/2011 23:48	John W Yanzuk II	1
01657	Magnesium	SW-846 6010B	1	111115708001	04/24/2011 11:22	Damary Valentin	1
06958	Manganese	SW-846 6010B	1	111115708001	04/24/2011 11:22	Damary Valentin	1
06961	Nickel	SW-846 6010B	1	111115708001	04/24/2011 11:22	Damary Valentin	1
01662	Potassium	SW-846 6010B	1	111115708001	04/24/2011 11:22	Damary Valentin	1
06936	Selenium	SW-846 6010B	1	111115708001	04/24/2011 11:22	Damary Valentin	1
06966	Silver	SW-846 6010B	1	111115708001	04/24/2011 11:22	Damary Valentin	1
01667	Sodium	SW-846 6010B	1	111115708001	04/24/2011 11:22	Damary Valentin	1
06925	Thallium	SW-846 6010B	1	111115708001	04/24/2011 11:22	Damary Valentin	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-46-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-46-WC_0-2'

LLI Sample # SW 6262263
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 09:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

46-02

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06971	Vanadium	SW-846 6010B	1	111115708001	04/24/2011 11:22	Damary Valentin	1
06972	Zinc	SW-846 6010B	1	111115708001	04/24/2011 11:22	Damary Valentin	1
00159	Mercury	SW-846 7471A	1	111115711001	04/22/2011 06:37	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111115708001	04/21/2011 12:14	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111115711001	04/21/2011 13:53	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820002A	04/22/2011 18:41	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-46-WC_5-8' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-46-WC_5-8'

LLI Sample # SW 6262264
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 09:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

46-58

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	N.D.		4,700	14,000	558.47
10950	Benzene	71-43-2	1,100	J	340	3,400	558.47
10950	Bromodichloromethane	75-27-4	N.D.		680	3,400	558.47
10950	Bromoform	75-25-2	N.D.		680	3,400	558.47
10950	Bromomethane	74-83-9	N.D.		1,400	3,400	558.47
10950	2-Butanone	78-93-3	N.D.		2,700	6,800	558.47
10950	Carbon Disulfide	75-15-0	N.D.		680	3,400	558.47
10950	Carbon Tetrachloride	56-23-5	N.D.		680	3,400	558.47
10950	Chlorobenzene	108-90-7	N.D.		680	3,400	558.47
10950	Chloroethane	75-00-3	N.D.		1,400	3,400	558.47
10950	Chloroform	67-66-3	N.D.		680	3,400	558.47
10950	Chloromethane	74-87-3	N.D.		1,400	3,400	558.47
10950	Cyclohexane	110-82-7	770	J	680	3,400	558.47
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		1,400	3,400	558.47
10950	Dibromochloromethane	124-48-1	N.D.		680	3,400	558.47
10950	1,2-Dibromoethane	106-93-4	N.D.		680	3,400	558.47
10950	1,2-Dichlorobenzene	95-50-1	N.D.		680	3,400	558.47
10950	1,3-Dichlorobenzene	541-73-1	N.D.		680	3,400	558.47
10950	1,4-Dichlorobenzene	106-46-7	N.D.		680	3,400	558.47
10950	Dichlorodifluoromethane	75-71-8	N.D.		1,400	3,400	558.47
10950	1,1-Dichloroethane	75-34-3	N.D.		680	3,400	558.47
10950	1,2-Dichloroethane	107-06-2	N.D.		680	3,400	558.47
10950	1,1-Dichloroethene	75-35-4	N.D.		680	3,400	558.47
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		680	3,400	558.47
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		680	3,400	558.47
10950	1,2-Dichloropropane	78-87-5	N.D.		680	3,400	558.47
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		680	3,400	558.47
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		680	3,400	558.47
10950	Ethylbenzene	100-41-4	N.D.		680	3,400	558.47
10950	Freon 113	76-13-1	N.D.		1,400	6,800	558.47
10950	2-Hexanone	591-78-6	N.D.		2,000	6,800	558.47
10950	Isopropylbenzene	98-82-8	N.D.		680	3,400	558.47
10950	Methyl Acetate	79-20-9	6,600		1,400	3,400	558.47
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		340	3,400	558.47
10950	4-Methyl-2-pentanone	108-10-1	N.D.		2,000	6,800	558.47
10950	Methylcyclohexane	108-87-2	1,600	J	680	3,400	558.47
10950	Methylene Chloride	75-09-2	N.D.		1,400	3,400	558.47
10950	Styrene	100-42-5	N.D.		680	3,400	558.47
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		680	3,400	558.47
10950	Tetrachloroethene	127-18-4	N.D.		680	3,400	558.47
10950	Toluene	108-88-3	3,300	J	680	3,400	558.47
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		680	3,400	558.47
10950	1,1,1-Trichloroethane	71-55-6	N.D.		680	3,400	558.47
10950	1,1,2-Trichloroethane	79-00-5	N.D.		680	3,400	558.47
10950	Trichloroethene	79-01-6	N.D.		680	3,400	558.47
10950	Trichlorofluoromethane	75-69-4	N.D.		1,400	3,400	558.47
10950	Vinyl Chloride	75-01-4	N.D.		680	3,400	558.47
10950	Xylene (Total)	1330-20-7	7,300		680	3,400	558.47

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

Sample Description: BH-10-46-WC_5-8' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-46-WC_5-8'

LLI Sample # SW 6262264
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 09:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

46-58

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**		**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	N.D.		2,000	10,000	10
10727	Acenaphthylene	208-96-8	N.D.		2,000	10,000	10
10727	Acetophenone	98-86-2	N.D.		4,000	10,000	10
10727	Anthracene	120-12-7	N.D.		2,000	10,000	10
10727	Atrazine	1912-24-9	N.D.		2,000	10,000	10
10727	Benzaldehyde	100-52-7	N.D.		4,000	10,000	10
10727	Benzo(a)anthracene	56-55-3	N.D.		2,000	10,000	10
10727	Benzo(a)pyrene	50-32-8	7,300	J	2,000	10,000	10
10727	Benzo(b)fluoranthene	205-99-2	2,400	J	2,000	10,000	10
10727	Benzo(g,h,i)perylene	191-24-2	N.D.		2,000	10,000	10
10727	Benzo(k)fluoranthene	207-08-9	N.D.		2,000	10,000	10
10727	1,1'-Biphenyl	92-52-4	N.D.		2,000	10,000	10
10727	4-Bromophenyl-phenylether	101-55-3	N.D.		2,000	10,000	10
10727	Butylbenzylphthalate	85-68-7	N.D.		4,000	10,000	10
10727	Di-n-butylphthalate	84-74-2	N.D.		4,000	10,000	10
10727	Caprolactam	105-60-2	N.D.		2,000	10,000	10
10727	Carbazole	86-74-8	N.D.		2,000	10,000	10
10727	4-Chloro-3-methylphenol	59-50-7	N.D.		4,000	10,000	10
10727	4-Chloroaniline	106-47-8	N.D.		4,000	10,000	10
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.		2,000	10,000	10
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.		2,000	10,000	10
10727	2-Chloronaphthalene	91-58-7	N.D.		2,000	10,000	10
10727	2-Chlorophenol	95-57-8	N.D.		2,000	10,000	10
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.		2,000	10,000	10
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.		2,000	10,000	10
10727	Chrysene	218-01-9	14,000		2,000	10,000	10
10727	Dibenz(a,h)anthracene	53-70-3	N.D.		2,000	10,000	10
10727	Dibenzofuran	132-64-9	N.D.		2,000	10,000	10
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.		6,000	20,000	10
10727	2,4-Dichlorophenol	120-83-2	N.D.		2,000	10,000	10
10727	Diethylphthalate	84-66-2	N.D.		4,000	10,000	10
10727	2,4-Dimethylphenol	105-67-9	N.D.		4,000	10,000	10
10727	Dimethylphthalate	131-11-3	N.D.		4,000	10,000	10
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.		10,000	30,000	10
10727	2,4-Dinitrophenol	51-28-5	N.D.		20,000	60,000	10
10727	2,4-Dinitrotoluene	121-14-2	N.D.		4,000	10,000	10
10727	2,6-Dinitrotoluene	606-20-2	N.D.		2,000	10,000	10
10727	bis(2-Ethylhexyl)phthalate	117-81-7	N.D.		4,000	20,000	10
10727	Fluoranthene	206-44-0	N.D.		2,000	10,000	10
10727	Fluorene	86-73-7	N.D.		2,000	10,000	10
10727	Hexachlorobenzene	118-74-1	N.D.		2,000	10,000	10
10727	Hexachlorobutadiene	87-68-3	N.D.		4,000	10,000	10
10727	Hexachlorocyclopentadiene	77-47-4	N.D.		10,000	30,000	10
10727	Hexachloroethane	67-72-1	N.D.		2,000	10,000	10
10727	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.		2,000	10,000	10
10727	Isophorone	78-59-1	N.D.		2,000	10,000	10
10727	2-Methylnaphthalene	91-57-6	39,000		2,000	10,000	10
10727	2-Methylphenol	95-48-7	N.D.		4,000	10,000	10
10727	4-Methylphenol	106-44-5	N.D.		4,000	10,000	10

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

Sample Description: BH-10-46-WC_5-8' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-46-WC_5-8'

LLI Sample # SW 6262264
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 09:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

46-58

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	16,000		2,000	10,000	10
10727	2-Nitroaniline	88-74-4	N.D.		2,000	10,000	10
10727	3-Nitroaniline	99-09-2	N.D.		4,000	10,000	10
10727	4-Nitroaniline	100-01-6	N.D.		4,000	10,000	10
10727	Nitrobenzene	98-95-3	N.D.		2,000	10,000	10
10727	2-Nitrophenol	88-75-5	N.D.		2,000	10,000	10
10727	4-Nitrophenol	100-02-7	N.D.		10,000	30,000	10
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		2,000	10,000	10
10727	N-Nitrosodiphenylamine	86-30-6	N.D.		2,000	10,000	10
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		4,000	10,000	10
10727	Pentachlorophenol	87-86-5	N.D.		10,000	30,000	10
10727	Phenanthrene	85-01-8	9,400	J	2,000	10,000	10
10727	Phenol	108-95-2	N.D.		2,000	10,000	10
10727	Pyrene	129-00-0	6,100	J	2,000	10,000	10
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		4,000	10,000	10
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		2,000	10,000	10
	Reporting limits were raised due to interference from the sample matrix.						
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	7,050		5.98	23.8	1
06944	Antimony	7440-36-0	N.D.		1.19	2.38	1
06935	Arsenic	7440-38-2	6.14		1.13	2.38	1
06946	Barium	7440-39-3	116		0.0475	0.594	1
06947	Beryllium	7440-41-7	0.103	J	0.0808	0.594	1
06949	Cadmium	7440-43-9	N.D.		0.166	0.594	1
01650	Calcium	7440-70-2	9,240		7.28	23.8	1
06951	Chromium	7440-47-3	20.1		0.701	1.78	1
06952	Cobalt	7440-48-4	1.01		0.226	0.594	1
06953	Copper	7440-50-8	165		0.261	1.19	1
01654	Iron	7439-89-6	4,770		5.60	23.8	1
06955	Lead	7439-92-1	79.6		0.713	1.78	1
01657	Magnesium	7439-95-4	2,330		3.02	11.9	1
06958	Manganese	7439-96-5	110		0.0927	0.594	1
06961	Nickel	7440-02-0	9.31		0.226	1.19	1
01662	Potassium	7440-09-7	397		21.4	59.4	1
06936	Selenium	7782-49-2	N.D.		1.16	2.38	1
06966	Silver	7440-22-4	N.D.		0.214	0.594	1
01667	Sodium	7440-23-5	114	J	44.3	119	1
06925	Thallium	7440-28-0	N.D.		1.72	3.57	1
06971	Vanadium	7440-62-2	19.8		0.226	0.594	1
06972	Zinc	7440-66-6	21.3		0.784	2.38	1
	SW-846 7471A		**mg/kg**		**mg/kg**	**mg/kg**	

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-46-WC_5-8' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-46-WC_5-8'

LLI Sample # SW 6262264
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 09:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

46-58

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.0629 J	0.0033	0.115	1
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	17.5	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	Q111121AA	04/22/2011 08:45	Stephanie A Selis	558.47
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/12/2011 09:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/12/2011 09:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/12/2011 09:30	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLA026	04/21/2011 18:34	Brian K Graham	10
10809	BNA Soil Microwave	SW-846 3546	1	11110SLA026	04/20/2011 15:40	Kelli M Barto	1
01643	Aluminum	SW-846 6010B	1	111115708001	04/24/2011 11:32	Damary Valentin	1
06944	Antimony	SW-846 6010B	1	111115708001	04/24/2011 11:32	Damary Valentin	1
06935	Arsenic	SW-846 6010B	1	111115708001	04/24/2011 11:32	Damary Valentin	1
06946	Barium	SW-846 6010B	1	111115708001	04/24/2011 11:32	Damary Valentin	1
06947	Beryllium	SW-846 6010B	1	111115708001	04/24/2011 11:32	Damary Valentin	1
06949	Cadmium	SW-846 6010B	1	111115708001	04/27/2011 02:26	John W Yanzuk II	1
01650	Calcium	SW-846 6010B	1	111115708001	04/24/2011 11:32	Damary Valentin	1
06951	Chromium	SW-846 6010B	1	111115708001	04/24/2011 11:32	Damary Valentin	1
06952	Cobalt	SW-846 6010B	1	111115708001	04/24/2011 11:32	Damary Valentin	1
06953	Copper	SW-846 6010B	1	111115708001	04/27/2011 02:26	John W Yanzuk II	1
01654	Iron	SW-846 6010B	1	111115708001	04/24/2011 11:32	Damary Valentin	1
06955	Lead	SW-846 6010B	1	111115708001	04/27/2011 23:54	John W Yanzuk II	1
01657	Magnesium	SW-846 6010B	1	111115708001	04/24/2011 11:32	Damary Valentin	1
06958	Manganese	SW-846 6010B	1	111115708001	04/24/2011 11:32	Damary Valentin	1
06961	Nickel	SW-846 6010B	1	111115708001	04/24/2011 11:32	Damary Valentin	1
01662	Potassium	SW-846 6010B	1	111115708001	04/24/2011 11:32	Damary Valentin	1
06936	Selenium	SW-846 6010B	1	111115708001	04/24/2011 11:32	Damary Valentin	1
06966	Silver	SW-846 6010B	1	111115708001	04/24/2011 11:32	Damary Valentin	1
01667	Sodium	SW-846 6010B	1	111115708001	04/24/2011 11:32	Damary Valentin	1
06925	Thallium	SW-846 6010B	1	111115708001	04/24/2011 11:32	Damary Valentin	1

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

Sample Description: **BH-10-46-WC_5-8' Grab Soil**
Philadelphia Refinery AOI-10
COC: 259438 BH-10-46-WC_5-8'

LLI Sample # SW 6262264
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 09:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

46-58

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06971	Vanadium	SW-846 6010B	1	111115708001	04/24/2011 11:32	Damary Valentin	1
06972	Zinc	SW-846 6010B	1	111115708001	04/24/2011 11:32	Damary Valentin	1
00159	Mercury	SW-846 7471A	1	111115711001	04/22/2011 06:38	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111115708001	04/21/2011 12:14	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111115711001	04/21/2011 13:53	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820002A	04/22/2011 18:41	Scott W Freisher	1

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-46-WC_17-18' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-46-WC_17-18'

LLI Sample # SW 6262265
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 10:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

46-17

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		ug/kg	ug/kg	ug/kg	
10950	Acetone	67-64-1	1,100	17	48	1.14
10950	Benzene	71-43-2	58	1	12	1.14
10950	Bromodichloromethane	75-27-4	N.D.	2	12	1.14
10950	Bromoform	75-25-2	N.D.	2	12	1.14
10950	Bromomethane	74-83-9	N.D.	5	12	1.14
10950	2-Butanone	78-93-3	260	10	24	1.14
10950	Carbon Disulfide	75-15-0	33	2	12	1.14
10950	Carbon Tetrachloride	56-23-5	N.D.	2	12	1.14
10950	Chlorobenzene	108-90-7	N.D.	2	12	1.14
10950	Chloroethane	75-00-3	N.D.	5	12	1.14
10950	Chloroform	67-66-3	N.D.	2	12	1.14
10950	Chloromethane	74-87-3	N.D.	5	12	1.14
10950	Cyclohexane	110-82-7	41	2	12	1.14
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.	5	12	1.14
10950	Dibromochloromethane	124-48-1	N.D.	2	12	1.14
10950	1,2-Dibromoethane	106-93-4	N.D.	2	12	1.14
10950	1,2-Dichlorobenzene	95-50-1	N.D.	2	12	1.14
10950	1,3-Dichlorobenzene	541-73-1	N.D.	2	12	1.14
10950	1,4-Dichlorobenzene	106-46-7	N.D.	2	12	1.14
10950	Dichlorodifluoromethane	75-71-8	N.D.	5	12	1.14
10950	1,1-Dichloroethane	75-34-3	N.D.	2	12	1.14
10950	1,2-Dichloroethane	107-06-2	N.D.	2	12	1.14
10950	1,1-Dichloroethene	75-35-4	N.D.	2	12	1.14
10950	cis-1,2-Dichloroethene	156-59-2	N.D.	2	12	1.14
10950	trans-1,2-Dichloroethene	156-60-5	N.D.	2	12	1.14
10950	1,2-Dichloropropane	78-87-5	N.D.	2	12	1.14
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.	2	12	1.14
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.	2	12	1.14
10950	Ethylbenzene	100-41-4	100	2	12	1.14
10950	Freon 113	76-13-1	N.D.	5	24	1.14
10950	2-Hexanone	591-78-6	N.D.	7	24	1.14
10950	Isopropylbenzene	98-82-8	25	2	12	1.14
10950	Methyl Acetate	79-20-9	N.D.	5	12	1.14
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.	1	12	1.14
10950	4-Methyl-2-pentanone	108-10-1	N.D.	7	24	1.14
10950	Methylcyclohexane	108-87-2	120	2	12	1.14
10950	Methylene Chloride	75-09-2	N.D.	5	12	1.14
10950	Styrene	100-42-5	N.D.	2	12	1.14
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.	2	12	1.14
10950	Tetrachloroethene	127-18-4	N.D.	2	12	1.14
10950	Toluene	108-88-3	240	2	12	1.14
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.	2	12	1.14
10950	1,1,1-Trichloroethane	71-55-6	N.D.	2	12	1.14
10950	1,1,2-Trichloroethane	79-00-5	N.D.	2	12	1.14
10950	Trichloroethene	79-01-6	N.D.	2	12	1.14
10950	Trichlorofluoromethane	75-69-4	N.D.	5	12	1.14
10950	Vinyl Chloride	75-01-4	N.D.	2	12	1.14
10950	Xylene (Total)	1330-20-7	500	2	12	1.14

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

Sample Description: BH-10-46-WC_17-18' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-46-WC_17-18'

LLI Sample # SW 6262265
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 10:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

46-17

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**		**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	N.D.		70	350	1
10727	Acenaphthylene	208-96-8	N.D.		70	350	1
10727	Acetophenone	98-86-2	N.D.		140	350	1
10727	Anthracene	120-12-7	N.D.		70	350	1
10727	Atrazine	1912-24-9	N.D.		70	350	1
10727	Benzaldehyde	100-52-7	N.D.		140	350	1
10727	Benzo(a)anthracene	56-55-3	110	J	70	350	1
10727	Benzo(a)pyrene	50-32-8	210	J	70	350	1
10727	Benzo(b)fluoranthene	205-99-2	76	J	70	350	1
10727	Benzo(g,h,i)perylene	191-24-2	N.D.		70	350	1
10727	Benzo(k)fluoranthene	207-08-9	N.D.		70	350	1
10727	1,1'-Biphenyl	92-52-4	100	J	70	350	1
10727	4-Bromophenyl-phenylether	101-55-3	N.D.		70	350	1
10727	Butylbenzylphthalate	85-68-7	N.D.		140	350	1
10727	Di-n-butylphthalate	84-74-2	N.D.		140	350	1
10727	Caprolactam	105-60-2	N.D.		70	350	1
10727	Carbazole	86-74-8	N.D.		70	350	1
10727	4-Chloro-3-methylphenol	59-50-7	N.D.		140	350	1
10727	4-Chloroaniline	106-47-8	N.D.		140	350	1
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.		70	350	1
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.		70	350	1
10727	2-Chloronaphthalene	91-58-7	N.D.		70	350	1
10727	2-Chlorophenol	95-57-8	N.D.		70	350	1
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.		70	350	1
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.		70	350	1
10727	Chrysene	218-01-9	460		70	350	1
10727	Dibenz(a,h)anthracene	53-70-3	N.D.		70	350	1
10727	Dibenzofuran	132-64-9	82	J	70	350	1
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.		210	700	1
10727	2,4-Dichlorophenol	120-83-2	N.D.		70	350	1
10727	Diethylphthalate	84-66-2	N.D.		140	350	1
10727	2,4-Dimethylphenol	105-67-9	N.D.		140	350	1
10727	Dimethylphthalate	131-11-3	N.D.		140	350	1
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.		350	1,000	1
10727	2,4-Dinitrophenol	51-28-5	N.D.		700	2,100	1
10727	2,4-Dinitrotoluene	121-14-2	N.D.		140	350	1
10727	2,6-Dinitrotoluene	606-20-2	N.D.		70	350	1
10727	bis(2-Ethylhexyl)phthalate	117-81-7	170	J	140	700	1
10727	Fluoranthene	206-44-0	89	J	70	350	1
10727	Fluorene	86-73-7	110	J	70	350	1
10727	Hexachlorobenzene	118-74-1	N.D.		70	350	1
10727	Hexachlorobutadiene	87-68-3	N.D.		140	350	1
10727	Hexachlorocyclopentadiene	77-47-4	N.D.		350	1,000	1
10727	Hexachloroethane	67-72-1	N.D.		70	350	1
10727	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.		70	350	1
10727	Isophorone	78-59-1	N.D.		70	350	1
10727	2-Methylnaphthalene	91-57-6	1,800		70	350	1
10727	2-Methylphenol	95-48-7	N.D.		140	350	1
10727	4-Methylphenol	106-44-5	N.D.		140	350	1

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

Sample Description: BH-10-46-WC_17-18' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-46-WC_17-18'

LLI Sample # SW 6262265
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 10:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

46-17

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	1,300		70	350	1
10727	2-Nitroaniline	88-74-4	N.D.		70	350	1
10727	3-Nitroaniline	99-09-2	N.D.		140	350	1
10727	4-Nitroaniline	100-01-6	N.D.		140	350	1
10727	Nitrobenzene	98-95-3	N.D.		70	350	1
10727	2-Nitrophenol	88-75-5	N.D.		70	350	1
10727	4-Nitrophenol	100-02-7	N.D.		350	1,000	1
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		70	350	1
10727	N-Nitrosodiphenylamine	86-30-6	N.D.		70	350	1
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		140	350	1
10727	Pentachlorophenol	87-86-5	N.D.		350	1,000	1
10727	Phenanthrene	85-01-8	1,300		70	350	1
10727	Phenol	108-95-2	N.D.		70	350	1
10727	Pyrene	129-00-0	200	J	70	350	1
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		140	350	1
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		70	350	1
	Bis(2-ethylhexyl)phthalate was detected in the method blank at a concentration of 120 ug/kg. The blank value was not subtracted from the analytical result. This sample was re-extracted outside of the method required holding time, and bis(2-ethylhexyl)phthalate was not detected in the method blank or the re-analysis of the sample. The data reported here is from the initial extraction of the sample.						
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	37,400		10.4	41.5	1
06944	Antimony	7440-36-0	N.D.		2.08	4.15	1
06935	Arsenic	7440-38-2	57.3		1.97	4.15	1
06946	Barium	7440-39-3	1,180		0.0830	1.04	1
06947	Beryllium	7440-41-7	1.04		0.141	1.04	1
06949	Cadmium	7440-43-9	0.897	J	0.291	1.04	1
01650	Calcium	7440-70-2	183,000		63.6	208	5
06951	Chromium	7440-47-3	236		1.22	3.11	1
06952	Cobalt	7440-48-4	13.3		0.394	1.04	1
06953	Copper	7440-50-8	409		0.457	2.08	1
01654	Iron	7439-89-6	16,700		9.78	41.5	1
06955	Lead	7439-92-1	1,400		1.25	3.11	1
01657	Magnesium	7439-95-4	36,600		5.27	20.8	1
06958	Manganese	7439-96-5	1,030		0.162	1.04	1
06961	Nickel	7440-02-0	221		0.394	2.08	1
01662	Potassium	7440-09-7	243		37.4	104	1
06936	Selenium	7782-49-2	N.D.		2.03	4.15	1
06966	Silver	7440-22-4	1.26		0.374	1.04	1
01667	Sodium	7440-23-5	653		77.4	208	1
06925	Thallium	7440-28-0	N.D.		3.01	6.23	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-46-WC_17-18' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-46-WC_17-18'

LLI Sample # SW 6262265
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 10:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

46-17

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
06971	Vanadium	7440-62-2	488	0.394	1.04	1
06972	Zinc	7440-66-6	570	1.37	4.15	1
	SW-846 7471A		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.0304 J	0.0058	0.203	1
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	52.3	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	X111151AA	04/25/2011 19:39	Sara E Johnson	1.14
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/12/2011 10:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/12/2011 10:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/12/2011 10:00	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLA026	04/21/2011 18:59	Brian K Graham	1
10809	BNA Soil Microwave	SW-846 3546	1	11110SLA026	04/20/2011 15:40	Kelli M Barto	1
01643	Aluminum	SW-846 6010B	1	111115708001	04/24/2011 11:35	Damary Valentin	1
06944	Antimony	SW-846 6010B	1	111115708001	04/24/2011 11:35	Damary Valentin	1
06935	Arsenic	SW-846 6010B	1	111115708001	04/24/2011 11:35	Damary Valentin	1
06946	Barium	SW-846 6010B	1	111115708001	04/24/2011 11:35	Damary Valentin	1
06947	Beryllium	SW-846 6010B	1	111115708001	04/24/2011 11:35	Damary Valentin	1
06949	Cadmium	SW-846 6010B	1	111115708001	04/27/2011 02:29	John W Yanzuk II	1
01650	Calcium	SW-846 6010B	1	111115708001	04/27/2011 02:34	John W Yanzuk II	5
06951	Chromium	SW-846 6010B	1	111115708001	04/24/2011 11:35	Damary Valentin	1
06952	Cobalt	SW-846 6010B	1	111115708001	04/24/2011 11:35	Damary Valentin	1
06953	Copper	SW-846 6010B	1	111115708001	04/27/2011 02:29	John W Yanzuk II	1
01654	Iron	SW-846 6010B	1	111115708001	04/24/2011 11:35	Damary Valentin	1
06955	Lead	SW-846 6010B	1	111115708001	04/27/2011 23:58	John W Yanzuk II	1
01657	Magnesium	SW-846 6010B	1	111115708001	04/24/2011 11:35	Damary Valentin	1
06958	Manganese	SW-846 6010B	1	111115708001	04/24/2011 11:35	Damary Valentin	1
06961	Nickel	SW-846 6010B	1	111115708001	04/24/2011 11:35	Damary Valentin	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-46-WC_17-18' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-46-WC_17-18'

LLI Sample # SW 6262265
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 10:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

46-17

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
01662	Potassium	SW-846 6010B	1	111115708001	04/24/2011 11:35	Damary Valentin	1
06936	Selenium	SW-846 6010B	1	111115708001	04/24/2011 11:35	Damary Valentin	1
06966	Silver	SW-846 6010B	1	111115708001	04/24/2011 11:35	Damary Valentin	1
01667	Sodium	SW-846 6010B	1	111115708001	04/24/2011 11:35	Damary Valentin	1
06925	Thallium	SW-846 6010B	1	111115708001	04/24/2011 11:35	Damary Valentin	1
06971	Vanadium	SW-846 6010B	1	111115708001	04/24/2011 11:35	Damary Valentin	1
06972	Zinc	SW-846 6010B	1	111115708001	04/24/2011 11:35	Damary Valentin	1
00159	Mercury	SW-846 7471A	1	111115711001	04/22/2011 06:40	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111115708001	04/21/2011 12:14	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111115711001	04/21/2011 13:53	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820002A	04/22/2011 18:41	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-44-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-44-WC_0-2'

LLI Sample # SW 6262266
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 10:20 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

44-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		ug/kg		ug/kg	ug/kg	
10950	Acetone	67-64-1	N.D.		380	1,100	44.95
10950	Benzene	71-43-2	33	J	27	270	44.95
10950	Bromodichloromethane	75-27-4	N.D.		54	270	44.95
10950	Bromoform	75-25-2	N.D.		54	270	44.95
10950	Bromomethane	74-83-9	N.D.		110	270	44.95
10950	2-Butanone	78-93-3	N.D.		220	540	44.95
10950	Carbon Disulfide	75-15-0	N.D.		54	270	44.95
10950	Carbon Tetrachloride	56-23-5	N.D.		54	270	44.95
10950	Chlorobenzene	108-90-7	N.D.		54	270	44.95
10950	Chloroethane	75-00-3	N.D.		110	270	44.95
10950	Chloroform	67-66-3	N.D.		54	270	44.95
10950	Chloromethane	74-87-3	N.D.		110	270	44.95
10950	Cyclohexane	110-82-7	N.D.		54	270	44.95
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		110	270	44.95
10950	Dibromochloromethane	124-48-1	N.D.		54	270	44.95
10950	1,2-Dibromoethane	106-93-4	N.D.		54	270	44.95
10950	1,2-Dichlorobenzene	95-50-1	N.D.		54	270	44.95
10950	1,3-Dichlorobenzene	541-73-1	N.D.		54	270	44.95
10950	1,4-Dichlorobenzene	106-46-7	N.D.		54	270	44.95
10950	Dichlorodifluoromethane	75-71-8	N.D.		110	270	44.95
10950	1,1-Dichloroethane	75-34-3	N.D.		54	270	44.95
10950	1,2-Dichloroethane	107-06-2	N.D.		54	270	44.95
10950	1,1-Dichloroethene	75-35-4	N.D.		54	270	44.95
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		54	270	44.95
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		54	270	44.95
10950	1,2-Dichloropropane	78-87-5	N.D.		54	270	44.95
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		54	270	44.95
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		54	270	44.95
10950	Ethylbenzene	100-41-4	140	J	54	270	44.95
10950	Freon 113	76-13-1	N.D.		110	540	44.95
10950	2-Hexanone	591-78-6	N.D.		160	540	44.95
10950	Isopropylbenzene	98-82-8	N.D.		54	270	44.95
10950	Methyl Acetate	79-20-9	460		110	270	44.95
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		27	270	44.95
10950	4-Methyl-2-pentanone	108-10-1	N.D.		160	540	44.95
10950	Methylcyclohexane	108-87-2	85	J	54	270	44.95
10950	Methylene Chloride	75-09-2	N.D.		110	270	44.95
10950	Styrene	100-42-5	N.D.		54	270	44.95
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		54	270	44.95
10950	Tetrachloroethene	127-18-4	N.D.		54	270	44.95
10950	Toluene	108-88-3	300		54	270	44.95
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		54	270	44.95
10950	1,1,1-Trichloroethane	71-55-6	N.D.		54	270	44.95
10950	1,1,2-Trichloroethane	79-00-5	N.D.		54	270	44.95
10950	Trichloroethene	79-01-6	N.D.		54	270	44.95
10950	Trichlorofluoromethane	75-69-4	N.D.		110	270	44.95
10950	Vinyl Chloride	75-01-4	N.D.		54	270	44.95
10950	Xylene (Total)	1330-20-7	910		54	270	44.95

Reporting limits were raised due to interference from the sample matrix.

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

Sample Description: BH-10-44-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-44-WC_0-2'

LLI Sample # SW 6262266
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 10:20 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

44-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**		**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	N.D.		40	200	1
10727	Acenaphthylene	208-96-8	N.D.		40	200	1
10727	Acetophenone	98-86-2	N.D.		79	200	1
10727	Anthracene	120-12-7	N.D.		40	200	1
10727	Atrazine	1912-24-9	N.D.		40	200	1
10727	Benzaldehyde	100-52-7	N.D.		79	200	1
10727	Benzo(a)anthracene	56-55-3	69	J	40	200	1
10727	Benzo(a)pyrene	50-32-8	180	J	40	200	1
10727	Benzo(b)fluoranthene	205-99-2	85	J	40	200	1
10727	Benzo(g,h,i)perylene	191-24-2	42	J	40	200	1
10727	Benzo(k)fluoranthene	207-08-9	N.D.		40	200	1
10727	1,1'-Biphenyl	92-52-4	N.D.		40	200	1
10727	4-Bromophenyl-phenylether	101-55-3	N.D.		40	200	1
10727	Butylbenzylphthalate	85-68-7	N.D.		79	200	1
10727	Di-n-butylphthalate	84-74-2	N.D.		79	200	1
10727	Caprolactam	105-60-2	N.D.		40	200	1
10727	Carbazole	86-74-8	N.D.		40	200	1
10727	4-Chloro-3-methylphenol	59-50-7	N.D.		79	200	1
10727	4-Chloroaniline	106-47-8	N.D.		79	200	1
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.		40	200	1
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.		40	200	1
10727	2-Chloronaphthalene	91-58-7	N.D.		40	200	1
10727	2-Chlorophenol	95-57-8	N.D.		40	200	1
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.		40	200	1
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.		40	200	1
10727	Chrysene	218-01-9	350		40	200	1
10727	Dibenz(a,h)anthracene	53-70-3	N.D.		40	200	1
10727	Dibenzofuran	132-64-9	N.D.		40	200	1
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.		120	400	1
10727	2,4-Dichlorophenol	120-83-2	N.D.		40	200	1
10727	Diethylphthalate	84-66-2	N.D.		79	200	1
10727	2,4-Dimethylphenol	105-67-9	N.D.		79	200	1
10727	Dimethylphthalate	131-11-3	N.D.		79	200	1
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.		200	600	1
10727	2,4-Dinitrophenol	51-28-5	N.D.		400	1,200	1
10727	2,4-Dinitrotoluene	121-14-2	N.D.		79	200	1
10727	2,6-Dinitrotoluene	606-20-2	N.D.		40	200	1
10727	bis(2-Ethylhexyl)phthalate	117-81-7	200	J	79	400	1
10727	Fluoranthene	206-44-0	58	J	40	200	1
10727	Fluorene	86-73-7	N.D.		40	200	1
10727	Hexachlorobenzene	118-74-1	N.D.		40	200	1
10727	Hexachlorobutadiene	87-68-3	N.D.		79	200	1
10727	Hexachlorocyclopentadiene	77-47-4	N.D.		200	600	1
10727	Hexachloroethane	67-72-1	N.D.		40	200	1
10727	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.		40	200	1
10727	Isophorone	78-59-1	N.D.		40	200	1
10727	2-Methylnaphthalene	91-57-6	2,100		40	200	1
10727	2-Methylphenol	95-48-7	N.D.		79	200	1
10727	4-Methylphenol	106-44-5	N.D.		79	200	1

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

Sample Description: BH-10-44-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-44-WC_0-2'

LLI Sample # SW 6262266
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 10:20 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

44-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	880		40	200	1
10727	2-Nitroaniline	88-74-4	N.D.		40	200	1
10727	3-Nitroaniline	99-09-2	N.D.		79	200	1
10727	4-Nitroaniline	100-01-6	N.D.		79	200	1
10727	Nitrobenzene	98-95-3	N.D.		40	200	1
10727	2-Nitrophenol	88-75-5	N.D.		40	200	1
10727	4-Nitrophenol	100-02-7	N.D.		200	600	1
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		40	200	1
10727	N-Nitrosodiphenylamine	86-30-6	N.D.		40	200	1
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		79	200	1
10727	Pentachlorophenol	87-86-5	N.D.		200	600	1
10727	Phenanthrene	85-01-8	260		40	200	1
10727	Phenol	108-95-2	N.D.		40	200	1
10727	Pyrene	129-00-0	130	J	40	200	1
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		79	200	1
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		40	200	1
	Bis(2-ethylhexyl)phthalate was detected in the method blank at a concentration of 120 ug/kg. The blank value was not subtracted from the analytical result. This sample was re-extracted outside of the method required holding time, and bis(2-ethylhexyl)phthalate was not detected in the method blank. Bis(2-ethylhexyl)phthalate was detected in the re-analysis of the sample. The data reported here is from the initial extraction of the sample.						
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	19,400		5.86	23.3	1
06944	Antimony	7440-36-0	N.D.		1.16	2.33	1
06935	Arsenic	7440-38-2	6.77		1.11	2.33	1
06946	Barium	7440-39-3	122		0.0466	0.582	1
06947	Beryllium	7440-41-7	2.40		0.0792	0.582	1
06949	Cadmium	7440-43-9	N.D.		0.163	0.582	1
01650	Calcium	7440-70-2	34,500		7.14	23.3	1
06951	Chromium	7440-47-3	19.3		0.687	1.75	1
06952	Cobalt	7440-48-4	11.7		0.221	0.582	1
06953	Copper	7440-50-8	33.2		0.256	1.16	1
01654	Iron	7439-89-6	41,000		27.4	116	5
06955	Lead	7439-92-1	22.3		0.698	1.75	1
01657	Magnesium	7439-95-4	17,200		2.96	11.6	1
06958	Manganese	7439-96-5	2,040		0.454	2.91	5
06961	Nickel	7440-02-0	25.8		0.221	1.16	1
01662	Potassium	7440-09-7	1,230		21.0	58.2	1
06936	Selenium	7782-49-2	N.D.		1.14	2.33	1
06966	Silver	7440-22-4	N.D.		0.210	0.582	1
01667	Sodium	7440-23-5	80.0	J	43.4	116	1
06925	Thallium	7440-28-0	N.D.		1.69	3.49	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-44-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-44-WC_0-2'

LLI Sample # SW 6262266
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 10:20 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

44-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
06971	Vanadium	7440-62-2	40.5	0.221	0.582	1
06972	Zinc	7440-66-6	88.1	0.768	2.33	1
	SW-846 7471A		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.0693 J	0.0034	0.118	1
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	16.6	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	Q111121AA	04/22/2011 06:27	Stephanie A Selis	44.95
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/12/2011 10:20	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/12/2011 10:20	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/12/2011 10:20	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLA026	04/21/2011 19:24	Brian K Graham	1
10809	BNA Soil Microwave	SW-846 3546	1	11110SLA026	04/20/2011 15:40	Kelli M Barto	1
01643	Aluminum	SW-846 6010B	1	111115708001	04/24/2011 11:39	Damary Valentin	1
06944	Antimony	SW-846 6010B	1	111115708001	04/24/2011 11:39	Damary Valentin	1
06935	Arsenic	SW-846 6010B	1	111115708001	04/24/2011 11:39	Damary Valentin	1
06946	Barium	SW-846 6010B	1	111115708001	04/24/2011 11:39	Damary Valentin	1
06947	Beryllium	SW-846 6010B	1	111115708001	04/24/2011 11:39	Damary Valentin	1
06949	Cadmium	SW-846 6010B	1	111115708001	04/27/2011 02:37	John W Yanzuk II	1
01650	Calcium	SW-846 6010B	1	111115708001	04/24/2011 11:39	Damary Valentin	1
06951	Chromium	SW-846 6010B	1	111115708001	04/24/2011 11:39	Damary Valentin	1
06952	Cobalt	SW-846 6010B	1	111115708001	04/24/2011 11:39	Damary Valentin	1
06953	Copper	SW-846 6010B	1	111115708001	04/27/2011 02:37	John W Yanzuk II	1
01654	Iron	SW-846 6010B	1	111115708001	04/27/2011 02:42	John W Yanzuk II	5
06955	Lead	SW-846 6010B	1	111115708001	04/28/2011 00:01	John W Yanzuk II	1
01657	Magnesium	SW-846 6010B	1	111115708001	04/24/2011 11:39	Damary Valentin	1
06958	Manganese	SW-846 6010B	1	111115708001	04/27/2011 02:42	John W Yanzuk II	5
06961	Nickel	SW-846 6010B	1	111115708001	04/24/2011 11:39	Damary Valentin	1

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

Sample Description: **BH-10-44-WC_0-2' Grab Soil**
Philadelphia Refinery AOI-10
COC: 259438 BH-10-44-WC_0-2'

LLI Sample # SW 6262266
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 10:20 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

44-02

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
01662	Potassium	SW-846 6010B	1	111115708001	04/24/2011 11:39	Damary Valentin	1
06936	Selenium	SW-846 6010B	1	111115708001	04/24/2011 11:39	Damary Valentin	1
06966	Silver	SW-846 6010B	1	111115708001	04/24/2011 11:39	Damary Valentin	1
01667	Sodium	SW-846 6010B	1	111115708001	04/24/2011 11:39	Damary Valentin	1
06925	Thallium	SW-846 6010B	1	111115708001	04/24/2011 11:39	Damary Valentin	1
06971	Vanadium	SW-846 6010B	1	111115708001	04/24/2011 11:39	Damary Valentin	1
06972	Zinc	SW-846 6010B	1	111115708001	04/24/2011 11:39	Damary Valentin	1
00159	Mercury	SW-846 7471A	1	111115711001	04/22/2011 06:43	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111115708001	04/21/2011 12:14	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111115711001	04/21/2011 13:53	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820002A	04/22/2011 18:41	Scott W Freisher	1

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-44-WC_10-12' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-44-WC_10-12'

LLI Sample # SW 6262267
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 10:40 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

44-10

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	N.D.	2,500	7,100	172.44
10950	Benzene	71-43-2	8,100	180	1,800	172.44
10950	Bromodichloromethane	75-27-4	N.D.	360	1,800	172.44
10950	Bromoform	75-25-2	N.D.	360	1,800	172.44
10950	Bromomethane	74-83-9	N.D.	710	1,800	172.44
10950	2-Butanone	78-93-3	N.D.	1,400	3,600	172.44
10950	Carbon Disulfide	75-15-0	N.D.	360	1,800	172.44
10950	Carbon Tetrachloride	56-23-5	N.D.	360	1,800	172.44
10950	Chlorobenzene	108-90-7	N.D.	360	1,800	172.44
10950	Chloroethane	75-00-3	N.D.	710	1,800	172.44
10950	Chloroform	67-66-3	N.D.	360	1,800	172.44
10950	Chloromethane	74-87-3	N.D.	710	1,800	172.44
10950	Cyclohexane	110-82-7	13,000	360	1,800	172.44
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.	710	1,800	172.44
10950	Dibromochloromethane	124-48-1	N.D.	360	1,800	172.44
10950	1,2-Dibromoethane	106-93-4	N.D.	360	1,800	172.44
10950	1,2-Dichlorobenzene	95-50-1	N.D.	360	1,800	172.44
10950	1,3-Dichlorobenzene	541-73-1	N.D.	360	1,800	172.44
10950	1,4-Dichlorobenzene	106-46-7	N.D.	360	1,800	172.44
10950	Dichlorodifluoromethane	75-71-8	N.D.	710	1,800	172.44
10950	1,1-Dichloroethane	75-34-3	N.D.	360	1,800	172.44
10950	1,2-Dichloroethane	107-06-2	N.D.	360	1,800	172.44
10950	1,1-Dichloroethene	75-35-4	N.D.	360	1,800	172.44
10950	cis-1,2-Dichloroethene	156-59-2	N.D.	360	1,800	172.44
10950	trans-1,2-Dichloroethene	156-60-5	N.D.	360	1,800	172.44
10950	1,2-Dichloropropane	78-87-5	N.D.	360	1,800	172.44
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.	360	1,800	172.44
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.	360	1,800	172.44
10950	Ethylbenzene	100-41-4	76,000	360	1,800	172.44
10950	Freon 113	76-13-1	N.D.	710	3,600	172.44
10950	2-Hexanone	591-78-6	N.D.	1,100	3,600	172.44
10950	Isopropylbenzene	98-82-8	20,000	360	1,800	172.44
10950	Methyl Acetate	79-20-9	N.D.	710	1,800	172.44
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.	180	1,800	172.44
10950	4-Methyl-2-pentanone	108-10-1	N.D.	1,100	3,600	172.44
10950	Methylcyclohexane	108-87-2	63,000	360	1,800	172.44
10950	Methylene Chloride	75-09-2	N.D.	710	1,800	172.44
10950	Styrene	100-42-5	N.D.	360	1,800	172.44
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.	360	1,800	172.44
10950	Tetrachloroethene	127-18-4	N.D.	360	1,800	172.44
10950	Toluene	108-88-3	140,000	3,600	18,000	1724.4
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.	360	1,800	172.44
10950	1,1,1-Trichloroethane	71-55-6	N.D.	360	1,800	172.44
10950	1,1,2-Trichloroethane	79-00-5	N.D.	360	1,800	172.44
10950	Trichloroethene	79-01-6	N.D.	360	1,800	172.44
10950	Trichlorofluoromethane	75-69-4	N.D.	710	1,800	172.44
10950	Vinyl Chloride	75-01-4	N.D.	360	1,800	172.44
10950	Xylene (Total)	1330-20-7	460,000	3,600	18,000	1724.4

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

Sample Description: BH-10-44-WC_10-12' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-44-WC_10-12'

LLI Sample # SW 6262267
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 10:40 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

44-10

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**		**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	66,000		4,100	21,000	10
10727	Acenaphthylene	208-96-8	N.D.		4,100	21,000	10
10727	Acetophenone	98-86-2	N.D.		8,300	21,000	10
10727	Anthracene	120-12-7	32,000		4,100	21,000	10
10727	Atrazine	1912-24-9	N.D.		4,100	21,000	10
10727	Benzaldehyde	100-52-7	N.D.		8,300	21,000	10
10727	Benzo(a)anthracene	56-55-3	8,400	J	4,100	21,000	10
10727	Benzo(a)pyrene	50-32-8	N.D.		4,100	21,000	10
10727	Benzo(b)fluoranthene	205-99-2	N.D.		4,100	21,000	10
10727	Benzo(g,h,i)perylene	191-24-2	N.D.		4,100	21,000	10
10727	Benzo(k)fluoranthene	207-08-9	N.D.		4,100	21,000	10
10727	1,1'-Biphenyl	92-52-4	98,000		4,100	21,000	10
10727	4-Bromophenyl-phenylether	101-55-3	N.D.		4,100	21,000	10
10727	Butylbenzylphthalate	85-68-7	N.D.		8,300	21,000	10
10727	Di-n-butylphthalate	84-74-2	N.D.		8,300	21,000	10
10727	Caprolactam	105-60-2	N.D.		4,100	21,000	10
10727	Carbazole	86-74-8	N.D.		4,100	21,000	10
10727	4-Chloro-3-methylphenol	59-50-7	N.D.		8,300	21,000	10
10727	4-Chloroaniline	106-47-8	N.D.		8,300	21,000	10
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.		4,100	21,000	10
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.		4,100	21,000	10
10727	2-Chloronaphthalene	91-58-7	N.D.		4,100	21,000	10
10727	2-Chlorophenol	95-57-8	N.D.		4,100	21,000	10
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.		4,100	21,000	10
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.		4,100	21,000	10
10727	Chrysene	218-01-9	16,000	J	4,100	21,000	10
10727	Dibenz(a,h)anthracene	53-70-3	N.D.		4,100	21,000	10
10727	Dibenzofuran	132-64-9	57,000		4,100	21,000	10
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.		12,000	41,000	10
10727	2,4-Dichlorophenol	120-83-2	N.D.		4,100	21,000	10
10727	Diethylphthalate	84-66-2	N.D.		8,300	21,000	10
10727	2,4-Dimethylphenol	105-67-9	N.D.		8,300	21,000	10
10727	Dimethylphthalate	131-11-3	N.D.		8,300	21,000	10
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.		21,000	62,000	10
10727	2,4-Dinitrophenol	51-28-5	N.D.		41,000	120,000	10
10727	2,4-Dinitrotoluene	121-14-2	N.D.		8,300	21,000	10
10727	2,6-Dinitrotoluene	606-20-2	N.D.		4,100	21,000	10
10727	bis(2-Ethylhexyl)phthalate	117-81-7	N.D.		8,300	41,000	10
10727	Fluoranthene	206-44-0	6,300	J	4,100	21,000	10
10727	Fluorene	86-73-7	96,000		4,100	21,000	10
10727	Hexachlorobenzene	118-74-1	N.D.		4,100	21,000	10
10727	Hexachlorobutadiene	87-68-3	N.D.		8,300	21,000	10
10727	Hexachlorocyclopentadiene	77-47-4	N.D.		21,000	62,000	10
10727	Hexachloroethane	67-72-1	N.D.		4,100	21,000	10
10727	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.		4,100	21,000	10
10727	Isophorone	78-59-1	N.D.		4,100	21,000	10
10727	2-Methylnaphthalene	91-57-6	1,500,000		21,000	100,000	50
10727	2-Methylphenol	95-48-7	N.D.		8,300	21,000	10
10727	4-Methylphenol	106-44-5	N.D.		8,300	21,000	10

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

Sample Description: BH-10-44-WC_10-12' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-44-WC_10-12'

LLI Sample # SW 6262267
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 10:40 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

44-10

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	410,000		4,100	21,000	10
10727	2-Nitroaniline	88-74-4	N.D.		4,100	21,000	10
10727	3-Nitroaniline	99-09-2	N.D.		8,300	21,000	10
10727	4-Nitroaniline	100-01-6	N.D.		8,300	21,000	10
10727	Nitrobenzene	98-95-3	N.D.		4,100	21,000	10
10727	2-Nitrophenol	88-75-5	N.D.		4,100	21,000	10
10727	4-Nitrophenol	100-02-7	N.D.		21,000	62,000	10
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		4,100	21,000	10
10727	N-Nitrosodiphenylamine	86-30-6	N.D.		4,100	21,000	10
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		8,300	21,000	10
10727	Pentachlorophenol	87-86-5	N.D.		21,000	62,000	10
10727	Phenanthrene	85-01-8	200,000		4,100	21,000	10
10727	Phenol	108-95-2	N.D.		4,100	21,000	10
10727	Pyrene	129-00-0	21,000	J	4,100	21,000	10
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		8,300	21,000	10
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		4,100	21,000	10
	Reporting limits were raised due to interference from the sample matrix.						
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	20,400		10.3	41.0	1
06944	Antimony	7440-36-0	4.02	J	2.05	4.10	1
06935	Arsenic	7440-38-2	21.9		1.95	4.10	1
06946	Barium	7440-39-3	349		0.0820	1.02	1
06947	Beryllium	7440-41-7	0.664	J	0.139	1.02	1
06949	Cadmium	7440-43-9	0.744	J	0.287	1.02	1
01650	Calcium	7440-70-2	140,000		62.8	205	5
06951	Chromium	7440-47-3	908		1.21	3.07	1
06952	Cobalt	7440-48-4	10.2		0.389	1.02	1
06953	Copper	7440-50-8	191		0.451	2.05	1
01654	Iron	7439-89-6	16,200		9.66	41.0	1
06955	Lead	7439-92-1	640		1.23	3.07	1
01657	Magnesium	7439-95-4	47,000		5.21	20.5	1
06958	Manganese	7439-96-5	937		0.160	1.02	1
06961	Nickel	7440-02-0	53.4		0.389	2.05	1
01662	Potassium	7440-09-7	990		36.9	102	1
06936	Selenium	7782-49-2	N.D.		2.01	4.10	1
06966	Silver	7440-22-4	N.D.		0.369	1.02	1
01667	Sodium	7440-23-5	269		76.5	205	1
06925	Thallium	7440-28-0	N.D.		2.97	6.15	1
06971	Vanadium	7440-62-2	100		0.389	1.02	1
06972	Zinc	7440-66-6	870		1.35	4.10	1
	SW-846 7471A		**mg/kg**		**mg/kg**	**mg/kg**	

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-44-WC_10-12' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-44-WC_10-12'

LLI Sample # SW 6262267
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 10:40 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

44-10

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	1.07	0.0058	0.203	1
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	51.7	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	Q111121AA	04/22/2011 13:12	Stephanie A Selis	172.44
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	Q111121AA	04/22/2011 13:35	Stephanie A Selis	1724.4
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/12/2011 10:40	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/12/2011 10:40	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/12/2011 10:40	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLA026	04/21/2011 19:49	Brian K Graham	10
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLA026	04/22/2011 07:36	Brian K Graham	50
10809	BNA Soil Microwave	SW-846 3546	1	11110SLA026	04/20/2011 15:40	Kelli M Barto	1
01643	Aluminum	SW-846 6010B	1	111115708001	04/24/2011 11:43	Damary Valentin	1
06944	Antimony	SW-846 6010B	1	111115708001	04/24/2011 11:43	Damary Valentin	1
06935	Arsenic	SW-846 6010B	1	111115708001	04/24/2011 11:43	Damary Valentin	1
06946	Barium	SW-846 6010B	1	111115708001	04/24/2011 11:43	Damary Valentin	1
06947	Beryllium	SW-846 6010B	1	111115708001	04/24/2011 11:43	Damary Valentin	1
06949	Cadmium	SW-846 6010B	1	111115708001	04/27/2011 02:45	John W Yanzuk II	1
01650	Calcium	SW-846 6010B	1	111115708001	04/27/2011 02:50	John W Yanzuk II	5
06951	Chromium	SW-846 6010B	1	111115708001	04/24/2011 11:43	Damary Valentin	1
06952	Cobalt	SW-846 6010B	1	111115708001	04/24/2011 11:43	Damary Valentin	1
06953	Copper	SW-846 6010B	1	111115708001	04/27/2011 02:45	John W Yanzuk II	1
01654	Iron	SW-846 6010B	1	111115708001	04/24/2011 11:43	Damary Valentin	1
06955	Lead	SW-846 6010B	1	111115708001	04/28/2011 00:05	John W Yanzuk II	1
01657	Magnesium	SW-846 6010B	1	111115708001	04/24/2011 11:43	Damary Valentin	1
06958	Manganese	SW-846 6010B	1	111115708001	04/24/2011 11:43	Damary Valentin	1
06961	Nickel	SW-846 6010B	1	111115708001	04/24/2011 11:43	Damary Valentin	1
01662	Potassium	SW-846 6010B	1	111115708001	04/24/2011 11:43	Damary Valentin	1
06936	Selenium	SW-846 6010B	1	111115708001	04/24/2011 11:43	Damary Valentin	1
06966	Silver	SW-846 6010B	1	111115708001	04/24/2011 11:43	Damary Valentin	1

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

Sample Description: **BH-10-44-WC_10-12' Grab Soil**
Philadelphia Refinery AOI-10
COC: 259438 BH-10-44-WC_10-12'

LLI Sample # SW 6262267
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 10:40 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

44-10

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
01667	Sodium	SW-846 6010B	1	111115708001	04/24/2011 11:43	Damary Valentin	1
06925	Thallium	SW-846 6010B	1	111115708001	04/24/2011 11:43	Damary Valentin	1
06971	Vanadium	SW-846 6010B	1	111115708001	04/24/2011 11:43	Damary Valentin	1
06972	Zinc	SW-846 6010B	1	111115708001	04/24/2011 11:43	Damary Valentin	1
00159	Mercury	SW-846 7471A	1	111115711001	04/22/2011 06:44	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111115708001	04/21/2011 12:14	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111115711001	04/21/2011 13:53	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820002A	04/22/2011 18:41	Scott W Freisher	1

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-44-WC_24-26' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-44-WC_24-26'

LLI Sample # SW 6262268
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 11:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

44-24

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	N.D.		730	2,100	70.49
10950	Benzene	71-43-2	98	J	52	520	70.49
10950	Bromodichloromethane	75-27-4	N.D.		100	520	70.49
10950	Bromoform	75-25-2	N.D.		100	520	70.49
10950	Bromomethane	74-83-9	N.D.		210	520	70.49
10950	2-Butanone	78-93-3	N.D.		420	1,000	70.49
10950	Carbon Disulfide	75-15-0	N.D.		100	520	70.49
10950	Carbon Tetrachloride	56-23-5	N.D.		100	520	70.49
10950	Chlorobenzene	108-90-7	N.D.		100	520	70.49
10950	Chloroethane	75-00-3	N.D.		210	520	70.49
10950	Chloroform	67-66-3	N.D.		100	520	70.49
10950	Chloromethane	74-87-3	N.D.		210	520	70.49
10950	Cyclohexane	110-82-7	420	J	100	520	70.49
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		210	520	70.49
10950	Dibromochloromethane	124-48-1	N.D.		100	520	70.49
10950	1,2-Dibromoethane	106-93-4	N.D.		100	520	70.49
10950	1,2-Dichlorobenzene	95-50-1	N.D.		100	520	70.49
10950	1,3-Dichlorobenzene	541-73-1	N.D.		100	520	70.49
10950	1,4-Dichlorobenzene	106-46-7	N.D.		100	520	70.49
10950	Dichlorodifluoromethane	75-71-8	N.D.		210	520	70.49
10950	1,1-Dichloroethane	75-34-3	N.D.		100	520	70.49
10950	1,2-Dichloroethane	107-06-2	N.D.		100	520	70.49
10950	1,1-Dichloroethene	75-35-4	N.D.		100	520	70.49
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		100	520	70.49
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		100	520	70.49
10950	1,2-Dichloropropane	78-87-5	N.D.		100	520	70.49
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		100	520	70.49
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		100	520	70.49
10950	Ethylbenzene	100-41-4	260	J	100	520	70.49
10950	Freon 113	76-13-1	N.D.		210	1,000	70.49
10950	2-Hexanone	591-78-6	N.D.		310	1,000	70.49
10950	Isopropylbenzene	98-82-8	460	J	100	520	70.49
10950	Methyl Acetate	79-20-9	440	J	210	520	70.49
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		52	520	70.49
10950	4-Methyl-2-pentanone	108-10-1	N.D.		310	1,000	70.49
10950	Methylcyclohexane	108-87-2	4,000		100	520	70.49
10950	Methylene Chloride	75-09-2	N.D.		210	520	70.49
10950	Styrene	100-42-5	N.D.		100	520	70.49
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		100	520	70.49
10950	Tetrachloroethene	127-18-4	N.D.		100	520	70.49
10950	Toluene	108-88-3	800		100	520	70.49
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		100	520	70.49
10950	1,1,1-Trichloroethane	71-55-6	N.D.		100	520	70.49
10950	1,1,2-Trichloroethane	79-00-5	N.D.		100	520	70.49
10950	Trichloroethene	79-01-6	N.D.		100	520	70.49
10950	Trichlorofluoromethane	75-69-4	N.D.		210	520	70.49
10950	Vinyl Chloride	75-01-4	N.D.		100	520	70.49
10950	Xylene (Total)	1330-20-7	900		100	520	70.49

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

Sample Description: BH-10-44-WC_24-26' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-44-WC_24-26'

LLI Sample # SW 6262268
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 11:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

44-24

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**		**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	22,000		480	2,400	10
10727	Acenaphthylene	208-96-8	3,400		480	2,400	10
10727	Acetophenone	98-86-2	N.D.		970	2,400	10
10727	Anthracene	120-12-7	16,000		480	2,400	10
10727	Atrazine	1912-24-9	N.D.		480	2,400	10
10727	Benzaldehyde	100-52-7	N.D.		970	2,400	10
10727	Benzo(a)anthracene	56-55-3	14,000		480	2,400	10
10727	Benzo(a)pyrene	50-32-8	9,000		480	2,400	10
10727	Benzo(b)fluoranthene	205-99-2	10,000		480	2,400	10
10727	Benzo(g,h,i)perylene	191-24-2	4,300		480	2,400	10
10727	Benzo(k)fluoranthene	207-08-9	5,000		480	2,400	10
10727	1,1'-Biphenyl	92-52-4	2,800		480	2,400	10
10727	4-Bromophenyl-phenylether	101-55-3	N.D.		480	2,400	10
10727	Butylbenzylphthalate	85-68-7	N.D.		970	2,400	10
10727	Di-n-butylphthalate	84-74-2	N.D.		970	2,400	10
10727	Caprolactam	105-60-2	N.D.		480	2,400	10
10727	Carbazole	86-74-8	1,400	J	480	2,400	10
10727	4-Chloro-3-methylphenol	59-50-7	N.D.		970	2,400	10
10727	4-Chloroaniline	106-47-8	N.D.		970	2,400	10
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.		480	2,400	10
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.		480	2,400	10
10727	2-Chloronaphthalene	91-58-7	N.D.		480	2,400	10
10727	2-Chlorophenol	95-57-8	N.D.		480	2,400	10
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.		480	2,400	10
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.		480	2,400	10
10727	Chrysene	218-01-9	13,000		480	2,400	10
10727	Dibenz(a,h)anthracene	53-70-3	1,500	J	480	2,400	10
10727	Dibenzofuran	132-64-9	7,500		480	2,400	10
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.		1,500	4,800	10
10727	2,4-Dichlorophenol	120-83-2	N.D.		480	2,400	10
10727	Diethylphthalate	84-66-2	N.D.		970	2,400	10
10727	2,4-Dimethylphenol	105-67-9	N.D.		970	2,400	10
10727	Dimethylphthalate	131-11-3	N.D.		970	2,400	10
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.		2,400	7,300	10
10727	2,4-Dinitrophenol	51-28-5	N.D.		4,800	15,000	10
10727	2,4-Dinitrotoluene	121-14-2	N.D.		970	2,400	10
10727	2,6-Dinitrotoluene	606-20-2	N.D.		480	2,400	10
10727	bis(2-Ethylhexyl)phthalate	117-81-7	1,300	J	970	4,800	10
10727	Fluoranthene	206-44-0	32,000		480	2,400	10
10727	Fluorene	86-73-7	17,000		480	2,400	10
10727	Hexachlorobenzene	118-74-1	N.D.		480	2,400	10
10727	Hexachlorobutadiene	87-68-3	N.D.		970	2,400	10
10727	Hexachlorocyclopentadiene	77-47-4	N.D.		2,400	7,300	10
10727	Hexachloroethane	67-72-1	N.D.		480	2,400	10
10727	Indeno(1,2,3-cd)pyrene	193-39-5	4,000		480	2,400	10
10727	Isophorone	78-59-1	N.D.		480	2,400	10
10727	2-Methylnaphthalene	91-57-6	21,000		480	2,400	10
10727	2-Methylphenol	95-48-7	N.D.		970	2,400	10
10727	4-Methylphenol	106-44-5	5,000		970	2,400	10

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

Sample Description: BH-10-44-WC_24-26' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-44-WC_24-26'

LLI Sample # SW 6262268
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 11:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

44-24

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.					
10727	Naphthalene	91-20-3	41,000	480	2,400	10
10727	2-Nitroaniline	88-74-4	N.D.	480	2,400	10
10727	3-Nitroaniline	99-09-2	N.D.	970	2,400	10
10727	4-Nitroaniline	100-01-6	N.D.	970	2,400	10
10727	Nitrobenzene	98-95-3	N.D.	480	2,400	10
10727	2-Nitrophenol	88-75-5	N.D.	480	2,400	10
10727	4-Nitrophenol	100-02-7	N.D.	2,400	7,300	10
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.	480	2,400	10
10727	N-Nitrosodiphenylamine	86-30-6	N.D.	480	2,400	10
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.					
10727	Di-n-octylphthalate	117-84-0	N.D.	970	2,400	10
10727	Pentachlorophenol	87-86-5	N.D.	2,400	7,300	10
10727	Phenanthrene	85-01-8	58,000	480	2,400	10
10727	Phenol	108-95-2	N.D.	480	2,400	10
10727	Pyrene	129-00-0	32,000	480	2,400	10
10727	2,4,5-Trichlorophenol	95-95-4	N.D.	970	2,400	10
10727	2,4,6-Trichlorophenol	88-06-2	N.D.	480	2,400	10

Reporting limits were raised due to interference from the sample matrix.

Bis(2-ethylhexyl)phthalate was detected in the method blank at a concentration of 120 ug/kg. The blank value was not subtracted from the analytical result. This sample was re-extracted outside of the method required holding time, and bis(2-ethylhexyl)phthalate was not detected in the method blank. Bis(2-ethylhexyl)phthalate was detected in the re-analysis of the sample. The data reported here is from the initial extraction of the sample.

Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	15,400	7.43	29.5	1
06944	Antimony	7440-36-0	N.D.	1.48	2.95	1
06935	Arsenic	7440-38-2	17.6	1.40	2.95	1
06946	Barium	7440-39-3	259	0.0591	0.739	1
06947	Beryllium	7440-41-7	1.41	0.100	0.739	1
06949	Cadmium	7440-43-9	1.26	0.207	0.739	1
01650	Calcium	7440-70-2	3,250	9.05	29.5	1
06951	Chromium	7440-47-3	50.8	0.871	2.22	1
06952	Cobalt	7440-48-4	20.2	0.281	0.739	1
06953	Copper	7440-50-8	103	0.325	1.48	1
01654	Iron	7439-89-6	23,200	6.96	29.5	1
06955	Lead	7439-92-1	281	0.886	2.22	1
01657	Magnesium	7439-95-4	3,320	3.75	14.8	1
06958	Manganese	7439-96-5	460	0.115	0.739	1
06961	Nickel	7440-02-0	34.8	0.281	1.48	1
01662	Potassium	7440-09-7	1,710	26.6	73.9	1
06936	Selenium	7782-49-2	2.04 J	1.45	2.95	1
06966	Silver	7440-22-4	0.496 J	0.266	0.739	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-44-WC_24-26' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-44-WC_24-26'

LLI Sample # SW 6262268
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 11:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

44-24

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
01667	Sodium	7440-23-5	167	55.1	148	1
06925	Thallium	7440-28-0	N.D.	2.14	4.43	1
06971	Vanadium	7440-62-2	34.0	0.281	0.739	1
06972	Zinc	7440-66-6	427	0.975	2.95	1
	SW-846 7471A		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.752	0.0042	0.145	1
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	32.3	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	Q111121AA	04/22/2011 09:08	Stephanie A Selis	70.49
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/12/2011 11:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/12/2011 11:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/12/2011 11:00	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLA026	04/21/2011 20:14	Brian K Graham	10
10809	BNA Soil Microwave	SW-846 3546	1	11110SLA026	04/20/2011 15:40	Kelli M Barto	1
01643	Aluminum	SW-846 6010B	1	111115708001	04/24/2011 11:47	Damary Valentin	1
06944	Antimony	SW-846 6010B	1	111115708001	04/24/2011 11:47	Damary Valentin	1
06935	Arsenic	SW-846 6010B	1	111115708001	04/24/2011 11:47	Damary Valentin	1
06946	Barium	SW-846 6010B	1	111115708001	04/24/2011 11:47	Damary Valentin	1
06947	Beryllium	SW-846 6010B	1	111115708001	04/24/2011 11:47	Damary Valentin	1
06949	Cadmium	SW-846 6010B	1	111115708001	04/27/2011 02:53	John W Yanzuk II	1
01650	Calcium	SW-846 6010B	1	111115708001	04/24/2011 11:47	Damary Valentin	1
06951	Chromium	SW-846 6010B	1	111115708001	04/24/2011 11:47	Damary Valentin	1
06952	Cobalt	SW-846 6010B	1	111115708001	04/24/2011 11:47	Damary Valentin	1
06953	Copper	SW-846 6010B	1	111115708001	04/27/2011 02:53	John W Yanzuk II	1
01654	Iron	SW-846 6010B	1	111115708001	04/24/2011 11:47	Damary Valentin	1
06955	Lead	SW-846 6010B	1	111115708001	04/28/2011 00:09	John W Yanzuk II	1
01657	Magnesium	SW-846 6010B	1	111115708001	04/24/2011 11:47	Damary Valentin	1

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

Sample Description: **BH-10-44-WC_24-26' Grab Soil**
Philadelphia Refinery AOI-10
COC: 259438 BH-10-44-WC_24-26'

LLI Sample # SW 6262268
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 11:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

44-24

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06958	Manganese	SW-846 6010B	1	111115708001	04/24/2011 11:47	Damary Valentin	1
06961	Nickel	SW-846 6010B	1	111115708001	04/24/2011 11:47	Damary Valentin	1
01662	Potassium	SW-846 6010B	1	111115708001	04/24/2011 11:47	Damary Valentin	1
06936	Selenium	SW-846 6010B	1	111115708001	04/24/2011 11:47	Damary Valentin	1
06966	Silver	SW-846 6010B	1	111115708001	04/24/2011 11:47	Damary Valentin	1
01667	Sodium	SW-846 6010B	1	111115708001	04/24/2011 11:47	Damary Valentin	1
06925	Thallium	SW-846 6010B	1	111115708001	04/24/2011 11:47	Damary Valentin	1
06971	Vanadium	SW-846 6010B	1	111115708001	04/24/2011 11:47	Damary Valentin	1
06972	Zinc	SW-846 6010B	1	111115708001	04/24/2011 11:47	Damary Valentin	1
00159	Mercury	SW-846 7471A	1	111115711001	04/22/2011 06:46	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111115708001	04/21/2011 12:14	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111115711001	04/21/2011 13:53	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820002A	04/22/2011 18:41	Scott W Freisher	1

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-45-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-45-WC_0-2'

LLI Sample # SW 6262269
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 12:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

45-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	290		7	21	0.86
10950	Benzene	71-43-2	19		0.5	5	0.86
10950	Bromodichloromethane	75-27-4	N.D.		1	5	0.86
10950	Bromoform	75-25-2	N.D.		1	5	0.86
10950	Bromomethane	74-83-9	N.D.		2	5	0.86
10950	2-Butanone	78-93-3	40		4	10	0.86
10950	Carbon Disulfide	75-15-0	4	J	1	5	0.86
10950	Carbon Tetrachloride	56-23-5	N.D.		1	5	0.86
10950	Chlorobenzene	108-90-7	N.D.		1	5	0.86
10950	Chloroethane	75-00-3	N.D.		2	5	0.86
10950	Chloroform	67-66-3	N.D.		1	5	0.86
10950	Chloromethane	74-87-3	N.D.		2	5	0.86
10950	Cyclohexane	110-82-7	2	J	1	5	0.86
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		2	5	0.86
10950	Dibromochloromethane	124-48-1	N.D.		1	5	0.86
10950	1,2-Dibromoethane	106-93-4	N.D.		1	5	0.86
10950	1,2-Dichlorobenzene	95-50-1	N.D.		1	5	0.86
10950	1,3-Dichlorobenzene	541-73-1	N.D.		1	5	0.86
10950	1,4-Dichlorobenzene	106-46-7	N.D.		1	5	0.86
10950	Dichlorodifluoromethane	75-71-8	N.D.		2	5	0.86
10950	1,1-Dichloroethane	75-34-3	N.D.		1	5	0.86
10950	1,2-Dichloroethane	107-06-2	N.D.		1	5	0.86
10950	1,1-Dichloroethene	75-35-4	N.D.		1	5	0.86
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		1	5	0.86
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		1	5	0.86
10950	1,2-Dichloropropane	78-87-5	N.D.		1	5	0.86
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		1	5	0.86
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		1	5	0.86
10950	Ethylbenzene	100-41-4	17		1	5	0.86
10950	Freon 113	76-13-1	N.D.		2	10	0.86
10950	2-Hexanone	591-78-6	N.D.		3	10	0.86
10950	Isopropylbenzene	98-82-8	5	J	1	5	0.86
10950	Methyl Acetate	79-20-9	N.D.		2	5	0.86
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.5	5	0.86
10950	4-Methyl-2-pentanone	108-10-1	N.D.		3	10	0.86
10950	Methylcyclohexane	108-87-2	5	J	1	5	0.86
10950	Methylene Chloride	75-09-2	N.D.		2	5	0.86
10950	Styrene	100-42-5	N.D.		1	5	0.86
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		1	5	0.86
10950	Tetrachloroethene	127-18-4	N.D.		1	5	0.86
10950	Toluene	108-88-3	41		1	5	0.86
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		1	5	0.86
10950	1,1,1-Trichloroethane	71-55-6	N.D.		1	5	0.86
10950	1,1,2-Trichloroethane	79-00-5	N.D.		1	5	0.86
10950	Trichloroethene	79-01-6	N.D.		1	5	0.86
10950	Trichlorofluoromethane	75-69-4	N.D.		2	5	0.86
10950	Vinyl Chloride	75-01-4	N.D.		1	5	0.86
10950	Xylene (Total)	1330-20-7	74		1	5	0.86

The GC/MS volatile internal standard peak areas were outside the QC limits. A re-analysis was performed, and the matrix effect

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

Sample Description: BH-10-45-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-45-WC_0-2'

LLI Sample # SW 6262269
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 12:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

45-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
was confirmed.						
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	N.D.	400	2,000	10
10727	Acenaphthylene	208-96-8	N.D.	400	2,000	10
10727	Acetophenone	98-86-2	N.D.	810	2,000	10
10727	Anthracene	120-12-7	N.D.	400	2,000	10
10727	Atrazine	1912-24-9	N.D.	400	2,000	10
10727	Benzaldehyde	100-52-7	N.D.	810	2,000	10
10727	Benzo(a)anthracene	56-55-3	N.D.	400	2,000	10
10727	Benzo(a)pyrene	50-32-8	N.D.	400	2,000	10
10727	Benzo(b)fluoranthene	205-99-2	N.D.	400	2,000	10
10727	Benzo(g,h,i)perylene	191-24-2	N.D.	400	2,000	10
10727	Benzo(k)fluoranthene	207-08-9	N.D.	400	2,000	10
10727	1,1'-Biphenyl	92-52-4	N.D.	400	2,000	10
10727	4-Bromophenyl-phenylether	101-55-3	N.D.	400	2,000	10
10727	Butylbenzylphthalate	85-68-7	N.D.	810	2,000	10
10727	Di-n-butylphthalate	84-74-2	N.D.	810	2,000	10
10727	Caprolactam	105-60-2	N.D.	400	2,000	10
10727	Carbazole	86-74-8	N.D.	400	2,000	10
10727	4-Chloro-3-methylphenol	59-50-7	N.D.	810	2,000	10
10727	4-Chloroaniline	106-47-8	N.D.	810	2,000	10
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.	400	2,000	10
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.	400	2,000	10
10727	2-Chloronaphthalene	91-58-7	N.D.	400	2,000	10
10727	2-Chlorophenol	95-57-8	N.D.	400	2,000	10
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.	400	2,000	10
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.	400	2,000	10
10727	Chrysene	218-01-9	N.D.	400	2,000	10
10727	Dibenz(a,h)anthracene	53-70-3	N.D.	400	2,000	10
10727	Dibenzofuran	132-64-9	N.D.	400	2,000	10
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.	1,200	4,000	10
10727	2,4-Dichlorophenol	120-83-2	N.D.	400	2,000	10
10727	Diethylphthalate	84-66-2	N.D.	810	2,000	10
10727	2,4-Dimethylphenol	105-67-9	N.D.	810	2,000	10
10727	Dimethylphthalate	131-11-3	N.D.	810	2,000	10
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.	2,000	6,100	10
10727	2,4-Dinitrophenol	51-28-5	N.D.	4,000	12,000	10
10727	2,4-Dinitrotoluene	121-14-2	N.D.	810	2,000	10
10727	2,6-Dinitrotoluene	606-20-2	N.D.	400	2,000	10
10727	bis(2-Ethylhexyl)phthalate	117-81-7	N.D.	810	4,000	10
10727	Fluoranthene	206-44-0	N.D.	400	2,000	10
10727	Fluorene	86-73-7	N.D.	400	2,000	10
10727	Hexachlorobenzene	118-74-1	N.D.	400	2,000	10
10727	Hexachlorobutadiene	87-68-3	N.D.	810	2,000	10
10727	Hexachlorocyclopentadiene	77-47-4	N.D.	2,000	6,100	10
10727	Hexachloroethane	67-72-1	N.D.	400	2,000	10
10727	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.	400	2,000	10
10727	Isophorone	78-59-1	N.D.	400	2,000	10
10727	2-Methylnaphthalene	91-57-6	N.D.	400	2,000	10
10727	2-Methylphenol	95-48-7	N.D.	810	2,000	10
10727	4-Methylphenol	106-44-5	N.D.	810	2,000	10

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

Sample Description: BH-10-45-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-45-WC_0-2'

LLI Sample # SW 6262269
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 12:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

45-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	N.D.		400	2,000	10
10727	2-Nitroaniline	88-74-4	N.D.		400	2,000	10
10727	3-Nitroaniline	99-09-2	N.D.		810	2,000	10
10727	4-Nitroaniline	100-01-6	N.D.		810	2,000	10
10727	Nitrobenzene	98-95-3	N.D.		400	2,000	10
10727	2-Nitrophenol	88-75-5	N.D.		400	2,000	10
10727	4-Nitrophenol	100-02-7	N.D.		2,000	6,100	10
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		400	2,000	10
10727	N-Nitrosodiphenylamine	86-30-6	N.D.		400	2,000	10
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		810	2,000	10
10727	Pentachlorophenol	87-86-5	N.D.		2,000	6,100	10
10727	Phenanthrene	85-01-8	N.D.		400	2,000	10
10727	Phenol	108-95-2	N.D.		400	2,000	10
10727	Pyrene	129-00-0	N.D.		400	2,000	10
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		810	2,000	10
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		400	2,000	10
	Reporting limits were raised due to interference from the sample matrix.						
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	11,200		5.83	23.2	1
06944	Antimony	7440-36-0	N.D.		1.16	2.32	1
06935	Arsenic	7440-38-2	6.94		1.10	2.32	1
06946	Barium	7440-39-3	75.7		0.0463	0.579	1
06947	Beryllium	7440-41-7	0.523	J	0.0788	0.579	1
06949	Cadmium	7440-43-9	N.D.		0.162	0.579	1
01650	Calcium	7440-70-2	37,300		7.10	23.2	1
06951	Chromium	7440-47-3	32.3		0.684	1.74	1
06952	Cobalt	7440-48-4	8.02		0.220	0.579	1
06953	Copper	7440-50-8	48.8		0.255	1.16	1
01654	Iron	7439-89-6	14,700		5.46	23.2	1
06955	Lead	7439-92-1	96.7		0.695	1.74	1
01657	Magnesium	7439-95-4	22,200		2.94	11.6	1
06958	Manganese	7439-96-5	396		0.0904	0.579	1
06961	Nickel	7440-02-0	16.1		0.220	1.16	1
01662	Potassium	7440-09-7	904		20.9	57.9	1
06936	Selenium	7782-49-2	N.D.		1.14	2.32	1
06966	Silver	7440-22-4	N.D.		0.209	0.579	1
01667	Sodium	7440-23-5	61.2	J	43.2	116	1
06925	Thallium	7440-28-0	N.D.		1.68	3.48	1
06971	Vanadium	7440-62-2	35.6		0.220	0.579	1
06972	Zinc	7440-66-6	70.8		0.765	2.32	1
	SW-846 7471A		**mg/kg**		**mg/kg**	**mg/kg**	

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

Sample Description: BH-10-45-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-45-WC_0-2'

LLI Sample # SW 6262269
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 12:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

45-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.267	0.0033	0.114	1
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	17.8	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	X111131AA	04/23/2011 07:02	Stephanie A Selis	0.86
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/12/2011 12:15	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/12/2011 12:15	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/12/2011 12:15	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLA026	04/21/2011 20:39	Brian K Graham	10
10809	BNA Soil Microwave	SW-846 3546	1	11110SLA026	04/20/2011 15:40	Kelli M Barto	1
01643	Aluminum	SW-846 6010B	1	111115708001	04/24/2011 11:50	Damary Valentin	1
06944	Antimony	SW-846 6010B	1	111115708001	04/24/2011 11:50	Damary Valentin	1
06935	Arsenic	SW-846 6010B	1	111115708001	04/24/2011 11:50	Damary Valentin	1
06946	Barium	SW-846 6010B	1	111115708001	04/24/2011 11:50	Damary Valentin	1
06947	Beryllium	SW-846 6010B	1	111115708001	04/24/2011 11:50	Damary Valentin	1
06949	Cadmium	SW-846 6010B	1	111115708001	04/27/2011 03:05	John W Yanzuk II	1
01650	Calcium	SW-846 6010B	1	111115708001	04/24/2011 11:50	Damary Valentin	1
06951	Chromium	SW-846 6010B	1	111115708001	04/24/2011 11:50	Damary Valentin	1
06952	Cobalt	SW-846 6010B	1	111115708001	04/24/2011 11:50	Damary Valentin	1
06953	Copper	SW-846 6010B	1	111115708001	04/27/2011 03:05	John W Yanzuk II	1
01654	Iron	SW-846 6010B	1	111115708001	04/24/2011 11:50	Damary Valentin	1
06955	Lead	SW-846 6010B	1	111115708001	04/28/2011 00:12	John W Yanzuk II	1
01657	Magnesium	SW-846 6010B	1	111115708001	04/24/2011 11:50	Damary Valentin	1
06958	Manganese	SW-846 6010B	1	111115708001	04/24/2011 11:50	Damary Valentin	1
06961	Nickel	SW-846 6010B	1	111115708001	04/24/2011 11:50	Damary Valentin	1
01662	Potassium	SW-846 6010B	1	111115708001	04/24/2011 11:50	Damary Valentin	1
06936	Selenium	SW-846 6010B	1	111115708001	04/24/2011 11:50	Damary Valentin	1
06966	Silver	SW-846 6010B	1	111115708001	04/24/2011 11:50	Damary Valentin	1
01667	Sodium	SW-846 6010B	1	111115708001	04/24/2011 11:50	Damary Valentin	1
06925	Thallium	SW-846 6010B	1	111115708001	04/24/2011 11:50	Damary Valentin	1

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

Sample Description: **BH-10-45-WC_0-2' Grab Soil**
Philadelphia Refinery AOI-10
COC: 259438 BH-10-45-WC_0-2'

LLI Sample # SW 6262269
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 12:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

45-02

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06971	Vanadium	SW-846 6010B	1	111115708001	04/24/2011 11:50	Damary Valentin	1
06972	Zinc	SW-846 6010B	1	111115708001	04/24/2011 11:50	Damary Valentin	1
00159	Mercury	SW-846 7471A	1	111115711001	04/22/2011 06:47	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111115708001	04/21/2011 12:14	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111115711001	04/21/2011 13:53	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820002A	04/22/2011 18:41	Scott W Freisher	1

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-45-WC_5-8' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-45-WC_5-8'

LLI Sample # SW 6262270
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 12:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

45-58

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	N.D.		530	1,500	61.23
10950	Benzene	71-43-2	890		38	380	61.23
10950	Bromodichloromethane	75-27-4	N.D.		76	380	61.23
10950	Bromoform	75-25-2	N.D.		76	380	61.23
10950	Bromomethane	74-83-9	N.D.		150	380	61.23
10950	2-Butanone	78-93-3	N.D.		310	760	61.23
10950	Carbon Disulfide	75-15-0	N.D.		76	380	61.23
10950	Carbon Tetrachloride	56-23-5	N.D.		76	380	61.23
10950	Chlorobenzene	108-90-7	N.D.		76	380	61.23
10950	Chloroethane	75-00-3	N.D.		150	380	61.23
10950	Chloroform	67-66-3	N.D.		76	380	61.23
10950	Chloromethane	74-87-3	N.D.		150	380	61.23
10950	Cyclohexane	110-82-7	2,100		76	380	61.23
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		150	380	61.23
10950	Dibromochloromethane	124-48-1	N.D.		76	380	61.23
10950	1,2-Dibromoethane	106-93-4	N.D.		76	380	61.23
10950	1,2-Dichlorobenzene	95-50-1	N.D.		76	380	61.23
10950	1,3-Dichlorobenzene	541-73-1	N.D.		76	380	61.23
10950	1,4-Dichlorobenzene	106-46-7	N.D.		76	380	61.23
10950	Dichlorodifluoromethane	75-71-8	N.D.		150	380	61.23
10950	1,1-Dichloroethane	75-34-3	N.D.		76	380	61.23
10950	1,2-Dichloroethane	107-06-2	N.D.		76	380	61.23
10950	1,1-Dichloroethene	75-35-4	N.D.		76	380	61.23
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		76	380	61.23
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		76	380	61.23
10950	1,2-Dichloropropane	78-87-5	N.D.		76	380	61.23
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		76	380	61.23
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		76	380	61.23
10950	Ethylbenzene	100-41-4	5,900		76	380	61.23
10950	Freon 113	76-13-1	N.D.		150	760	61.23
10950	2-Hexanone	591-78-6	N.D.		230	760	61.23
10950	Isopropylbenzene	98-82-8	3,900		76	380	61.23
10950	Methyl Acetate	79-20-9	260	J	150	380	61.23
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		38	380	61.23
10950	4-Methyl-2-pentanone	108-10-1	N.D.		230	760	61.23
10950	Methylcyclohexane	108-87-2	12,000		76	380	61.23
10950	Methylene Chloride	75-09-2	N.D.		150	380	61.23
10950	Styrene	100-42-5	N.D.		76	380	61.23
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		76	380	61.23
10950	Tetrachloroethene	127-18-4	N.D.		76	380	61.23
10950	Toluene	108-88-3	360	J	76	380	61.23
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		76	380	61.23
10950	1,1,1-Trichloroethane	71-55-6	N.D.		76	380	61.23
10950	1,1,2-Trichloroethane	79-00-5	N.D.		76	380	61.23
10950	Trichloroethene	79-01-6	N.D.		76	380	61.23
10950	Trichlorofluoromethane	75-69-4	N.D.		150	380	61.23
10950	Vinyl Chloride	75-01-4	N.D.		76	380	61.23
10950	Xylene (Total)	1330-20-7	11,000		76	380	61.23

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

Sample Description: BH-10-45-WC_5-8' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-45-WC_5-8'

LLI Sample # SW 6262270
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 12:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

45-58

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**		**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	5,700	J	2,100	10,000	5
10727	Acenaphthylene	208-96-8	N.D.		2,100	10,000	5
10727	Acetophenone	98-86-2	N.D.		4,100	10,000	5
10727	Anthracene	120-12-7	2,500	J	2,100	10,000	5
10727	Atrazine	1912-24-9	N.D.		2,100	10,000	5
10727	Benzaldehyde	100-52-7	N.D.		4,100	10,000	5
10727	Benzo(a)anthracene	56-55-3	3,400	J	2,100	10,000	5
10727	Benzo(a)pyrene	50-32-8	N.D.		2,100	10,000	5
10727	Benzo(b)fluoranthene	205-99-2	N.D.		2,100	10,000	5
10727	Benzo(g,h,i)perylene	191-24-2	N.D.		2,100	10,000	5
10727	Benzo(k)fluoranthene	207-08-9	N.D.		2,100	10,000	5
10727	1,1'-Biphenyl	92-52-4	6,400	J	2,100	10,000	5
10727	4-Bromophenyl-phenylether	101-55-3	N.D.		2,100	10,000	5
10727	Butylbenzylphthalate	85-68-7	N.D.		4,100	10,000	5
10727	Di-n-butylphthalate	84-74-2	N.D.		4,100	10,000	5
10727	Caprolactam	105-60-2	N.D.		2,100	10,000	5
10727	Carbazole	86-74-8	N.D.		2,100	10,000	5
10727	4-Chloro-3-methylphenol	59-50-7	N.D.		4,100	10,000	5
10727	4-Chloroaniline	106-47-8	N.D.		4,100	10,000	5
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.		2,100	10,000	5
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.		2,100	10,000	5
10727	2-Chloronaphthalene	91-58-7	N.D.		2,100	10,000	5
10727	2-Chlorophenol	95-57-8	N.D.		2,100	10,000	5
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.		2,100	10,000	5
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.		2,100	10,000	5
10727	Chrysene	218-01-9	15,000		2,100	10,000	5
10727	Dibenz(a,h)anthracene	53-70-3	N.D.		2,100	10,000	5
10727	Dibenzofuran	132-64-9	N.D.		2,100	10,000	5
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.		6,200	21,000	5
10727	2,4-Dichlorophenol	120-83-2	N.D.		2,100	10,000	5
10727	Diethylphthalate	84-66-2	N.D.		4,100	10,000	5
10727	2,4-Dimethylphenol	105-67-9	N.D.		4,100	10,000	5
10727	Dimethylphthalate	131-11-3	N.D.		4,100	10,000	5
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.		10,000	31,000	5
10727	2,4-Dinitrophenol	51-28-5	N.D.		21,000	62,000	5
10727	2,4-Dinitrotoluene	121-14-2	N.D.		4,100	10,000	5
10727	2,6-Dinitrotoluene	606-20-2	N.D.		2,100	10,000	5
10727	bis(2-Ethylhexyl)phthalate	117-81-7	N.D.		4,100	21,000	5
10727	Fluoranthene	206-44-0	N.D.		2,100	10,000	5
10727	Fluorene	86-73-7	8,600	J	2,100	10,000	5
10727	Hexachlorobenzene	118-74-1	N.D.		2,100	10,000	5
10727	Hexachlorobutadiene	87-68-3	N.D.		4,100	10,000	5
10727	Hexachlorocyclopentadiene	77-47-4	N.D.		10,000	31,000	5
10727	Hexachloroethane	67-72-1	N.D.		2,100	10,000	5
10727	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.		2,100	10,000	5
10727	Isophorone	78-59-1	N.D.		2,100	10,000	5
10727	2-Methylnaphthalene	91-57-6	110,000		2,100	10,000	5
10727	2-Methylphenol	95-48-7	N.D.		4,100	10,000	5
10727	4-Methylphenol	106-44-5	N.D.		4,100	10,000	5

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

Sample Description: BH-10-45-WC_5-8' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-45-WC_5-8'

LLI Sample # SW 6262270
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 12:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

45-58

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	27,000		2,100	10,000	5
10727	2-Nitroaniline	88-74-4	N.D.		2,100	10,000	5
10727	3-Nitroaniline	99-09-2	N.D.		4,100	10,000	5
10727	4-Nitroaniline	100-01-6	N.D.		4,100	10,000	5
10727	Nitrobenzene	98-95-3	N.D.		2,100	10,000	5
10727	2-Nitrophenol	88-75-5	N.D.		2,100	10,000	5
10727	4-Nitrophenol	100-02-7	N.D.		10,000	31,000	5
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		2,100	10,000	5
10727	N-Nitrosodiphenylamine	86-30-6	15,000		2,100	10,000	5
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		4,100	10,000	5
10727	Pentachlorophenol	87-86-5	N.D.		10,000	31,000	5
10727	Phenanthrene	85-01-8	23,000		2,100	10,000	5
10727	Phenol	108-95-2	N.D.		2,100	10,000	5
10727	Pyrene	129-00-0	4,700	J	2,100	10,000	5
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		4,100	10,000	5
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		2,100	10,000	5
	Reporting limits were raised due to interference from the sample matrix.						
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	12,000		6.09	24.2	1
06944	Antimony	7440-36-0	N.D.		1.21	2.42	1
06935	Arsenic	7440-38-2	10.7		1.15	2.42	1
06946	Barium	7440-39-3	122		0.0484	0.605	1
06947	Beryllium	7440-41-7	0.551	J	0.0823	0.605	1
06949	Cadmium	7440-43-9	N.D.		0.169	0.605	1
01650	Calcium	7440-70-2	20,900		7.42	24.2	1
06951	Chromium	7440-47-3	160		0.714	1.82	1
06952	Cobalt	7440-48-4	10.0		0.230	0.605	1
06953	Copper	7440-50-8	80.3		0.266	1.21	1
01654	Iron	7439-89-6	26,600		5.70	24.2	1
06955	Lead	7439-92-1	307		0.726	1.82	1
01657	Magnesium	7439-95-4	8,680		3.07	12.1	1
06958	Manganese	7439-96-5	434		0.0944	0.605	1
06961	Nickel	7440-02-0	34.1		0.230	1.21	1
01662	Potassium	7440-09-7	1,490		21.8	60.5	1
06936	Selenium	7782-49-2	N.D.		1.19	2.42	1
06966	Silver	7440-22-4	N.D.		0.218	0.605	1
01667	Sodium	7440-23-5	114	J	45.2	121	1
06925	Thallium	7440-28-0	4.31		1.76	3.63	1
06971	Vanadium	7440-62-2	76.5		0.230	0.605	1
06972	Zinc	7440-66-6	229		0.799	2.42	1
	SW-846 7471A		**mg/kg**		**mg/kg**	**mg/kg**	

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

Sample Description: BH-10-45-WC_5-8' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-45-WC_5-8'

LLI Sample # SW 6262270
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 12:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

45-58

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.667	0.0034	0.119	1
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	19.8	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	Q111121AA	04/22/2011 09:32	Stephanie A Selis	61.23
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/12/2011 12:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/12/2011 12:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/12/2011 12:30	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLD026	04/25/2011 04:10	Brian K Graham	5
10809	BNA Soil Microwave	SW-846 3546	1	11110SLD026	04/21/2011 09:30	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111125708002	04/26/2011 23:04	John W Yanzuk II	1
06944	Antimony	SW-846 6010B	1	111125708002	04/26/2011 23:04	John W Yanzuk II	1
06935	Arsenic	SW-846 6010B	1	111125708002	04/26/2011 23:04	John W Yanzuk II	1
06946	Barium	SW-846 6010B	1	111125708002	04/26/2011 23:04	John W Yanzuk II	1
06947	Beryllium	SW-846 6010B	1	111125708002	04/26/2011 23:04	John W Yanzuk II	1
06949	Cadmium	SW-846 6010B	1	111125708002	04/26/2011 23:04	John W Yanzuk II	1
01650	Calcium	SW-846 6010B	1	111125708002	04/26/2011 23:04	John W Yanzuk II	1
06951	Chromium	SW-846 6010B	1	111125708002	04/26/2011 23:04	John W Yanzuk II	1
06952	Cobalt	SW-846 6010B	1	111125708002	04/26/2011 23:04	John W Yanzuk II	1
06953	Copper	SW-846 6010B	1	111125708002	04/26/2011 23:04	John W Yanzuk II	1
01654	Iron	SW-846 6010B	1	111125708002	04/26/2011 23:04	John W Yanzuk II	1
06955	Lead	SW-846 6010B	1	111125708002	04/26/2011 23:04	John W Yanzuk II	1
01657	Magnesium	SW-846 6010B	1	111125708002	04/26/2011 23:04	John W Yanzuk II	1
06958	Manganese	SW-846 6010B	1	111125708002	04/26/2011 23:04	John W Yanzuk II	1
06961	Nickel	SW-846 6010B	1	111125708002	04/26/2011 23:04	John W Yanzuk II	1
01662	Potassium	SW-846 6010B	1	111125708002	04/26/2011 23:04	John W Yanzuk II	1
06936	Selenium	SW-846 6010B	1	111125708002	04/26/2011 23:04	John W Yanzuk II	1
06966	Silver	SW-846 6010B	1	111125708002	04/26/2011 23:04	John W Yanzuk II	1
01667	Sodium	SW-846 6010B	1	111125708002	04/26/2011 23:04	John W Yanzuk II	1
06925	Thallium	SW-846 6010B	1	111125708002	04/26/2011 23:04	John W Yanzuk II	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: **BH-10-45-WC_5-8' Grab Soil**
Philadelphia Refinery AOI-10
COC: 259438 BH-10-45-WC_5-8'

LLI Sample # SW 6262270
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 12:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

45-58

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06971	Vanadium	SW-846 6010B	1	111125708002	04/26/2011 23:04	John W Yanzuk II	1
06972	Zinc	SW-846 6010B	1	111125708002	04/26/2011 23:04	John W Yanzuk II	1
00159	Mercury	SW-846 7471A	2	111155711002	04/26/2011 08:10	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111125708002	04/22/2011 20:18	Annamaria Stipkovits	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111125711002	04/22/2011 23:30	Annamaria Stipkovits	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	2	111155711002	04/26/2011 01:05	Annamaria Stipkovits	1
00111	Moisture	SM20 2540 G	1	11112820002B	04/22/2011 18:41	Scott W Freisher	1

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-45-WC_18-20' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-45-WC_18-20'

LLI Sample # SW 6262271
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 13:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

18-45

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	N.D.		720	2,000	70.37
10950	Benzene	71-43-2	1,200		51	510	70.37
10950	Bromodichloromethane	75-27-4	N.D.		100	510	70.37
10950	Bromoform	75-25-2	N.D.		100	510	70.37
10950	Bromomethane	74-83-9	N.D.		200	510	70.37
10950	2-Butanone	78-93-3	N.D.		410	1,000	70.37
10950	Carbon Disulfide	75-15-0	N.D.		100	510	70.37
10950	Carbon Tetrachloride	56-23-5	N.D.		100	510	70.37
10950	Chlorobenzene	108-90-7	N.D.		100	510	70.37
10950	Chloroethane	75-00-3	N.D.		200	510	70.37
10950	Chloroform	67-66-3	N.D.		100	510	70.37
10950	Chloromethane	74-87-3	N.D.		200	510	70.37
10950	Cyclohexane	110-82-7	2,000		100	510	70.37
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		200	510	70.37
10950	Dibromochloromethane	124-48-1	N.D.		100	510	70.37
10950	1,2-Dibromoethane	106-93-4	N.D.		100	510	70.37
10950	1,2-Dichlorobenzene	95-50-1	N.D.		100	510	70.37
10950	1,3-Dichlorobenzene	541-73-1	N.D.		100	510	70.37
10950	1,4-Dichlorobenzene	106-46-7	N.D.		100	510	70.37
10950	Dichlorodifluoromethane	75-71-8	N.D.		200	510	70.37
10950	1,1-Dichloroethane	75-34-3	N.D.		100	510	70.37
10950	1,2-Dichloroethane	107-06-2	N.D.		100	510	70.37
10950	1,1-Dichloroethene	75-35-4	N.D.		100	510	70.37
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		100	510	70.37
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		100	510	70.37
10950	1,2-Dichloropropane	78-87-5	N.D.		100	510	70.37
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		100	510	70.37
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		100	510	70.37
10950	Ethylbenzene	100-41-4	520		100	510	70.37
10950	Freon 113	76-13-1	N.D.		200	1,000	70.37
10950	2-Hexanone	591-78-6	N.D.		310	1,000	70.37
10950	Isopropylbenzene	98-82-8	6,400		100	510	70.37
10950	Methyl Acetate	79-20-9	480	J	200	510	70.37
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		51	510	70.37
10950	4-Methyl-2-pentanone	108-10-1	N.D.		310	1,000	70.37
10950	Methylcyclohexane	108-87-2	11,000		100	510	70.37
10950	Methylene Chloride	75-09-2	N.D.		200	510	70.37
10950	Styrene	100-42-5	N.D.		100	510	70.37
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		100	510	70.37
10950	Tetrachloroethene	127-18-4	N.D.		100	510	70.37
10950	Toluene	108-88-3	310	J	100	510	70.37
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		100	510	70.37
10950	1,1,1-Trichloroethane	71-55-6	N.D.		100	510	70.37
10950	1,1,2-Trichloroethane	79-00-5	N.D.		100	510	70.37
10950	Trichloroethene	79-01-6	N.D.		100	510	70.37
10950	Trichlorofluoromethane	75-69-4	N.D.		200	510	70.37
10950	Vinyl Chloride	75-01-4	N.D.		100	510	70.37
10950	Xylene (Total)	1330-20-7	2,600		100	510	70.37

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

Sample Description: BH-10-45-WC_18-20' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-45-WC_18-20'

LLI Sample # SW 6262271
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 13:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

18-45

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**		**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	4,900		240	1,200	5
10727	Acenaphthylene	208-96-8	N.D.		240	1,200	5
10727	Acetophenone	98-86-2	N.D.		480	1,200	5
10727	Anthracene	120-12-7	2,800		240	1,200	5
10727	Atrazine	1912-24-9	N.D.		240	1,200	5
10727	Benzaldehyde	100-52-7	N.D.		480	1,200	5
10727	Benzo(a)anthracene	56-55-3	2,800		240	1,200	5
10727	Benzo(a)pyrene	50-32-8	2,200		240	1,200	5
10727	Benzo(b)fluoranthene	205-99-2	2,600		240	1,200	5
10727	Benzo(g,h,i)perylene	191-24-2	1,200	J	240	1,200	5
10727	Benzo(k)fluoranthene	207-08-9	900	J	240	1,200	5
10727	1,1'-Biphenyl	92-52-4	630	J	240	1,200	5
10727	4-Bromophenyl-phenylether	101-55-3	N.D.		240	1,200	5
10727	Butylbenzylphthalate	85-68-7	N.D.		480	1,200	5
10727	Di-n-butylphthalate	84-74-2	N.D.		480	1,200	5
10727	Caprolactam	105-60-2	N.D.		240	1,200	5
10727	Carbazole	86-74-8	510	J	240	1,200	5
10727	4-Chloro-3-methylphenol	59-50-7	N.D.		480	1,200	5
10727	4-Chloroaniline	106-47-8	N.D.		480	1,200	5
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.		240	1,200	5
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.		240	1,200	5
10727	2-Chloronaphthalene	91-58-7	N.D.		240	1,200	5
10727	2-Chlorophenol	95-57-8	N.D.		240	1,200	5
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.		240	1,200	5
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.		240	1,200	5
10727	Chrysene	218-01-9	3,700		240	1,200	5
10727	Dibenz(a,h)anthracene	53-70-3	430	J	240	1,200	5
10727	Dibenzofuran	132-64-9	3,500		240	1,200	5
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.		720	2,400	5
10727	2,4-Dichlorophenol	120-83-2	N.D.		240	1,200	5
10727	Diethylphthalate	84-66-2	N.D.		480	1,200	5
10727	2,4-Dimethylphenol	105-67-9	N.D.		480	1,200	5
10727	Dimethylphthalate	131-11-3	N.D.		480	1,200	5
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.		1,200	3,600	5
10727	2,4-Dinitrophenol	51-28-5	N.D.		2,400	7,200	5
10727	2,4-Dinitrotoluene	121-14-2	N.D.		480	1,200	5
10727	2,6-Dinitrotoluene	606-20-2	N.D.		240	1,200	5
10727	bis(2-Ethylhexyl)phthalate	117-81-7	2,100	J	480	2,400	5
10727	Fluoranthene	206-44-0	4,600		240	1,200	5
10727	Fluorene	86-73-7	6,100		240	1,200	5
10727	Hexachlorobenzene	118-74-1	N.D.		240	1,200	5
10727	Hexachlorobutadiene	87-68-3	N.D.		480	1,200	5
10727	Hexachlorocyclopentadiene	77-47-4	N.D.		1,200	3,600	5
10727	Hexachloroethane	67-72-1	N.D.		240	1,200	5
10727	Indeno(1,2,3-cd)pyrene	193-39-5	1,000	J	240	1,200	5
10727	Isophorone	78-59-1	N.D.		240	1,200	5
10727	2-Methylnaphthalene	91-57-6	25,000		240	1,200	5
10727	2-Methylphenol	95-48-7	N.D.		480	1,200	5
10727	4-Methylphenol	106-44-5	N.D.		480	1,200	5

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

Sample Description: BH-10-45-WC_18-20' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-45-WC_18-20'

LLI Sample # SW 6262271
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 13:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

18-45

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.					
10727	Naphthalene	91-20-3	9,000	240	1,200	5
10727	2-Nitroaniline	88-74-4	N.D.	240	1,200	5
10727	3-Nitroaniline	99-09-2	N.D.	480	1,200	5
10727	4-Nitroaniline	100-01-6	N.D.	480	1,200	5
10727	Nitrobenzene	98-95-3	N.D.	240	1,200	5
10727	2-Nitrophenol	88-75-5	N.D.	240	1,200	5
10727	4-Nitrophenol	100-02-7	N.D.	1,200	3,600	5
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.	240	1,200	5
10727	N-Nitrosodiphenylamine	86-30-6	N.D.	240	1,200	5
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.					
10727	Di-n-octylphthalate	117-84-0	N.D.	480	1,200	5
10727	Pentachlorophenol	87-86-5	N.D.	1,200	3,600	5
10727	Phenanthrene	85-01-8	20,000	240	1,200	5
10727	Phenol	108-95-2	N.D.	240	1,200	5
10727	Pyrene	129-00-0	4,600	240	1,200	5
10727	2,4,5-Trichlorophenol	95-95-4	N.D.	480	1,200	5
10727	2,4,6-Trichlorophenol	88-06-2	N.D.	240	1,200	5
	Reporting limits were raised due to interference from the sample matrix.					
Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	21,500	7.32	29.1	1
06944	Antimony	7440-36-0	N.D.	1.46	2.91	1
06935	Arsenic	7440-38-2	6.88	1.38	2.91	1
06946	Barium	7440-39-3	224	0.0582	0.728	1
06947	Beryllium	7440-41-7	1.19	0.0990	0.728	1
06949	Cadmium	7440-43-9	N.D.	0.204	0.728	1
01650	Calcium	7440-70-2	4,740	8.92	29.1	1
06951	Chromium	7440-47-3	46.6	0.859	2.18	1
06952	Cobalt	7440-48-4	13.1	0.277	0.728	1
06953	Copper	7440-50-8	52.7	0.320	1.46	1
01654	Iron	7439-89-6	25,200	6.86	29.1	1
06955	Lead	7439-92-1	159	0.873	2.18	1
01657	Magnesium	7439-95-4	6,760	3.70	14.6	1
06958	Manganese	7439-96-5	449	0.114	0.728	1
06961	Nickel	7440-02-0	30.6	0.277	1.46	1
01662	Potassium	7440-09-7	2,050	26.2	72.8	1
06936	Selenium	7782-49-2	1.60 J	1.43	2.91	1
06966	Silver	7440-22-4	N.D.	0.262	0.728	1
01667	Sodium	7440-23-5	300	54.3	146	1
06925	Thallium	7440-28-0	3.53 J	2.11	4.37	1
06971	Vanadium	7440-62-2	52.3	0.277	0.728	1
06972	Zinc	7440-66-6	204	0.961	2.91	1
	SW-846 7471A		**mg/kg**	**mg/kg**	**mg/kg**	

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-45-WC_18-20' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-45-WC_18-20'

LLI Sample # SW 6262271
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 13:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

18-45

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.669	0.0041	0.144	1
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	31.3	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	Q111121AA	04/22/2011 07:13	Stephanie A Selis	70.37
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/12/2011 13:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/12/2011 13:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/12/2011 13:00	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLD026	04/25/2011 05:27	Brian K Graham	5
10809	BNA Soil Microwave	SW-846 3546	1	11110SLD026	04/21/2011 09:30	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111125708002	04/26/2011 23:08	John W Yanzuk II	1
06944	Antimony	SW-846 6010B	1	111125708002	04/26/2011 23:08	John W Yanzuk II	1
06935	Arsenic	SW-846 6010B	1	111125708002	04/26/2011 23:08	John W Yanzuk II	1
06946	Barium	SW-846 6010B	1	111125708002	04/26/2011 23:08	John W Yanzuk II	1
06947	Beryllium	SW-846 6010B	1	111125708002	04/26/2011 23:08	John W Yanzuk II	1
06949	Cadmium	SW-846 6010B	1	111125708002	04/26/2011 23:08	John W Yanzuk II	1
01650	Calcium	SW-846 6010B	1	111125708002	04/26/2011 23:08	John W Yanzuk II	1
06951	Chromium	SW-846 6010B	1	111125708002	04/26/2011 23:08	John W Yanzuk II	1
06952	Cobalt	SW-846 6010B	1	111125708002	04/26/2011 23:08	John W Yanzuk II	1
06953	Copper	SW-846 6010B	1	111125708002	04/26/2011 23:08	John W Yanzuk II	1
01654	Iron	SW-846 6010B	1	111125708002	04/26/2011 23:08	John W Yanzuk II	1
06955	Lead	SW-846 6010B	1	111125708002	04/26/2011 23:08	John W Yanzuk II	1
01657	Magnesium	SW-846 6010B	1	111125708002	04/26/2011 23:08	John W Yanzuk II	1
06958	Manganese	SW-846 6010B	1	111125708002	04/26/2011 23:08	John W Yanzuk II	1
06961	Nickel	SW-846 6010B	1	111125708002	04/26/2011 23:08	John W Yanzuk II	1
01662	Potassium	SW-846 6010B	1	111125708002	04/26/2011 23:08	John W Yanzuk II	1
06936	Selenium	SW-846 6010B	1	111125708002	04/26/2011 23:08	John W Yanzuk II	1
06966	Silver	SW-846 6010B	1	111125708002	04/26/2011 23:08	John W Yanzuk II	1
01667	Sodium	SW-846 6010B	1	111125708002	04/26/2011 23:08	John W Yanzuk II	1
06925	Thallium	SW-846 6010B	1	111125708002	04/26/2011 23:08	John W Yanzuk II	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-45-WC_18-20' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-45-WC_18-20'

LLI Sample # SW 6262271
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 13:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

18-45

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06971	Vanadium	SW-846 6010B	1	111125708002	04/26/2011 23:08	John W Yanzuk II	1
06972	Zinc	SW-846 6010B	1	111125708002	04/26/2011 23:08	John W Yanzuk II	1
00159	Mercury	SW-846 7471A	2	111155711002	04/26/2011 08:11	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111125708002	04/22/2011 20:18	Annamaria Stipkovits	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111125711002	04/22/2011 23:30	Annamaria Stipkovits	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	2	111155711002	04/26/2011 01:05	Annamaria Stipkovits	1
00111	Moisture	SM20 2540 G	1	11112820002B	04/22/2011 18:41	Scott W Freisher	1

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-55-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-55-WC_0-2'

LLI Sample # SW 6262272
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 14:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

55-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	93		9	25	0.98
10950	Benzene	71-43-2	35		0.6	6	0.98
10950	Bromodichloromethane	75-27-4	N.D.		1	6	0.98
10950	Bromoform	75-25-2	N.D.		1	6	0.98
10950	Bromomethane	74-83-9	N.D.		3	6	0.98
10950	2-Butanone	78-93-3	11	J	5	13	0.98
10950	Carbon Disulfide	75-15-0	4	J	1	6	0.98
10950	Carbon Tetrachloride	56-23-5	N.D.		1	6	0.98
10950	Chlorobenzene	108-90-7	N.D.		1	6	0.98
10950	Chloroethane	75-00-3	N.D.		3	6	0.98
10950	Chloroform	67-66-3	N.D.		1	6	0.98
10950	Chloromethane	74-87-3	N.D.		3	6	0.98
10950	Cyclohexane	110-82-7	3	J	1	6	0.98
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		3	6	0.98
10950	Dibromochloromethane	124-48-1	N.D.		1	6	0.98
10950	1,2-Dibromoethane	106-93-4	N.D.		1	6	0.98
10950	1,2-Dichlorobenzene	95-50-1	N.D.		1	6	0.98
10950	1,3-Dichlorobenzene	541-73-1	N.D.		1	6	0.98
10950	1,4-Dichlorobenzene	106-46-7	N.D.		1	6	0.98
10950	Dichlorodifluoromethane	75-71-8	N.D.		3	6	0.98
10950	1,1-Dichloroethane	75-34-3	N.D.		1	6	0.98
10950	1,2-Dichloroethane	107-06-2	N.D.		1	6	0.98
10950	1,1-Dichloroethene	75-35-4	N.D.		1	6	0.98
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		1	6	0.98
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		1	6	0.98
10950	1,2-Dichloropropane	78-87-5	N.D.		1	6	0.98
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		1	6	0.98
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		1	6	0.98
10950	Ethylbenzene	100-41-4	7		1	6	0.98
10950	Freon 113	76-13-1	N.D.		3	13	0.98
10950	2-Hexanone	591-78-6	N.D.		4	13	0.98
10950	Isopropylbenzene	98-82-8	3	J	1	6	0.98
10950	Methyl Acetate	79-20-9	N.D.		3	6	0.98
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.6	6	0.98
10950	4-Methyl-2-pentanone	108-10-1	N.D.		4	13	0.98
10950	Methylcyclohexane	108-87-2	8		1	6	0.98
10950	Methylene Chloride	75-09-2	N.D.		3	6	0.98
10950	Styrene	100-42-5	N.D.		1	6	0.98
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		1	6	0.98
10950	Tetrachloroethene	127-18-4	N.D.		1	6	0.98
10950	Toluene	108-88-3	26		1	6	0.98
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		1	6	0.98
10950	1,1,1-Trichloroethane	71-55-6	N.D.		1	6	0.98
10950	1,1,2-Trichloroethane	79-00-5	N.D.		1	6	0.98
10950	Trichloroethene	79-01-6	N.D.		1	6	0.98
10950	Trichlorofluoromethane	75-69-4	N.D.		3	6	0.98
10950	Vinyl Chloride	75-01-4	N.D.		1	6	0.98
10950	Xylene (Total)	1330-20-7	34		1	6	0.98

The GC/MS volatile internal standard peak areas were outside the QC limits. A re-analysis was performed, and the matrix effect

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

Sample Description: BH-10-55-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-55-WC_0-2'

LLI Sample # SW 6262272
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 14:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

55-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
was confirmed.							
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	N.D.		210	1,100	5
10727	Acenaphthylene	208-96-8	N.D.		210	1,100	5
10727	Acetophenone	98-86-2	N.D.		420	1,100	5
10727	Anthracene	120-12-7	250	J	210	1,100	5
10727	Atrazine	1912-24-9	N.D.		210	1,100	5
10727	Benzaldehyde	100-52-7	N.D.		420	1,100	5
10727	Benzo(a)anthracene	56-55-3	680	J	210	1,100	5
10727	Benzo(a)pyrene	50-32-8	820	J	210	1,100	5
10727	Benzo(b)fluoranthene	205-99-2	1,200		210	1,100	5
10727	Benzo(g,h,i)perylene	191-24-2	990	J	210	1,100	5
10727	Benzo(k)fluoranthene	207-08-9	400	J	210	1,100	5
10727	1,1'-Biphenyl	92-52-4	N.D.		210	1,100	5
10727	4-Bromophenyl-phenylether	101-55-3	N.D.		210	1,100	5
10727	Butylbenzylphthalate	85-68-7	N.D.		420	1,100	5
10727	Di-n-butylphthalate	84-74-2	N.D.		420	1,100	5
10727	Caprolactam	105-60-2	N.D.		210	1,100	5
10727	Carbazole	86-74-8	N.D.		210	1,100	5
10727	4-Chloro-3-methylphenol	59-50-7	N.D.		420	1,100	5
10727	4-Chloroaniline	106-47-8	N.D.		420	1,100	5
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.		210	1,100	5
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.		210	1,100	5
10727	2-Chloronaphthalene	91-58-7	N.D.		210	1,100	5
10727	2-Chlorophenol	95-57-8	N.D.		210	1,100	5
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.		210	1,100	5
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.		210	1,100	5
10727	Chrysene	218-01-9	850	J	210	1,100	5
10727	Dibenz(a,h)anthracene	53-70-3	290	J	210	1,100	5
10727	Dibenzofuran	132-64-9	N.D.		210	1,100	5
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.		630	2,100	5
10727	2,4-Dichlorophenol	120-83-2	N.D.		210	1,100	5
10727	Diethylphthalate	84-66-2	N.D.		420	1,100	5
10727	2,4-Dimethylphenol	105-67-9	N.D.		420	1,100	5
10727	Dimethylphthalate	131-11-3	N.D.		420	1,100	5
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.		1,100	3,200	5
10727	2,4-Dinitrophenol	51-28-5	N.D.		2,100	6,300	5
10727	2,4-Dinitrotoluene	121-14-2	N.D.		420	1,100	5
10727	2,6-Dinitrotoluene	606-20-2	N.D.		210	1,100	5
10727	bis(2-Ethylhexyl)phthalate	117-81-7	460	J	420	2,100	5
10727	Fluoranthene	206-44-0	940	J	210	1,100	5
10727	Fluorene	86-73-7	N.D.		210	1,100	5
10727	Hexachlorobenzene	118-74-1	N.D.		210	1,100	5
10727	Hexachlorobutadiene	87-68-3	N.D.		420	1,100	5
10727	Hexachlorocyclopentadiene	77-47-4	N.D.		1,100	3,200	5
10727	Hexachloroethane	67-72-1	N.D.		210	1,100	5
10727	Indeno(1,2,3-cd)pyrene	193-39-5	660	J	210	1,100	5
10727	Isophorone	78-59-1	N.D.		210	1,100	5
10727	2-Methylnaphthalene	91-57-6	920	J	210	1,100	5
10727	2-Methylphenol	95-48-7	N.D.		420	1,100	5
10727	4-Methylphenol	106-44-5	N.D.		420	1,100	5

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

Sample Description: BH-10-55-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-55-WC_0-2'

LLI Sample # SW 6262272
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 14:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

55-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	560	J	210	1,100	5
10727	2-Nitroaniline	88-74-4	N.D.		210	1,100	5
10727	3-Nitroaniline	99-09-2	N.D.		420	1,100	5
10727	4-Nitroaniline	100-01-6	N.D.		420	1,100	5
10727	Nitrobenzene	98-95-3	N.D.		210	1,100	5
10727	2-Nitrophenol	88-75-5	N.D.		210	1,100	5
10727	4-Nitrophenol	100-02-7	N.D.		1,100	3,200	5
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		210	1,100	5
10727	N-Nitrosodiphenylamine	86-30-6	N.D.		210	1,100	5
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		420	1,100	5
10727	Pentachlorophenol	87-86-5	N.D.		1,100	3,200	5
10727	Phenanthrene	85-01-8	870	J	210	1,100	5
10727	Phenol	108-95-2	N.D.		210	1,100	5
10727	Pyrene	129-00-0	900	J	210	1,100	5
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		420	1,100	5
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		210	1,100	5
	Reporting limits were raised due to interference from the sample matrix.						
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	12,500		6.25	24.9	1
06944	Antimony	7440-36-0	N.D.		1.24	2.49	1
06935	Arsenic	7440-38-2	17.1		1.18	2.49	1
06946	Barium	7440-39-3	108		0.0497	0.622	1
06947	Beryllium	7440-41-7	0.645		0.0845	0.622	1
06949	Cadmium	7440-43-9	0.557	J	0.174	0.622	1
01650	Calcium	7440-70-2	71,000		38.1	124	5
06951	Chromium	7440-47-3	254		0.733	1.86	1
06952	Cobalt	7440-48-4	7.77		0.236	0.622	1
06953	Copper	7440-50-8	545		0.273	1.24	1
01654	Iron	7439-89-6	21,300		5.86	24.9	1
06955	Lead	7439-92-1	953		0.746	1.86	1
01657	Magnesium	7439-95-4	32,500		3.16	12.4	1
06958	Manganese	7439-96-5	479		0.0970	0.622	1
06961	Nickel	7440-02-0	39.1		0.236	1.24	1
01662	Potassium	7440-09-7	1,040		22.4	62.2	1
06936	Selenium	7782-49-2	1.57	J	1.22	2.49	1
06966	Silver	7440-22-4	0.286	J	0.224	0.622	1
01667	Sodium	7440-23-5	142		46.4	124	1
06925	Thallium	7440-28-0	5.11		1.80	3.73	1
06971	Vanadium	7440-62-2	100		0.236	0.622	1
06972	Zinc	7440-66-6	427		0.820	2.49	1
	SW-846 7471A		**mg/kg**		**mg/kg**	**mg/kg**	

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

Sample Description: BH-10-55-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-55-WC_0-2'

LLI Sample # SW 6262272
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 14:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

55-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	2.32	0.0177	0.618	5
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	21.9	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	X111131AA	04/23/2011 07:25	Stephanie A Selis	0.98
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/12/2011 14:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/12/2011 14:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/12/2011 14:30	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLD026	04/25/2011 05:53	Brian K Graham	5
10809	BNA Soil Microwave	SW-846 3546	1	11110SLD026	04/21/2011 09:30	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111125708002	04/26/2011 23:12	John W Yanzuk II	1
06944	Antimony	SW-846 6010B	1	111125708002	04/26/2011 23:12	John W Yanzuk II	1
06935	Arsenic	SW-846 6010B	1	111125708002	04/26/2011 23:12	John W Yanzuk II	1
06946	Barium	SW-846 6010B	1	111125708002	04/26/2011 23:12	John W Yanzuk II	1
06947	Beryllium	SW-846 6010B	1	111125708002	04/26/2011 23:12	John W Yanzuk II	1
06949	Cadmium	SW-846 6010B	1	111125708002	04/26/2011 23:12	John W Yanzuk II	1
01650	Calcium	SW-846 6010B	1	111125708002	04/27/2011 21:09	John P Hook	5
06951	Chromium	SW-846 6010B	1	111125708002	04/26/2011 23:12	John W Yanzuk II	1
06952	Cobalt	SW-846 6010B	1	111125708002	04/26/2011 23:12	John W Yanzuk II	1
06953	Copper	SW-846 6010B	1	111125708002	04/26/2011 23:12	John W Yanzuk II	1
01654	Iron	SW-846 6010B	1	111125708002	04/26/2011 23:12	John W Yanzuk II	1
06955	Lead	SW-846 6010B	1	111125708002	04/26/2011 23:12	John W Yanzuk II	1
01657	Magnesium	SW-846 6010B	1	111125708002	04/26/2011 23:12	John W Yanzuk II	1
06958	Manganese	SW-846 6010B	1	111125708002	04/26/2011 23:12	John W Yanzuk II	1
06961	Nickel	SW-846 6010B	1	111125708002	04/26/2011 23:12	John W Yanzuk II	1
01662	Potassium	SW-846 6010B	1	111125708002	04/26/2011 23:12	John W Yanzuk II	1
06936	Selenium	SW-846 6010B	1	111125708002	04/26/2011 23:12	John W Yanzuk II	1
06966	Silver	SW-846 6010B	1	111125708002	04/26/2011 23:12	John W Yanzuk II	1
01667	Sodium	SW-846 6010B	1	111125708002	04/26/2011 23:12	John W Yanzuk II	1
06925	Thallium	SW-846 6010B	1	111125708002	04/26/2011 23:12	John W Yanzuk II	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: **BH-10-55-WC_0-2' Grab Soil**
Philadelphia Refinery AOI-10
COC: 259438 BH-10-55-WC_0-2'

LLI Sample # SW 6262272
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 14:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

55-02

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06971	Vanadium	SW-846 6010B	1	111125708002	04/26/2011 23:12	John W Yanzuk II	1
06972	Zinc	SW-846 6010B	1	111125708002	04/26/2011 23:12	John W Yanzuk II	1
00159	Mercury	SW-846 7471A	2	111155711002	04/26/2011 09:54	Damary Valentin	5
05708	SW SW846 ICP Digest	SW-846 3050B	1	111125708002	04/22/2011 20:18	Annamaria Stipkovits	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111125711002	04/22/2011 23:30	Annamaria Stipkovits	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	2	111155711002	04/26/2011 01:05	Annamaria Stipkovits	1
00111	Moisture	SM20 2540 G	1	11112820002B	04/22/2011 18:41	Scott W Freisher	1

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-55-WC_5-8' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-55-WC_5-8'

LLI Sample # SW 6262273
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 14:45 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

55-58

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	N.D.		770	2,200	66.54
10950	Benzene	71-43-2	N.D.		55	550	66.54
10950	Bromodichloromethane	75-27-4	N.D.		110	550	66.54
10950	Bromoform	75-25-2	N.D.		110	550	66.54
10950	Bromomethane	74-83-9	N.D.		220	550	66.54
10950	2-Butanone	78-93-3	N.D.		440	1,100	66.54
10950	Carbon Disulfide	75-15-0	N.D.		110	550	66.54
10950	Carbon Tetrachloride	56-23-5	N.D.		110	550	66.54
10950	Chlorobenzene	108-90-7	N.D.		110	550	66.54
10950	Chloroethane	75-00-3	N.D.		220	550	66.54
10950	Chloroform	67-66-3	N.D.		110	550	66.54
10950	Chloromethane	74-87-3	N.D.		220	550	66.54
10950	Cyclohexane	110-82-7	210	J	110	550	66.54
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		220	550	66.54
10950	Dibromochloromethane	124-48-1	N.D.		110	550	66.54
10950	1,2-Dibromoethane	106-93-4	N.D.		110	550	66.54
10950	1,2-Dichlorobenzene	95-50-1	N.D.		110	550	66.54
10950	1,3-Dichlorobenzene	541-73-1	N.D.		110	550	66.54
10950	1,4-Dichlorobenzene	106-46-7	N.D.		110	550	66.54
10950	Dichlorodifluoromethane	75-71-8	N.D.		220	550	66.54
10950	1,1-Dichloroethane	75-34-3	N.D.		110	550	66.54
10950	1,2-Dichloroethane	107-06-2	N.D.		110	550	66.54
10950	1,1-Dichloroethene	75-35-4	N.D.		110	550	66.54
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		110	550	66.54
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		110	550	66.54
10950	1,2-Dichloropropane	78-87-5	N.D.		110	550	66.54
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		110	550	66.54
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		110	550	66.54
10950	Ethylbenzene	100-41-4	390	J	110	550	66.54
10950	Freon 113	76-13-1	N.D.		220	1,100	66.54
10950	2-Hexanone	591-78-6	N.D.		330	1,100	66.54
10950	Isopropylbenzene	98-82-8	530	J	110	550	66.54
10950	Methyl Acetate	79-20-9	N.D.		220	550	66.54
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		55	550	66.54
10950	4-Methyl-2-pentanone	108-10-1	N.D.		330	1,100	66.54
10950	Methylcyclohexane	108-87-2	2,300		110	550	66.54
10950	Methylene Chloride	75-09-2	N.D.		220	550	66.54
10950	Styrene	100-42-5	N.D.		110	550	66.54
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		110	550	66.54
10950	Tetrachloroethene	127-18-4	N.D.		110	550	66.54
10950	Toluene	108-88-3	N.D.		110	550	66.54
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		110	550	66.54
10950	1,1,1-Trichloroethane	71-55-6	N.D.		110	550	66.54
10950	1,1,2-Trichloroethane	79-00-5	N.D.		110	550	66.54
10950	Trichloroethene	79-01-6	N.D.		110	550	66.54
10950	Trichlorofluoromethane	75-69-4	N.D.		220	550	66.54
10950	Vinyl Chloride	75-01-4	N.D.		110	550	66.54
10950	Xylene (Total)	1330-20-7	2,700		110	550	66.54

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

Sample Description: BH-10-55-WC_5-8' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-55-WC_5-8'

LLI Sample # SW 6262273
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 14:45 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

55-58

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**		**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	1,600		270	1,400	1
10727	Acenaphthylene	208-96-8	N.D.		270	1,400	1
10727	Acetophenone	98-86-2	N.D.		540	1,400	1
10727	Anthracene	120-12-7	450	J	270	1,400	1
10727	Atrazine	1912-24-9	N.D.		270	1,400	1
10727	Benzaldehyde	100-52-7	N.D.		540	1,400	1
10727	Benzo(a)anthracene	56-55-3	340	J	270	1,400	1
10727	Benzo(a)pyrene	50-32-8	N.D.		270	1,400	1
10727	Benzo(b)fluoranthene	205-99-2	N.D.		270	1,400	1
10727	Benzo(g,h,i)perylene	191-24-2	N.D.		270	1,400	1
10727	Benzo(k)fluoranthene	207-08-9	N.D.		270	1,400	1
10727	1,1'-Biphenyl	92-52-4	1,600		270	1,400	1
10727	4-Bromophenyl-phenylether	101-55-3	N.D.		270	1,400	1
10727	Butylbenzylphthalate	85-68-7	N.D.		540	1,400	1
10727	Di-n-butylphthalate	84-74-2	N.D.		540	1,400	1
10727	Caprolactam	105-60-2	N.D.		270	1,400	1
10727	Carbazole	86-74-8	N.D.		270	1,400	1
10727	4-Chloro-3-methylphenol	59-50-7	N.D.		540	1,400	1
10727	4-Chloroaniline	106-47-8	N.D.		540	1,400	1
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.		270	1,400	1
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.		270	1,400	1
10727	2-Chloronaphthalene	91-58-7	N.D.		270	1,400	1
10727	2-Chlorophenol	95-57-8	N.D.		270	1,400	1
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.		270	1,400	1
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.		270	1,400	1
10727	Chrysene	218-01-9	670	J	270	1,400	1
10727	Dibenz(a,h)anthracene	53-70-3	N.D.		270	1,400	1
10727	Dibenzofuran	132-64-9	N.D.		270	1,400	1
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.		820	2,700	1
10727	2,4-Dichlorophenol	120-83-2	N.D.		270	1,400	1
10727	Diethylphthalate	84-66-2	N.D.		540	1,400	1
10727	2,4-Dimethylphenol	105-67-9	N.D.		540	1,400	1
10727	Dimethylphthalate	131-11-3	N.D.		540	1,400	1
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.		1,400	4,100	1
10727	2,4-Dinitrophenol	51-28-5	N.D.		2,700	8,200	1
10727	2,4-Dinitrotoluene	121-14-2	N.D.		540	1,400	1
10727	2,6-Dinitrotoluene	606-20-2	N.D.		270	1,400	1
10727	bis(2-Ethylhexyl)phthalate	117-81-7	N.D.		540	2,700	1
10727	Fluoranthene	206-44-0	330	J	270	1,400	1
10727	Fluorene	86-73-7	1,500		270	1,400	1
10727	Hexachlorobenzene	118-74-1	N.D.		270	1,400	1
10727	Hexachlorobutadiene	87-68-3	N.D.		540	1,400	1
10727	Hexachlorocyclopentadiene	77-47-4	N.D.		1,400	4,100	1
10727	Hexachloroethane	67-72-1	N.D.		270	1,400	1
10727	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.		270	1,400	1
10727	Isophorone	78-59-1	N.D.		270	1,400	1
10727	2-Methylnaphthalene	91-57-6	18,000		270	1,400	1
10727	2-Methylphenol	95-48-7	N.D.		540	1,400	1
10727	4-Methylphenol	106-44-5	N.D.		540	1,400	1

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

Sample Description: BH-10-55-WC_5-8' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-55-WC_5-8'

LLI Sample # SW 6262273
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 14:45 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

55-58

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	2,500		270	1,400	1
10727	2-Nitroaniline	88-74-4	N.D.		270	1,400	1
10727	3-Nitroaniline	99-09-2	N.D.		540	1,400	1
10727	4-Nitroaniline	100-01-6	N.D.		540	1,400	1
10727	Nitrobenzene	98-95-3	N.D.		270	1,400	1
10727	2-Nitrophenol	88-75-5	N.D.		270	1,400	1
10727	4-Nitrophenol	100-02-7	N.D.		1,400	4,100	1
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		270	1,400	1
10727	N-Nitrosodiphenylamine	86-30-6	N.D.		270	1,400	1
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		540	1,400	1
10727	Pentachlorophenol	87-86-5	N.D.		1,400	4,100	1
10727	Phenanthrene	85-01-8	5,600		270	1,400	1
10727	Phenol	108-95-2	N.D.		270	1,400	1
10727	Pyrene	129-00-0	720	J	270	1,400	1
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		540	1,400	1
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		270	1,400	1
	Reporting limits were raised due to interference from the sample matrix.						
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	14,000		8.22	32.7	1
06944	Antimony	7440-36-0	N.D.		8.17	16.3	5
	Reporting limits were raised due to interference from the sample matrix.						
06935	Arsenic	7440-38-2	12.7		1.55	3.27	1
06946	Barium	7440-39-3	88.8		0.0654	0.817	1
06947	Beryllium	7440-41-7	0.425	J	0.111	0.817	1
06949	Cadmium	7440-43-9	0.422	J	0.229	0.817	1
01650	Calcium	7440-70-2	152,000		50.1	163	5
06951	Chromium	7440-47-3	475		0.964	2.45	1
06952	Cobalt	7440-48-4	6.24		0.310	0.817	1
06953	Copper	7440-50-8	120		0.359	1.63	1
01654	Iron	7439-89-6	11,300		7.70	32.7	1
06955	Lead	7439-92-1	316		0.980	2.45	1
01657	Magnesium	7439-95-4	116,000		20.7	81.7	5
06958	Manganese	7439-96-5	617		0.127	0.817	1
06961	Nickel	7440-02-0	38.4		0.310	1.63	1
01662	Potassium	7440-09-7	496		29.4	81.7	1
06936	Selenium	7782-49-2	1.68	J	1.60	3.27	1
06966	Silver	7440-22-4	N.D.		0.294	0.817	1
01667	Sodium	7440-23-5	85.4	J	60.9	163	1
06925	Thallium	7440-28-0	3.30	J	2.37	4.90	1
06971	Vanadium	7440-62-2	71.7		0.310	0.817	1
06972	Zinc	7440-66-6	641		1.08	3.27	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-55-WC_5-8' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-55-WC_5-8'

LLI Sample # SW 6262273
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 14:45 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

55-58

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**		**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.116	J	0.0045	0.157	1
Wet Chemistry	**SM20 2540 G**		**%**		**%**	**%**	
00111	Moisture	n.a.	39.4		0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	Q111121AA	04/22/2011 09:54	Stephanie A Selis	66.54
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/12/2011 14:45	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/12/2011 14:45	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/12/2011 14:45	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLD026	04/25/2011 06:18	Brian K Graham	1
10809	BNA Soil Microwave	SW-846 3546	1	11110SLD026	04/21/2011 09:30	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111125708002	04/26/2011 23:17	John W Yanzuk II	1
06944	Antimony	SW-846 6010B	1	111125708002	04/27/2011 21:12	John P Hook	5
06935	Arsenic	SW-846 6010B	1	111125708002	04/26/2011 23:17	John W Yanzuk II	1
06946	Barium	SW-846 6010B	1	111125708002	04/26/2011 23:17	John W Yanzuk II	1
06947	Beryllium	SW-846 6010B	1	111125708002	04/26/2011 23:17	John W Yanzuk II	1
06949	Cadmium	SW-846 6010B	1	111125708002	04/26/2011 23:17	John W Yanzuk II	1
01650	Calcium	SW-846 6010B	1	111125708002	04/27/2011 21:12	John P Hook	5
06951	Chromium	SW-846 6010B	1	111125708002	04/26/2011 23:17	John W Yanzuk II	1
06952	Cobalt	SW-846 6010B	1	111125708002	04/26/2011 23:17	John W Yanzuk II	1
06953	Copper	SW-846 6010B	1	111125708002	04/26/2011 23:17	John W Yanzuk II	1
01654	Iron	SW-846 6010B	1	111125708002	04/26/2011 23:17	John W Yanzuk II	1
06955	Lead	SW-846 6010B	1	111125708002	04/26/2011 23:17	John W Yanzuk II	1
01657	Magnesium	SW-846 6010B	1	111125708002	04/27/2011 21:12	John P Hook	5
06958	Manganese	SW-846 6010B	1	111125708002	04/26/2011 23:17	John W Yanzuk II	1
06961	Nickel	SW-846 6010B	1	111125708002	04/26/2011 23:17	John W Yanzuk II	1
01662	Potassium	SW-846 6010B	1	111125708002	04/26/2011 23:17	John W Yanzuk II	1
06936	Selenium	SW-846 6010B	1	111125708002	04/26/2011 23:17	John W Yanzuk II	1
06966	Silver	SW-846 6010B	1	111125708002	04/26/2011 23:17	John W Yanzuk II	1
01667	Sodium	SW-846 6010B	1	111125708002	04/26/2011 23:17	John W Yanzuk II	1
06925	Thallium	SW-846 6010B	1	111125708002	04/26/2011 23:17	John W Yanzuk II	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: **BH-10-55-WC_5-8' Grab Soil**
Philadelphia Refinery AOI-10
COC: 259438 BH-10-55-WC_5-8'

LLI Sample # SW 6262273
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 14:45 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

55-58

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06971	Vanadium	SW-846 6010B	1	111125708002	04/26/2011 23:17	John W Yanzuk II	1
06972	Zinc	SW-846 6010B	1	111125708002	04/26/2011 23:17	John W Yanzuk II	1
00159	Mercury	SW-846 7471A	2	111155711002	04/26/2011 08:21	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111125708002	04/22/2011 20:18	Annamaria Stipkovits	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111125711002	04/22/2011 23:30	Annamaria Stipkovits	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	2	111155711002	04/26/2011 01:05	Annamaria Stipkovits	1
00111	Moisture	SM20 2540 G	1	11112820002B	04/22/2011 18:41	Scott W Freisher	1

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-55-WC_20-22' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-55-WC_20-22'

LLI Sample # SW 6262274
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 15:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

55-20

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	N.D.		670	1,900	64.67
10950	Benzene	71-43-2	120	J	48	480	64.67
10950	Bromodichloromethane	75-27-4	N.D.		96	480	64.67
10950	Bromoform	75-25-2	N.D.		96	480	64.67
10950	Bromomethane	74-83-9	N.D.		190	480	64.67
10950	2-Butanone	78-93-3	N.D.		380	960	64.67
10950	Carbon Disulfide	75-15-0	N.D.		96	480	64.67
10950	Carbon Tetrachloride	56-23-5	N.D.		96	480	64.67
10950	Chlorobenzene	108-90-7	N.D.		96	480	64.67
10950	Chloroethane	75-00-3	N.D.		190	480	64.67
10950	Chloroform	67-66-3	N.D.		96	480	64.67
10950	Chloromethane	74-87-3	N.D.		190	480	64.67
10950	Cyclohexane	110-82-7	460	J	96	480	64.67
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		190	480	64.67
10950	Dibromochloromethane	124-48-1	N.D.		96	480	64.67
10950	1,2-Dibromoethane	106-93-4	N.D.		96	480	64.67
10950	1,2-Dichlorobenzene	95-50-1	N.D.		96	480	64.67
10950	1,3-Dichlorobenzene	541-73-1	N.D.		96	480	64.67
10950	1,4-Dichlorobenzene	106-46-7	N.D.		96	480	64.67
10950	Dichlorodifluoromethane	75-71-8	N.D.		190	480	64.67
10950	1,1-Dichloroethane	75-34-3	N.D.		96	480	64.67
10950	1,2-Dichloroethane	107-06-2	N.D.		96	480	64.67
10950	1,1-Dichloroethene	75-35-4	N.D.		96	480	64.67
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		96	480	64.67
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		96	480	64.67
10950	1,2-Dichloropropane	78-87-5	N.D.		96	480	64.67
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		96	480	64.67
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		96	480	64.67
10950	Ethylbenzene	100-41-4	140	J	96	480	64.67
10950	Freon 113	76-13-1	N.D.		190	960	64.67
10950	2-Hexanone	591-78-6	N.D.		290	960	64.67
10950	Isopropylbenzene	98-82-8	290	J	96	480	64.67
10950	Methyl Acetate	79-20-9	N.D.		190	480	64.67
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		48	480	64.67
10950	4-Methyl-2-pentanone	108-10-1	N.D.		290	960	64.67
10950	Methylcyclohexane	108-87-2	4,300		96	480	64.67
10950	Methylene Chloride	75-09-2	N.D.		190	480	64.67
10950	Styrene	100-42-5	N.D.		96	480	64.67
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		96	480	64.67
10950	Tetrachloroethene	127-18-4	N.D.		96	480	64.67
10950	Toluene	108-88-3	1,100		96	480	64.67
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		96	480	64.67
10950	1,1,1-Trichloroethane	71-55-6	N.D.		96	480	64.67
10950	1,1,2-Trichloroethane	79-00-5	N.D.		96	480	64.67
10950	Trichloroethene	79-01-6	N.D.		96	480	64.67
10950	Trichlorofluoromethane	75-69-4	N.D.		190	480	64.67
10950	Vinyl Chloride	75-01-4	N.D.		96	480	64.67
10950	Xylene (Total)	1330-20-7	400	J	96	480	64.67

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

Sample Description: BH-10-55-WC_20-22' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-55-WC_20-22'

LLI Sample # SW 6262274
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 15:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

55-20

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**		**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	8,700		240	1,200	5
10727	Acenaphthylene	208-96-8	2,100		240	1,200	5
10727	Acetophenone	98-86-2	N.D.		490	1,200	5
10727	Anthracene	120-12-7	5,900		240	1,200	5
10727	Atrazine	1912-24-9	N.D.		240	1,200	5
10727	Benzaldehyde	100-52-7	N.D.		490	1,200	5
10727	Benzo(a)anthracene	56-55-3	7,100		240	1,200	5
10727	Benzo(a)pyrene	50-32-8	6,000		240	1,200	5
10727	Benzo(b)fluoranthene	205-99-2	6,900		240	1,200	5
10727	Benzo(g,h,i)perylene	191-24-2	3,100		240	1,200	5
10727	Benzo(k)fluoranthene	207-08-9	3,300		240	1,200	5
10727	1,1'-Biphenyl	92-52-4	1,700		240	1,200	5
10727	4-Bromophenyl-phenylether	101-55-3	N.D.		240	1,200	5
10727	Butylbenzylphthalate	85-68-7	N.D.		490	1,200	5
10727	Di-n-butylphthalate	84-74-2	N.D.		490	1,200	5
10727	Caprolactam	105-60-2	N.D.		240	1,200	5
10727	Carbazole	86-74-8	820	J	240	1,200	5
10727	4-Chloro-3-methylphenol	59-50-7	N.D.		490	1,200	5
10727	4-Chloroaniline	106-47-8	N.D.		490	1,200	5
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.		240	1,200	5
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.		240	1,200	5
10727	2-Chloronaphthalene	91-58-7	N.D.		240	1,200	5
10727	2-Chlorophenol	95-57-8	N.D.		240	1,200	5
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.		240	1,200	5
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.		240	1,200	5
10727	Chrysene	218-01-9	7,100		240	1,200	5
10727	Dibenz(a,h)anthracene	53-70-3	1,100	J	240	1,200	5
10727	Dibenzofuran	132-64-9	3,700		240	1,200	5
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.		730	2,400	5
10727	2,4-Dichlorophenol	120-83-2	N.D.		240	1,200	5
10727	Diethylphthalate	84-66-2	N.D.		490	1,200	5
10727	2,4-Dimethylphenol	105-67-9	630	J	490	1,200	5
10727	Dimethylphthalate	131-11-3	N.D.		490	1,200	5
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.		1,200	3,700	5
10727	2,4-Dinitrophenol	51-28-5	N.D.		2,400	7,300	5
10727	2,4-Dinitrotoluene	121-14-2	N.D.		490	1,200	5
10727	2,6-Dinitrotoluene	606-20-2	N.D.		240	1,200	5
10727	bis(2-Ethylhexyl)phthalate	117-81-7	1,500	J	490	2,400	5
10727	Fluoranthene	206-44-0	15,000		240	1,200	5
10727	Fluorene	86-73-7	6,800		240	1,200	5
10727	Hexachlorobenzene	118-74-1	N.D.		240	1,200	5
10727	Hexachlorobutadiene	87-68-3	N.D.		490	1,200	5
10727	Hexachlorocyclopentadiene	77-47-4	N.D.		1,200	3,700	5
10727	Hexachloroethane	67-72-1	N.D.		240	1,200	5
10727	Indeno(1,2,3-cd)pyrene	193-39-5	2,900		240	1,200	5
10727	Isophorone	78-59-1	N.D.		240	1,200	5
10727	2-Methylnaphthalene	91-57-6	12,000		240	1,200	5
10727	2-Methylphenol	95-48-7	N.D.		490	1,200	5
10727	4-Methylphenol	106-44-5	6,700		490	1,200	5

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

Sample Description: BH-10-55-WC_20-22' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-55-WC_20-22'

LLI Sample # SW 6262274
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 15:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

55-20

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	27,000		240	1,200	5
10727	2-Nitroaniline	88-74-4	N.D.		240	1,200	5
10727	3-Nitroaniline	99-09-2	N.D.		490	1,200	5
10727	4-Nitroaniline	100-01-6	N.D.		490	1,200	5
10727	Nitrobenzene	98-95-3	N.D.		240	1,200	5
10727	2-Nitrophenol	88-75-5	N.D.		240	1,200	5
10727	4-Nitrophenol	100-02-7	N.D.		1,200	3,700	5
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		240	1,200	5
10727	N-Nitrosodiphenylamine	86-30-6	N.D.		240	1,200	5
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		490	1,200	5
10727	Pentachlorophenol	87-86-5	N.D.		1,200	3,700	5
10727	Phenanthrene	85-01-8	24,000		240	1,200	5
10727	Phenol	108-95-2	270	J	240	1,200	5
10727	Pyrene	129-00-0	15,000		240	1,200	5
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		490	1,200	5
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		240	1,200	5
Reporting limits were raised due to interference from the sample matrix.							
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	12,800		7.15	28.4	1
06944	Antimony	7440-36-0	N.D.		1.42	2.84	1
06935	Arsenic	7440-38-2	12.3		1.35	2.84	1
06946	Barium	7440-39-3	345		0.0569	0.711	1
06947	Beryllium	7440-41-7	1.45		0.0967	0.711	1
06949	Cadmium	7440-43-9	1.56		0.199	0.711	1
01650	Calcium	7440-70-2	4,830		8.72	28.4	1
06951	Chromium	7440-47-3	47.7		0.839	2.13	1
06952	Cobalt	7440-48-4	17.9		0.270	0.711	1
06953	Copper	7440-50-8	97.4		0.313	1.42	1
01654	Iron	7439-89-6	21,200		6.70	28.4	1
06955	Lead	7439-92-1	304		0.853	2.13	1
01657	Magnesium	7439-95-4	3,140		3.61	14.2	1
06958	Manganese	7439-96-5	369		0.111	0.711	1
06961	Nickel	7440-02-0	32.8		0.270	1.42	1
01662	Potassium	7440-09-7	1,450		25.6	71.1	1
06936	Selenium	7782-49-2	2.76	J	1.39	2.84	1
06966	Silver	7440-22-4	0.583	J	0.256	0.711	1
01667	Sodium	7440-23-5	215		53.1	142	1
06925	Thallium	7440-28-0	N.D.		2.06	4.27	1
06971	Vanadium	7440-62-2	30.3		0.270	0.711	1
06972	Zinc	7440-66-6	399		0.939	2.84	1
	SW-846 7471A		**mg/kg**		**mg/kg**	**mg/kg**	

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-55-WC_20-22' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-55-WC_20-22'

LLI Sample # SW 6262274
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 15:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

55-20

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.735	0.0041	0.144	1
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	32.4	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	Q111121AA	04/22/2011 10:17	Stephanie A Selis	64.67
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/12/2011 15:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/12/2011 15:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/12/2011 15:00	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLD026	04/25/2011 06:44	Brian K Graham	5
10809	BNA Soil Microwave	SW-846 3546	1	11110SLD026	04/21/2011 09:30	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111125708002	04/26/2011 23:21	John W Yanzuk II	1
06944	Antimony	SW-846 6010B	1	111125708002	04/26/2011 23:21	John W Yanzuk II	1
06935	Arsenic	SW-846 6010B	1	111125708002	04/26/2011 23:21	John W Yanzuk II	1
06946	Barium	SW-846 6010B	1	111125708002	04/26/2011 23:21	John W Yanzuk II	1
06947	Beryllium	SW-846 6010B	1	111125708002	04/26/2011 23:21	John W Yanzuk II	1
06949	Cadmium	SW-846 6010B	1	111125708002	04/26/2011 23:21	John W Yanzuk II	1
01650	Calcium	SW-846 6010B	1	111125708002	04/26/2011 23:21	John W Yanzuk II	1
06951	Chromium	SW-846 6010B	1	111125708002	04/26/2011 23:21	John W Yanzuk II	1
06952	Cobalt	SW-846 6010B	1	111125708002	04/26/2011 23:21	John W Yanzuk II	1
06953	Copper	SW-846 6010B	1	111125708002	04/26/2011 23:21	John W Yanzuk II	1
01654	Iron	SW-846 6010B	1	111125708002	04/26/2011 23:21	John W Yanzuk II	1
06955	Lead	SW-846 6010B	1	111125708002	04/26/2011 23:21	John W Yanzuk II	1
01657	Magnesium	SW-846 6010B	1	111125708002	04/26/2011 23:21	John W Yanzuk II	1
06958	Manganese	SW-846 6010B	1	111125708002	04/26/2011 23:21	John W Yanzuk II	1
06961	Nickel	SW-846 6010B	1	111125708002	04/26/2011 23:21	John W Yanzuk II	1
01662	Potassium	SW-846 6010B	1	111125708002	04/26/2011 23:21	John W Yanzuk II	1
06936	Selenium	SW-846 6010B	1	111125708002	04/26/2011 23:21	John W Yanzuk II	1
06966	Silver	SW-846 6010B	1	111125708002	04/26/2011 23:21	John W Yanzuk II	1
01667	Sodium	SW-846 6010B	1	111125708002	04/26/2011 23:21	John W Yanzuk II	1
06925	Thallium	SW-846 6010B	1	111125708002	04/26/2011 23:21	John W Yanzuk II	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-55-WC_20-22' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-55-WC_20-22'

LLI Sample # SW 6262274
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 15:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

55-20

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06971	Vanadium	SW-846 6010B	1	111125708002	04/26/2011 23:21	John W Yanzuk II	1
06972	Zinc	SW-846 6010B	1	111125708002	04/26/2011 23:21	John W Yanzuk II	1
00159	Mercury	SW-846 7471A	2	111155711002	04/26/2011 08:22	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111125708002	04/22/2011 20:18	Annamaria Stipkovits	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111125711002	04/22/2011 23:30	Annamaria Stipkovits	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	2	111155711002	04/26/2011 01:05	Annamaria Stipkovits	1
00111	Moisture	SM20 2540 G	1	11112820002B	04/22/2011 18:41	Scott W Freisher	1

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-56-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-56-WC_0-2'

LLI Sample # SW 6262275
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 16:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

56-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		ug/kg		ug/kg	ug/kg	
10950	Acetone	67-64-1	30		8	24	1.02
10950	Benzene	71-43-2	16		0.6	6	1.02
10950	Bromodichloromethane	75-27-4	N.D.		1	6	1.02
10950	Bromoform	75-25-2	N.D.		1	6	1.02
10950	Bromomethane	74-83-9	N.D.		2	6	1.02
10950	2-Butanone	78-93-3	N.D.		5	12	1.02
10950	Carbon Disulfide	75-15-0	2	J	1	6	1.02
10950	Carbon Tetrachloride	56-23-5	N.D.		1	6	1.02
10950	Chlorobenzene	108-90-7	N.D.		1	6	1.02
10950	Chloroethane	75-00-3	N.D.		2	6	1.02
10950	Chloroform	67-66-3	N.D.		1	6	1.02
10950	Chloromethane	74-87-3	N.D.		2	6	1.02
10950	Cyclohexane	110-82-7	1	J	1	6	1.02
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		2	6	1.02
10950	Dibromochloromethane	124-48-1	N.D.		1	6	1.02
10950	1,2-Dibromoethane	106-93-4	N.D.		1	6	1.02
10950	1,2-Dichlorobenzene	95-50-1	N.D.		1	6	1.02
10950	1,3-Dichlorobenzene	541-73-1	N.D.		1	6	1.02
10950	1,4-Dichlorobenzene	106-46-7	N.D.		1	6	1.02
10950	Dichlorodifluoromethane	75-71-8	N.D.		2	6	1.02
10950	1,1-Dichloroethane	75-34-3	N.D.		1	6	1.02
10950	1,2-Dichloroethane	107-06-2	N.D.		1	6	1.02
10950	1,1-Dichloroethene	75-35-4	N.D.		1	6	1.02
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		1	6	1.02
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		1	6	1.02
10950	1,2-Dichloropropane	78-87-5	N.D.		1	6	1.02
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		1	6	1.02
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		1	6	1.02
10950	Ethylbenzene	100-41-4	3	J	1	6	1.02
10950	Freon 113	76-13-1	N.D.		2	12	1.02
10950	2-Hexanone	591-78-6	N.D.		4	12	1.02
10950	Isopropylbenzene	98-82-8	1	J	1	6	1.02
10950	Methyl Acetate	79-20-9	N.D.		2	6	1.02
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.6	6	1.02
10950	4-Methyl-2-pentanone	108-10-1	N.D.		4	12	1.02
10950	Methylcyclohexane	108-87-2	4	J	1	6	1.02
10950	Methylene Chloride	75-09-2	N.D.		2	6	1.02
10950	Styrene	100-42-5	N.D.		1	6	1.02
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		1	6	1.02
10950	Tetrachloroethene	127-18-4	2	J	1	6	1.02
10950	Toluene	108-88-3	9		1	6	1.02
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		1	6	1.02
10950	1,1,1-Trichloroethane	71-55-6	N.D.		1	6	1.02
10950	1,1,2-Trichloroethane	79-00-5	N.D.		1	6	1.02
10950	Trichloroethene	79-01-6	N.D.		1	6	1.02
10950	Trichlorofluoromethane	75-69-4	N.D.		2	6	1.02
10950	Vinyl Chloride	75-01-4	N.D.		1	6	1.02
10950	Xylene (Total)	1330-20-7	17		1	6	1.02

The GC/MS volatile internal standard peak areas were outside the QC limits. A re-analysis was performed, and the matrix effect

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

Sample Description: BH-10-56-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-56-WC_0-2'

LLI Sample # SW 6262275
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 16:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

56-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
was confirmed.							
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	N.D.		190	970	5
10727	Acenaphthylene	208-96-8	N.D.		190	970	5
10727	Acetophenone	98-86-2	N.D.		390	970	5
10727	Anthracene	120-12-7	250	J	190	970	5
10727	Atrazine	1912-24-9	N.D.		190	970	5
10727	Benzaldehyde	100-52-7	N.D.		390	970	5
10727	Benzo(a)anthracene	56-55-3	1,200		190	970	5
10727	Benzo(a)pyrene	50-32-8	1,600		190	970	5
10727	Benzo(b)fluoranthene	205-99-2	2,100		190	970	5
10727	Benzo(g,h,i)perylene	191-24-2	1,500		190	970	5
10727	Benzo(k)fluoranthene	207-08-9	760	J	190	970	5
10727	1,1'-Biphenyl	92-52-4	N.D.		190	970	5
10727	4-Bromophenyl-phenylether	101-55-3	N.D.		190	970	5
10727	Butylbenzylphthalate	85-68-7	N.D.		390	970	5
10727	Di-n-butylphthalate	84-74-2	N.D.		390	970	5
10727	Caprolactam	105-60-2	N.D.		190	970	5
10727	Carbazole	86-74-8	N.D.		190	970	5
10727	4-Chloro-3-methylphenol	59-50-7	N.D.		390	970	5
10727	4-Chloroaniline	106-47-8	N.D.		390	970	5
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.		190	970	5
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.		190	970	5
10727	2-Chloronaphthalene	91-58-7	N.D.		190	970	5
10727	2-Chlorophenol	95-57-8	N.D.		190	970	5
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.		190	970	5
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.		190	970	5
10727	Chrysene	218-01-9	1,300		190	970	5
10727	Dibenz(a,h)anthracene	53-70-3	520	J	190	970	5
10727	Dibenzofuran	132-64-9	N.D.		190	970	5
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.		580	1,900	5
10727	2,4-Dichlorophenol	120-83-2	N.D.		190	970	5
10727	Diethylphthalate	84-66-2	N.D.		390	970	5
10727	2,4-Dimethylphenol	105-67-9	N.D.		390	970	5
10727	Dimethylphthalate	131-11-3	N.D.		390	970	5
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.		970	2,900	5
10727	2,4-Dinitrophenol	51-28-5	N.D.		1,900	5,800	5
10727	2,4-Dinitrotoluene	121-14-2	N.D.		390	970	5
10727	2,6-Dinitrotoluene	606-20-2	N.D.		190	970	5
10727	bis(2-Ethylhexyl)phthalate	117-81-7	N.D.		390	1,900	5
10727	Fluoranthene	206-44-0	1,500		190	970	5
10727	Fluorene	86-73-7	N.D.		190	970	5
10727	Hexachlorobenzene	118-74-1	N.D.		190	970	5
10727	Hexachlorobutadiene	87-68-3	N.D.		390	970	5
10727	Hexachlorocyclopentadiene	77-47-4	N.D.		970	2,900	5
10727	Hexachloroethane	67-72-1	N.D.		190	970	5
10727	Indeno(1,2,3-cd)pyrene	193-39-5	1,100		190	970	5
10727	Isophorone	78-59-1	N.D.		190	970	5
10727	2-Methylnaphthalene	91-57-6	520	J	190	970	5
10727	2-Methylphenol	95-48-7	N.D.		390	970	5
10727	4-Methylphenol	106-44-5	N.D.		390	970	5

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

Sample Description: BH-10-56-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-56-WC_0-2'

LLI Sample # SW 6262275
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 16:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

56-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	450	J	190	970	5
10727	2-Nitroaniline	88-74-4	N.D.		190	970	5
10727	3-Nitroaniline	99-09-2	N.D.		390	970	5
10727	4-Nitroaniline	100-01-6	N.D.		390	970	5
10727	Nitrobenzene	98-95-3	N.D.		190	970	5
10727	2-Nitrophenol	88-75-5	N.D.		190	970	5
10727	4-Nitrophenol	100-02-7	N.D.		970	2,900	5
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		190	970	5
10727	N-Nitrosodiphenylamine	86-30-6	N.D.		190	970	5
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		390	970	5
10727	Pentachlorophenol	87-86-5	N.D.		970	2,900	5
10727	Phenanthrene	85-01-8	930	J	190	970	5
10727	Phenol	108-95-2	N.D.		190	970	5
10727	Pyrene	129-00-0	1,400		190	970	5
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		390	970	5
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		190	970	5
	Reporting limits were raised due to interference from the sample matrix.						
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	14,900		5.95	23.6	1
06944	Antimony	7440-36-0	N.D.		1.18	2.36	1
06935	Arsenic	7440-38-2	9.44		1.12	2.36	1
06946	Barium	7440-39-3	100		0.0473	0.591	1
06947	Beryllium	7440-41-7	0.796		0.0804	0.591	1
06949	Cadmium	7440-43-9	N.D.		0.165	0.591	1
01650	Calcium	7440-70-2	18,400		7.25	23.6	1
06951	Chromium	7440-47-3	93.1		0.697	1.77	1
06952	Cobalt	7440-48-4	6.74		0.225	0.591	1
06953	Copper	7440-50-8	58.8		0.260	1.18	1
01654	Iron	7439-89-6	19,900		5.57	23.6	1
06955	Lead	7439-92-1	86.4		0.709	1.77	1
01657	Magnesium	7439-95-4	7,330		3.00	11.8	1
06958	Manganese	7439-96-5	242		0.0922	0.591	1
06961	Nickel	7440-02-0	23.5		0.225	1.18	1
01662	Potassium	7440-09-7	1,540		21.3	59.1	1
06936	Selenium	7782-49-2	N.D.		1.16	2.36	1
06966	Silver	7440-22-4	N.D.		0.213	0.591	1
01667	Sodium	7440-23-5	142		44.1	118	1
06925	Thallium	7440-28-0	3.51	J	1.71	3.55	1
06971	Vanadium	7440-62-2	58.6		0.225	0.591	1
06972	Zinc	7440-66-6	106		0.780	2.36	1
	SW-846 7471A		**mg/kg**		**mg/kg**	**mg/kg**	

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

Sample Description: BH-10-56-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-56-WC_0-2'

LLI Sample # SW 6262275
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 16:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

56-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.153	0.0032	0.112	1
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	15.4	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	X111131AA	04/23/2011 07:48	Stephanie A Selis	1.02
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/12/2011 16:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/12/2011 16:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/12/2011 16:00	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLD026	04/25/2011 07:09	Brian K Graham	5
10809	BNA Soil Microwave	SW-846 3546	1	11110SLD026	04/21/2011 09:30	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111125708006	04/27/2011 23:28	John W Yanzuk II	1
06944	Antimony	SW-846 6010B	1	111125708006	04/27/2011 23:28	John W Yanzuk II	1
06935	Arsenic	SW-846 6010B	1	111125708006	04/27/2011 23:28	John W Yanzuk II	1
06946	Barium	SW-846 6010B	1	111125708006	04/27/2011 23:28	John W Yanzuk II	1
06947	Beryllium	SW-846 6010B	1	111125708006	04/27/2011 23:28	John W Yanzuk II	1
06949	Cadmium	SW-846 6010B	1	111125708006	04/27/2011 23:28	John W Yanzuk II	1
01650	Calcium	SW-846 6010B	1	111125708006	04/27/2011 23:28	John W Yanzuk II	1
06951	Chromium	SW-846 6010B	1	111125708006	04/27/2011 23:28	John W Yanzuk II	1
06952	Cobalt	SW-846 6010B	1	111125708006	04/27/2011 23:28	John W Yanzuk II	1
06953	Copper	SW-846 6010B	1	111125708006	04/27/2011 23:28	John W Yanzuk II	1
01654	Iron	SW-846 6010B	1	111125708006	04/27/2011 23:28	John W Yanzuk II	1
06955	Lead	SW-846 6010B	1	111125708006	04/27/2011 23:28	John W Yanzuk II	1
01657	Magnesium	SW-846 6010B	1	111125708006	04/27/2011 23:28	John W Yanzuk II	1
06958	Manganese	SW-846 6010B	1	111125708006	04/27/2011 23:28	John W Yanzuk II	1
06961	Nickel	SW-846 6010B	1	111125708006	04/27/2011 23:28	John W Yanzuk II	1
01662	Potassium	SW-846 6010B	1	111125708006	04/27/2011 23:28	John W Yanzuk II	1
06936	Selenium	SW-846 6010B	1	111125708006	04/27/2011 23:28	John W Yanzuk II	1
06966	Silver	SW-846 6010B	1	111125708006	04/27/2011 23:28	John W Yanzuk II	1
01667	Sodium	SW-846 6010B	1	111125708006	04/27/2011 23:28	John W Yanzuk II	1
06925	Thallium	SW-846 6010B	1	111125708006	04/27/2011 23:28	John W Yanzuk II	1

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

Sample Description: **BH-10-56-WC_0-2' Grab Soil**
Philadelphia Refinery AOI-10
COC: 259438 BH-10-56-WC_0-2'

LLI Sample # SW 6262275
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 16:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

56-02

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06971	Vanadium	SW-846 6010B	1	111125708006	04/27/2011 23:28	John W Yanzuk II	1
06972	Zinc	SW-846 6010B	1	111125708006	04/27/2011 23:28	John W Yanzuk II	1
00159	Mercury	SW-846 7471A	1	111125711006	04/26/2011 08:27	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111125708006	04/25/2011 09:10	Denise K Conners	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111125711006	04/25/2011 10:10	Denise K Conners	1
00111	Moisture	SM20 2540 G	1	11112820002B	04/22/2011 18:41	Scott W Freisher	1

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-56-WC_10-12' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-56-WC_10-12'

LLI Sample # SW 6262276
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 16:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

56-10

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	N.D.		650	1,900	62.71
10950	Benzene	71-43-2	11,000		46	460	62.71
10950	Bromodichloromethane	75-27-4	N.D.		93	460	62.71
10950	Bromoform	75-25-2	N.D.		93	460	62.71
10950	Bromomethane	74-83-9	N.D.		190	460	62.71
10950	2-Butanone	78-93-3	N.D.		370	930	62.71
10950	Carbon Disulfide	75-15-0	N.D.		93	460	62.71
10950	Carbon Tetrachloride	56-23-5	N.D.		93	460	62.71
10950	Chlorobenzene	108-90-7	N.D.		93	460	62.71
10950	Chloroethane	75-00-3	N.D.		190	460	62.71
10950	Chloroform	67-66-3	N.D.		93	460	62.71
10950	Chloromethane	74-87-3	N.D.		190	460	62.71
10950	Cyclohexane	110-82-7	590		93	460	62.71
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		190	460	62.71
10950	Dibromochloromethane	124-48-1	N.D.		93	460	62.71
10950	1,2-Dibromoethane	106-93-4	N.D.		93	460	62.71
10950	1,2-Dichlorobenzene	95-50-1	N.D.		93	460	62.71
10950	1,3-Dichlorobenzene	541-73-1	N.D.		93	460	62.71
10950	1,4-Dichlorobenzene	106-46-7	N.D.		93	460	62.71
10950	Dichlorodifluoromethane	75-71-8	N.D.		190	460	62.71
10950	1,1-Dichloroethane	75-34-3	N.D.		93	460	62.71
10950	1,2-Dichloroethane	107-06-2	N.D.		93	460	62.71
10950	1,1-Dichloroethene	75-35-4	N.D.		93	460	62.71
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		93	460	62.71
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		93	460	62.71
10950	1,2-Dichloropropane	78-87-5	N.D.		93	460	62.71
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		93	460	62.71
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		93	460	62.71
10950	Ethylbenzene	100-41-4	2,500		93	460	62.71
10950	Freon 113	76-13-1	N.D.		190	930	62.71
10950	2-Hexanone	591-78-6	N.D.		280	930	62.71
10950	Isopropylbenzene	98-82-8	1,200		93	460	62.71
10950	Methyl Acetate	79-20-9	670		190	460	62.71
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		46	460	62.71
10950	4-Methyl-2-pentanone	108-10-1	N.D.		280	930	62.71
10950	Methylcyclohexane	108-87-2	1,500		93	460	62.71
10950	Methylene Chloride	75-09-2	500		190	460	62.71
10950	Styrene	100-42-5	N.D.		93	460	62.71
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		93	460	62.71
10950	Tetrachloroethene	127-18-4	520		93	460	62.71
10950	Toluene	108-88-3	11,000		93	460	62.71
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		93	460	62.71
10950	1,1,1-Trichloroethane	71-55-6	N.D.		93	460	62.71
10950	1,1,2-Trichloroethane	79-00-5	N.D.		93	460	62.71
10950	Trichloroethene	79-01-6	110	J	93	460	62.71
10950	Trichlorofluoromethane	75-69-4	N.D.		190	460	62.71
10950	Vinyl Chloride	75-01-4	N.D.		93	460	62.71
10950	Xylene (Total)	1330-20-7	13,000		93	460	62.71

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

Sample Description: BH-10-56-WC_10-12' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-56-WC_10-12'

LLI Sample # SW 6262276
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 16:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

56-10

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**		**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	2,200	J	1,200	6,100	5
10727	Acenaphthylene	208-96-8	N.D.		1,200	6,100	5
10727	Acetophenone	98-86-2	N.D.		2,400	6,100	5
10727	Anthracene	120-12-7	1,500	J	1,200	6,100	5
10727	Atrazine	1912-24-9	N.D.		1,200	6,100	5
10727	Benzaldehyde	100-52-7	N.D.		2,400	6,100	5
10727	Benzo(a)anthracene	56-55-3	3,300	J	1,200	6,100	5
10727	Benzo(a)pyrene	50-32-8	3,100	J	1,200	6,100	5
10727	Benzo(b)fluoranthene	205-99-2	2,600	J	1,200	6,100	5
10727	Benzo(g,h,i)perylene	191-24-2	3,300	J	1,200	6,100	5
10727	Benzo(k)fluoranthene	207-08-9	N.D.		1,200	6,100	5
10727	1,1'-Biphenyl	92-52-4	N.D.		1,200	6,100	5
10727	4-Bromophenyl-phenylether	101-55-3	N.D.		1,200	6,100	5
10727	Butylbenzylphthalate	85-68-7	N.D.		2,400	6,100	5
10727	Di-n-butylphthalate	84-74-2	N.D.		2,400	6,100	5
10727	Caprolactam	105-60-2	N.D.		1,200	6,100	5
10727	Carbazole	86-74-8	N.D.		1,200	6,100	5
10727	4-Chloro-3-methylphenol	59-50-7	N.D.		2,400	6,100	5
10727	4-Chloroaniline	106-47-8	N.D.		2,400	6,100	5
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.		1,200	6,100	5
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.		1,200	6,100	5
10727	2-Chloronaphthalene	91-58-7	N.D.		1,200	6,100	5
10727	2-Chlorophenol	95-57-8	N.D.		1,200	6,100	5
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.		1,200	6,100	5
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.		1,200	6,100	5
10727	Chrysene	218-01-9	5,700	J	1,200	6,100	5
10727	Dibenz(a,h)anthracene	53-70-3	N.D.		1,200	6,100	5
10727	Dibenzofuran	132-64-9	1,800	J	1,200	6,100	5
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.		3,700	12,000	5
10727	2,4-Dichlorophenol	120-83-2	N.D.		1,200	6,100	5
10727	Diethylphthalate	84-66-2	N.D.		2,400	6,100	5
10727	2,4-Dimethylphenol	105-67-9	N.D.		2,400	6,100	5
10727	Dimethylphthalate	131-11-3	N.D.		2,400	6,100	5
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.		6,100	18,000	5
10727	2,4-Dinitrophenol	51-28-5	N.D.		12,000	37,000	5
10727	2,4-Dinitrotoluene	121-14-2	N.D.		2,400	6,100	5
10727	2,6-Dinitrotoluene	606-20-2	N.D.		1,200	6,100	5
10727	bis(2-Ethylhexyl)phthalate	117-81-7	N.D.		2,400	12,000	5
10727	Fluoranthene	206-44-0	2,300	J	1,200	6,100	5
10727	Fluorene	86-73-7	2,700	J	1,200	6,100	5
10727	Hexachlorobenzene	118-74-1	N.D.		1,200	6,100	5
10727	Hexachlorobutadiene	87-68-3	N.D.		2,400	6,100	5
10727	Hexachlorocyclopentadiene	77-47-4	N.D.		6,100	18,000	5
10727	Hexachloroethane	67-72-1	N.D.		1,200	6,100	5
10727	Indeno(1,2,3-cd)pyrene	193-39-5	1,400	J	1,200	6,100	5
10727	Isophorone	78-59-1	N.D.		1,200	6,100	5
10727	2-Methylnaphthalene	91-57-6	15,000		1,200	6,100	5
10727	2-Methylphenol	95-48-7	N.D.		2,400	6,100	5
10727	4-Methylphenol	106-44-5	N.D.		2,400	6,100	5

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

Sample Description: BH-10-56-WC_10-12' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-56-WC_10-12'

LLI Sample # SW 6262276
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 16:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

56-10

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	7,100		1,200	6,100	5
10727	2-Nitroaniline	88-74-4	N.D.		1,200	6,100	5
10727	3-Nitroaniline	99-09-2	N.D.		2,400	6,100	5
10727	4-Nitroaniline	100-01-6	N.D.		2,400	6,100	5
10727	Nitrobenzene	98-95-3	N.D.		1,200	6,100	5
10727	2-Nitrophenol	88-75-5	N.D.		1,200	6,100	5
10727	4-Nitrophenol	100-02-7	N.D.		6,100	18,000	5
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		1,200	6,100	5
10727	N-Nitrosodiphenylamine	86-30-6	N.D.		1,200	6,100	5
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		2,400	6,100	5
10727	Pentachlorophenol	87-86-5	N.D.		6,100	18,000	5
10727	Phenanthrene	85-01-8	12,000		1,200	6,100	5
10727	Phenol	108-95-2	N.D.		1,200	6,100	5
10727	Pyrene	129-00-0	4,700	J	1,200	6,100	5
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		2,400	6,100	5
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		1,200	6,100	5
	Reporting limits were raised due to interference from the sample matrix.						
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	15,500		7.45	29.6	1
06944	Antimony	7440-36-0	N.D.		1.48	2.96	1
06935	Arsenic	7440-38-2	13.5		1.41	2.96	1
06946	Barium	7440-39-3	178		0.0593	0.741	1
06947	Beryllium	7440-41-7	0.640	J	0.101	0.741	1
06949	Cadmium	7440-43-9	N.D.		0.207	0.741	1
01650	Calcium	7440-70-2	53,700		9.08	29.6	1
06951	Chromium	7440-47-3	282		0.874	2.22	1
06952	Cobalt	7440-48-4	9.60		0.281	0.741	1
06953	Copper	7440-50-8	163		0.326	1.48	1
01654	Iron	7439-89-6	28,100		6.98	29.6	1
06955	Lead	7439-92-1	676		0.889	2.22	1
01657	Magnesium	7439-95-4	24,900		3.76	14.8	1
06958	Manganese	7439-96-5	675		0.116	0.741	1
06961	Nickel	7440-02-0	67.7		0.281	1.48	1
01662	Potassium	7440-09-7	2,010		26.7	74.1	1
06936	Selenium	7782-49-2	N.D.		1.45	2.96	1
06966	Silver	7440-22-4	0.290	J	0.267	0.741	1
01667	Sodium	7440-23-5	402		55.3	148	1
06925	Thallium	7440-28-0	6.02		2.15	4.44	1
06971	Vanadium	7440-62-2	120		0.281	0.741	1
06972	Zinc	7440-66-6	513		0.978	2.96	1
	SW-846 7471A		**mg/kg**		**mg/kg**	**mg/kg**	

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-56-WC_10-12' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-56-WC_10-12'

LLI Sample # SW 6262276
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 16:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

56-10

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	1.88	0.0208	0.727	5
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	32.5	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	Q111121AA	04/22/2011 10:40	Stephanie A Selis	62.71
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/12/2011 16:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/12/2011 16:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/12/2011 16:30	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLD026	04/25/2011 07:35	Brian K Graham	5
10809	BNA Soil Microwave	SW-846 3546	1	11110SLD026	04/21/2011 09:30	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111125708006	04/27/2011 23:32	John W Yanzuk II	1
06944	Antimony	SW-846 6010B	1	111125708006	04/27/2011 23:32	John W Yanzuk II	1
06935	Arsenic	SW-846 6010B	1	111125708006	04/27/2011 23:32	John W Yanzuk II	1
06946	Barium	SW-846 6010B	1	111125708006	04/27/2011 23:32	John W Yanzuk II	1
06947	Beryllium	SW-846 6010B	1	111125708006	04/27/2011 23:32	John W Yanzuk II	1
06949	Cadmium	SW-846 6010B	1	111125708006	04/27/2011 23:32	John W Yanzuk II	1
01650	Calcium	SW-846 6010B	1	111125708006	04/27/2011 23:32	John W Yanzuk II	1
06951	Chromium	SW-846 6010B	1	111125708006	04/27/2011 23:32	John W Yanzuk II	1
06952	Cobalt	SW-846 6010B	1	111125708006	04/27/2011 23:32	John W Yanzuk II	1
06953	Copper	SW-846 6010B	1	111125708006	04/27/2011 23:32	John W Yanzuk II	1
01654	Iron	SW-846 6010B	1	111125708006	04/27/2011 23:32	John W Yanzuk II	1
06955	Lead	SW-846 6010B	1	111125708006	04/27/2011 23:32	John W Yanzuk II	1
01657	Magnesium	SW-846 6010B	1	111125708006	04/27/2011 23:32	John W Yanzuk II	1
06958	Manganese	SW-846 6010B	1	111125708006	04/27/2011 23:32	John W Yanzuk II	1
06961	Nickel	SW-846 6010B	1	111125708006	04/27/2011 23:32	John W Yanzuk II	1
01662	Potassium	SW-846 6010B	1	111125708006	04/27/2011 23:32	John W Yanzuk II	1
06936	Selenium	SW-846 6010B	1	111125708006	04/27/2011 23:32	John W Yanzuk II	1
06966	Silver	SW-846 6010B	1	111125708006	04/27/2011 23:32	John W Yanzuk II	1
01667	Sodium	SW-846 6010B	1	111125708006	04/27/2011 23:32	John W Yanzuk II	1
06925	Thallium	SW-846 6010B	1	111125708006	04/27/2011 23:32	John W Yanzuk II	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-56-WC_10-12' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-56-WC_10-12'

LLI Sample # SW 6262276
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 16:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

56-10

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06971	Vanadium	SW-846 6010B	1	111125708006	04/27/2011 23:32	John W Yanzuk II	1
06972	Zinc	SW-846 6010B	1	111125708006	04/27/2011 23:32	John W Yanzuk II	1
00159	Mercury	SW-846 7471A	1	111125711006	04/26/2011 09:32	Damary Valentin	5
05708	SW SW846 ICP Digest	SW-846 3050B	1	111125708006	04/25/2011 09:10	Denise K Conners	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111125711006	04/25/2011 10:10	Denise K Conners	1
00111	Moisture	SM20 2540 G	1	11112820002B	04/22/2011 18:41	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-56-WC_22-24' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-56-WC_22-24'

LLI Sample # SW 6262277
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 17:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

56-22

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	N.D.		740	2,100	70.31
10950	Benzene	71-43-2	160	J	53	530	70.31
10950	Bromodichloromethane	75-27-4	N.D.		110	530	70.31
10950	Bromoform	75-25-2	N.D.		110	530	70.31
10950	Bromomethane	74-83-9	N.D.		210	530	70.31
10950	2-Butanone	78-93-3	N.D.		420	1,100	70.31
10950	Carbon Disulfide	75-15-0	N.D.		110	530	70.31
10950	Carbon Tetrachloride	56-23-5	N.D.		110	530	70.31
10950	Chlorobenzene	108-90-7	N.D.		110	530	70.31
10950	Chloroethane	75-00-3	N.D.		210	530	70.31
10950	Chloroform	67-66-3	N.D.		110	530	70.31
10950	Chloromethane	74-87-3	N.D.		210	530	70.31
10950	Cyclohexane	110-82-7	N.D.		110	530	70.31
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		210	530	70.31
10950	Dibromochloromethane	124-48-1	N.D.		110	530	70.31
10950	1,2-Dibromoethane	106-93-4	N.D.		110	530	70.31
10950	1,2-Dichlorobenzene	95-50-1	N.D.		110	530	70.31
10950	1,3-Dichlorobenzene	541-73-1	N.D.		110	530	70.31
10950	1,4-Dichlorobenzene	106-46-7	N.D.		110	530	70.31
10950	Dichlorodifluoromethane	75-71-8	N.D.		210	530	70.31
10950	1,1-Dichloroethane	75-34-3	N.D.		110	530	70.31
10950	1,2-Dichloroethane	107-06-2	N.D.		110	530	70.31
10950	1,1-Dichloroethene	75-35-4	N.D.		110	530	70.31
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		110	530	70.31
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		110	530	70.31
10950	1,2-Dichloropropane	78-87-5	N.D.		110	530	70.31
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		110	530	70.31
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		110	530	70.31
10950	Ethylbenzene	100-41-4	210	J	110	530	70.31
10950	Freon 113	76-13-1	N.D.		210	1,100	70.31
10950	2-Hexanone	591-78-6	N.D.		320	1,100	70.31
10950	Isopropylbenzene	98-82-8	190	J	110	530	70.31
10950	Methyl Acetate	79-20-9	320	J	210	530	70.31
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		53	530	70.31
10950	4-Methyl-2-pentanone	108-10-1	N.D.		320	1,100	70.31
10950	Methylcyclohexane	108-87-2	520	J	110	530	70.31
10950	Methylene Chloride	75-09-2	N.D.		210	530	70.31
10950	Styrene	100-42-5	N.D.		110	530	70.31
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		110	530	70.31
10950	Tetrachloroethene	127-18-4	N.D.		110	530	70.31
10950	Toluene	108-88-3	1,300		110	530	70.31
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		110	530	70.31
10950	1,1,1-Trichloroethane	71-55-6	N.D.		110	530	70.31
10950	1,1,2-Trichloroethane	79-00-5	N.D.		110	530	70.31
10950	Trichloroethene	79-01-6	N.D.		110	530	70.31
10950	Trichlorofluoromethane	75-69-4	N.D.		210	530	70.31
10950	Vinyl Chloride	75-01-4	N.D.		110	530	70.31
10950	Xylene (Total)	1330-20-7	590		110	530	70.31

Reporting limits were raised due to interference from the sample matrix.

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

Sample Description: BH-10-56-WC_22-24' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-56-WC_22-24'

LLI Sample # SW 6262277
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 17:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

56-22

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	7,300		250	1,200	5
10727	Acenaphthylene	208-96-8	1,700		250	1,200	5
10727	Acetophenone	98-86-2	N.D.		500	1,200	5
10727	Anthracene	120-12-7	6,000		250	1,200	5
10727	Atrazine	1912-24-9	N.D.		250	1,200	5
10727	Benzaldehyde	100-52-7	N.D.		500	1,200	5
10727	Benzo(a)anthracene	56-55-3	5,300		250	1,200	5
10727	Benzo(a)pyrene	50-32-8	4,500		250	1,200	5
10727	Benzo(b)fluoranthene	205-99-2	5,300		250	1,200	5
10727	Benzo(g,h,i)perylene	191-24-2	2,500		250	1,200	5
10727	Benzo(k)fluoranthene	207-08-9	1,900		250	1,200	5
10727	1,1'-Biphenyl	92-52-4	2,200		250	1,200	5
10727	4-Bromophenyl-phenylether	101-55-3	N.D.		250	1,200	5
10727	Butylbenzylphthalate	85-68-7	N.D.		500	1,200	5
10727	Di-n-butylphthalate	84-74-2	N.D.		500	1,200	5
10727	Caprolactam	105-60-2	N.D.		250	1,200	5
10727	Carbazole	86-74-8	810	J	250	1,200	5
10727	4-Chloro-3-methylphenol	59-50-7	N.D.		500	1,200	5
10727	4-Chloroaniline	106-47-8	N.D.		500	1,200	5
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.		250	1,200	5
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.		250	1,200	5
10727	2-Chloronaphthalene	91-58-7	N.D.		250	1,200	5
10727	2-Chlorophenol	95-57-8	N.D.		250	1,200	5
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.		250	1,200	5
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.		250	1,200	5
10727	Chrysene	218-01-9	6,400		250	1,200	5
10727	Dibenz(a,h)anthracene	53-70-3	850	J	250	1,200	5
10727	Dibenzofuran	132-64-9	3,300		250	1,200	5
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.		750	2,500	5
10727	2,4-Dichlorophenol	120-83-2	N.D.		250	1,200	5
10727	Diethylphthalate	84-66-2	N.D.		500	1,200	5
10727	2,4-Dimethylphenol	105-67-9	970	J	500	1,200	5
10727	Dimethylphthalate	131-11-3	N.D.		500	1,200	5
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.		1,200	3,700	5
10727	2,4-Dinitrophenol	51-28-5	N.D.		2,500	7,500	5
10727	2,4-Dinitrotoluene	121-14-2	N.D.		500	1,200	5
10727	2,6-Dinitrotoluene	606-20-2	N.D.		250	1,200	5
10727	bis(2-Ethylhexyl)phthalate	117-81-7	580	J	500	2,500	5
10727	Fluoranthene	206-44-0	12,000		250	1,200	5
10727	Fluorene	86-73-7	6,100		250	1,200	5
10727	Hexachlorobenzene	118-74-1	N.D.		250	1,200	5
10727	Hexachlorobutadiene	87-68-3	N.D.		500	1,200	5
10727	Hexachlorocyclopentadiene	77-47-4	N.D.		1,200	3,700	5
10727	Hexachloroethane	67-72-1	N.D.		250	1,200	5
10727	Indeno(1,2,3-cd)pyrene	193-39-5	2,100		250	1,200	5
10727	Isophorone	78-59-1	N.D.		250	1,200	5
10727	2-Methylnaphthalene	91-57-6	17,000		250	1,200	5
10727	2-Methylphenol	95-48-7	530	J	500	1,200	5
10727	4-Methylphenol	106-44-5	7,200		500	1,200	5

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

Sample Description: BH-10-56-WC_22-24' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-56-WC_22-24'

LLI Sample # SW 6262277
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 17:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

56-22

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	34,000		2,500	12,000	50
10727	2-Nitroaniline	88-74-4	N.D.		250	1,200	5
10727	3-Nitroaniline	99-09-2	N.D.		500	1,200	5
10727	4-Nitroaniline	100-01-6	N.D.		500	1,200	5
10727	Nitrobenzene	98-95-3	N.D.		250	1,200	5
10727	2-Nitrophenol	88-75-5	N.D.		250	1,200	5
10727	4-Nitrophenol	100-02-7	N.D.		1,200	3,700	5
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		250	1,200	5
10727	N-Nitrosodiphenylamine	86-30-6	N.D.		250	1,200	5
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		500	1,200	5
10727	Pentachlorophenol	87-86-5	N.D.		1,200	3,700	5
10727	Phenanthrene	85-01-8	20,000		250	1,200	5
10727	Phenol	108-95-2	370	J	250	1,200	5
10727	Pyrene	129-00-0	13,000		250	1,200	5
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		500	1,200	5
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		250	1,200	5
	Reporting limits were raised due to interference from the sample matrix.						
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	15,500		7.28	29.0	1
06944	Antimony	7440-36-0	N.D.		1.45	2.90	1
06935	Arsenic	7440-38-2	18.0		1.38	2.90	1
06946	Barium	7440-39-3	245		0.0579	0.724	1
06947	Beryllium	7440-41-7	1.61		0.0985	0.724	1
06949	Cadmium	7440-43-9	1.66		0.203	0.724	1
01650	Calcium	7440-70-2	4,390		8.88	29.0	1
06951	Chromium	7440-47-3	50.3		0.854	2.17	1
06952	Cobalt	7440-48-4	19.7		0.275	0.724	1
06953	Copper	7440-50-8	109		0.319	1.45	1
01654	Iron	7439-89-6	23,300		6.82	29.0	1
06955	Lead	7439-92-1	316		0.869	2.17	1
01657	Magnesium	7439-95-4	3,580		3.68	14.5	1
06958	Manganese	7439-96-5	424		0.113	0.724	1
06961	Nickel	7440-02-0	35.6		0.275	1.45	1
01662	Potassium	7440-09-7	1,720		26.1	72.4	1
06936	Selenium	7782-49-2	3.57		1.42	2.90	1
06966	Silver	7440-22-4	0.520	J	0.261	0.724	1
01667	Sodium	7440-23-5	656		54.0	145	1
06925	Thallium	7440-28-0	N.D.		2.10	4.34	1
06971	Vanadium	7440-62-2	31.1		0.275	0.724	1
06972	Zinc	7440-66-6	457		0.956	2.90	1
	SW-846 7471A		**mg/kg**		**mg/kg**	**mg/kg**	

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-56-WC_22-24' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-56-WC_22-24'

LLI Sample # SW 6262277
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 17:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

56-22

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.906	0.0041	0.144	1
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	33.6	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	Q111121AA	04/22/2011 11:03	Stephanie A Selis	70.31
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/12/2011 17:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/12/2011 17:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/12/2011 17:00	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLD026	04/25/2011 08:00	Brian K Graham	5
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLD026	04/25/2011 13:35	Brian K Graham	50
10809	BNA Soil Microwave	SW-846 3546	1	11110SLD026	04/21/2011 09:30	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111125708004	04/28/2011 01:29	Tara L Snyder	1
06944	Antimony	SW-846 6010B	1	111125708004	04/28/2011 01:29	Tara L Snyder	1
06935	Arsenic	SW-846 6010B	1	111125708004	04/28/2011 01:29	Tara L Snyder	1
06946	Barium	SW-846 6010B	1	111125708004	04/28/2011 01:29	Tara L Snyder	1
06947	Beryllium	SW-846 6010B	1	111125708004	04/28/2011 01:29	Tara L Snyder	1
06949	Cadmium	SW-846 6010B	1	111125708004	04/28/2011 01:29	Tara L Snyder	1
01650	Calcium	SW-846 6010B	1	111125708004	04/28/2011 01:29	Tara L Snyder	1
06951	Chromium	SW-846 6010B	1	111125708004	04/28/2011 01:29	Tara L Snyder	1
06952	Cobalt	SW-846 6010B	1	111125708004	04/28/2011 01:29	Tara L Snyder	1
06953	Copper	SW-846 6010B	1	111125708004	04/28/2011 01:29	Tara L Snyder	1
01654	Iron	SW-846 6010B	1	111125708004	04/28/2011 01:29	Tara L Snyder	1
06955	Lead	SW-846 6010B	1	111125708004	04/28/2011 01:29	Tara L Snyder	1
01657	Magnesium	SW-846 6010B	1	111125708004	04/28/2011 01:29	Tara L Snyder	1
06958	Manganese	SW-846 6010B	1	111125708004	04/28/2011 01:29	Tara L Snyder	1
06961	Nickel	SW-846 6010B	1	111125708004	04/28/2011 01:29	Tara L Snyder	1
01662	Potassium	SW-846 6010B	1	111125708004	04/28/2011 01:29	Tara L Snyder	1
06936	Selenium	SW-846 6010B	1	111125708004	04/28/2011 08:37	Joanne M Gates	1
06966	Silver	SW-846 6010B	1	111125708004	04/28/2011 01:29	Tara L Snyder	1
01667	Sodium	SW-846 6010B	1	111125708004	04/28/2011 01:29	Tara L Snyder	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-56-WC_22-24' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-56-WC_22-24'

LLI Sample # SW 6262277
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/12/2011 17:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

56-22

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06925	Thallium	SW-846 6010B	1	111125708004	04/28/2011 01:29	Tara L Snyder	1
06971	Vanadium	SW-846 6010B	1	111125708004	04/28/2011 01:29	Tara L Snyder	1
06972	Zinc	SW-846 6010B	1	111125708004	04/28/2011 01:29	Tara L Snyder	1
00159	Mercury	SW-846 7471A	1	111125711004	04/25/2011 09:56	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111125708004	04/23/2011 10:17	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111125711004	04/23/2011 12:05	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820002B	04/22/2011 18:41	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-77-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-77-WC_0-2'

LLI Sample # SW 6262278
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 10:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

77-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	82		6	18	0.74
10950	Benzene	71-43-2	2	J	0.4	4	0.74
10950	Bromodichloromethane	75-27-4	N.D.		0.9	4	0.74
10950	Bromoform	75-25-2	N.D.		0.9	4	0.74
10950	Bromomethane	74-83-9	N.D.		2	4	0.74
10950	2-Butanone	78-93-3	8	J	4	9	0.74
10950	Carbon Disulfide	75-15-0	1	J	0.9	4	0.74
10950	Carbon Tetrachloride	56-23-5	N.D.		0.9	4	0.74
10950	Chlorobenzene	108-90-7	N.D.		0.9	4	0.74
10950	Chloroethane	75-00-3	N.D.		2	4	0.74
10950	Chloroform	67-66-3	N.D.		0.9	4	0.74
10950	Chloromethane	74-87-3	N.D.		2	4	0.74
10950	Cyclohexane	110-82-7	N.D.		0.9	4	0.74
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		2	4	0.74
10950	Dibromochloromethane	124-48-1	N.D.		0.9	4	0.74
10950	1,2-Dibromoethane	106-93-4	N.D.		0.9	4	0.74
10950	1,2-Dichlorobenzene	95-50-1	N.D.		0.9	4	0.74
10950	1,3-Dichlorobenzene	541-73-1	N.D.		0.9	4	0.74
10950	1,4-Dichlorobenzene	106-46-7	N.D.		0.9	4	0.74
10950	Dichlorodifluoromethane	75-71-8	N.D.		2	4	0.74
10950	1,1-Dichloroethane	75-34-3	N.D.		0.9	4	0.74
10950	1,2-Dichloroethane	107-06-2	N.D.		0.9	4	0.74
10950	1,1-Dichloroethene	75-35-4	N.D.		0.9	4	0.74
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		0.9	4	0.74
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		0.9	4	0.74
10950	1,2-Dichloropropane	78-87-5	N.D.		0.9	4	0.74
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		0.9	4	0.74
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		0.9	4	0.74
10950	Ethylbenzene	100-41-4	N.D.		0.9	4	0.74
10950	Freon 113	76-13-1	N.D.		2	9	0.74
10950	2-Hexanone	591-78-6	N.D.		3	9	0.74
10950	Isopropylbenzene	98-82-8	N.D.		0.9	4	0.74
10950	Methyl Acetate	79-20-9	N.D.		2	4	0.74
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.4	4	0.74
10950	4-Methyl-2-pentanone	108-10-1	N.D.		3	9	0.74
10950	Methylcyclohexane	108-87-2	0.9	J	0.9	4	0.74
10950	Methylene Chloride	75-09-2	N.D.		2	4	0.74
10950	Styrene	100-42-5	N.D.		0.9	4	0.74
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		0.9	4	0.74
10950	Tetrachloroethene	127-18-4	N.D.		0.9	4	0.74
10950	Toluene	108-88-3	N.D.		0.9	4	0.74
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		0.9	4	0.74
10950	1,1,1-Trichloroethane	71-55-6	N.D.		0.9	4	0.74
10950	1,1,2-Trichloroethane	79-00-5	N.D.		0.9	4	0.74
10950	Trichloroethene	79-01-6	N.D.		0.9	4	0.74
10950	Trichlorofluoromethane	75-69-4	N.D.		2	4	0.74
10950	Vinyl Chloride	75-01-4	N.D.		0.9	4	0.74
10950	Xylene (Total)	1330-20-7	N.D.		0.9	4	0.74

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

Sample Description: BH-10-77-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-77-WC_0-2'

LLI Sample # SW 6262278
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 10:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

77-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**		**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	270	J	200	1,000	5
10727	Acenaphthylene	208-96-8	N.D.		200	1,000	5
10727	Acetophenone	98-86-2	N.D.		400	1,000	5
10727	Anthracene	120-12-7	520	J	200	1,000	5
10727	Atrazine	1912-24-9	N.D.		200	1,000	5
10727	Benzaldehyde	100-52-7	N.D.		400	1,000	5
10727	Benzo(a)anthracene	56-55-3	2,000		200	1,000	5
10727	Benzo(a)pyrene	50-32-8	1,900		200	1,000	5
10727	Benzo(b)fluoranthene	205-99-2	2,500		200	1,000	5
10727	Benzo(g,h,i)perylene	191-24-2	1,500		200	1,000	5
10727	Benzo(k)fluoranthene	207-08-9	1,100		200	1,000	5
10727	1,1'-Biphenyl	92-52-4	N.D.		200	1,000	5
10727	4-Bromophenyl-phenylether	101-55-3	N.D.		200	1,000	5
10727	Butylbenzylphthalate	85-68-7	N.D.		400	1,000	5
10727	Di-n-butylphthalate	84-74-2	N.D.		400	1,000	5
10727	Caprolactam	105-60-2	N.D.		200	1,000	5
10727	Carbazole	86-74-8	380	J	200	1,000	5
10727	4-Chloro-3-methylphenol	59-50-7	N.D.		400	1,000	5
10727	4-Chloroaniline	106-47-8	N.D.		400	1,000	5
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.		200	1,000	5
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.		200	1,000	5
10727	2-Chloronaphthalene	91-58-7	N.D.		200	1,000	5
10727	2-Chlorophenol	95-57-8	N.D.		200	1,000	5
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.		200	1,000	5
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.		200	1,000	5
10727	Chrysene	218-01-9	2,000		200	1,000	5
10727	Dibenz(a,h)anthracene	53-70-3	530	J	200	1,000	5
10727	Dibenzofuran	132-64-9	N.D.		200	1,000	5
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.		600	2,000	5
10727	2,4-Dichlorophenol	120-83-2	N.D.		200	1,000	5
10727	Diethylphthalate	84-66-2	N.D.		400	1,000	5
10727	2,4-Dimethylphenol	105-67-9	N.D.		400	1,000	5
10727	Dimethylphthalate	131-11-3	N.D.		400	1,000	5
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.		1,000	3,000	5
10727	2,4-Dinitrophenol	51-28-5	N.D.		2,000	6,000	5
10727	2,4-Dinitrotoluene	121-14-2	N.D.		400	1,000	5
10727	2,6-Dinitrotoluene	606-20-2	N.D.		200	1,000	5
10727	bis(2-Ethylhexyl)phthalate	117-81-7	N.D.		400	2,000	5
10727	Fluoranthene	206-44-0	3,700		200	1,000	5
10727	Fluorene	86-73-7	220	J	200	1,000	5
10727	Hexachlorobenzene	118-74-1	N.D.		200	1,000	5
10727	Hexachlorobutadiene	87-68-3	N.D.		400	1,000	5
10727	Hexachlorocyclopentadiene	77-47-4	N.D.		1,000	3,000	5
10727	Hexachloroethane	67-72-1	N.D.		200	1,000	5
10727	Indeno(1,2,3-cd)pyrene	193-39-5	1,300		200	1,000	5
10727	Isophorone	78-59-1	N.D.		200	1,000	5
10727	2-Methylnaphthalene	91-57-6	230	J	200	1,000	5
10727	2-Methylphenol	95-48-7	N.D.		400	1,000	5
10727	4-Methylphenol	106-44-5	N.D.		400	1,000	5

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

Sample Description: BH-10-77-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-77-WC_0-2'

LLI Sample # SW 6262278
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 10:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

77-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	240	J	200	1,000	5
10727	2-Nitroaniline	88-74-4	N.D.		200	1,000	5
10727	3-Nitroaniline	99-09-2	N.D.		400	1,000	5
10727	4-Nitroaniline	100-01-6	N.D.		400	1,000	5
10727	Nitrobenzene	98-95-3	N.D.		200	1,000	5
10727	2-Nitrophenol	88-75-5	N.D.		200	1,000	5
10727	4-Nitrophenol	100-02-7	N.D.		1,000	3,000	5
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		200	1,000	5
10727	N-Nitrosodiphenylamine	86-30-6	N.D.		200	1,000	5
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		400	1,000	5
10727	Pentachlorophenol	87-86-5	N.D.		1,000	3,000	5
10727	Phenanthrene	85-01-8	2,700		200	1,000	5
10727	Phenol	108-95-2	N.D.		200	1,000	5
10727	Pyrene	129-00-0	3,200		200	1,000	5
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		400	1,000	5
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		200	1,000	5
	Reporting limits were raised due to interference from the sample matrix.						
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	16,700		5.91	23.5	1
06944	Antimony	7440-36-0	N.D.		1.17	2.35	1
06935	Arsenic	7440-38-2	12.2		1.12	2.35	1
06946	Barium	7440-39-3	128		0.0470	0.587	1
06947	Beryllium	7440-41-7	0.780		0.0798	0.587	1
06949	Cadmium	7440-43-9	N.D.		0.164	0.587	1
01650	Calcium	7440-70-2	6,090		7.20	23.5	1
06951	Chromium	7440-47-3	37.0		0.693	1.76	1
06952	Cobalt	7440-48-4	7.60		0.223	0.587	1
06953	Copper	7440-50-8	160		0.258	1.17	1
01654	Iron	7439-89-6	26,700		5.53	23.5	1
06955	Lead	7439-92-1	225		0.704	1.76	1
01657	Magnesium	7439-95-4	3,450		2.98	11.7	1
06958	Manganese	7439-96-5	214		0.0916	0.587	1
06961	Nickel	7440-02-0	26.1		0.223	1.17	1
01662	Potassium	7440-09-7	1,550		21.1	58.7	1
06936	Selenium	7782-49-2	N.D.		1.15	2.35	1
06966	Silver	7440-22-4	N.D.		0.211	0.587	1
01667	Sodium	7440-23-5	83.3	J	43.8	117	1
06925	Thallium	7440-28-0	N.D.		1.70	3.52	1
06971	Vanadium	7440-62-2	50.2		0.223	0.587	1
06972	Zinc	7440-66-6	109		0.775	2.35	1
	SW-846 7471A		**mg/kg**		**mg/kg**	**mg/kg**	

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

Sample Description: BH-10-77-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-77-WC_0-2'

LLI Sample # SW 6262278
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 10:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

77-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.414	0.0033	0.116	1
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	17.3	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	X111151AA	04/25/2011 21:10	Sara E Johnson	0.74
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/13/2011 10:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/13/2011 10:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/13/2011 10:00	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLD026	04/25/2011 08:26	Brian K Graham	5
10809	BNA Soil Microwave	SW-846 3546	1	11110SLD026	04/21/2011 09:30	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111125708004	04/28/2011 01:50	Tara L Snyder	1
06944	Antimony	SW-846 6010B	1	111125708004	04/28/2011 01:50	Tara L Snyder	1
06935	Arsenic	SW-846 6010B	1	111125708004	04/28/2011 01:50	Tara L Snyder	1
06946	Barium	SW-846 6010B	1	111125708004	04/28/2011 01:50	Tara L Snyder	1
06947	Beryllium	SW-846 6010B	1	111125708004	04/28/2011 01:50	Tara L Snyder	1
06949	Cadmium	SW-846 6010B	1	111125708004	04/28/2011 01:50	Tara L Snyder	1
01650	Calcium	SW-846 6010B	1	111125708004	04/28/2011 01:50	Tara L Snyder	1
06951	Chromium	SW-846 6010B	1	111125708004	04/28/2011 01:50	Tara L Snyder	1
06952	Cobalt	SW-846 6010B	1	111125708004	04/28/2011 01:50	Tara L Snyder	1
06953	Copper	SW-846 6010B	1	111125708004	04/28/2011 01:50	Tara L Snyder	1
01654	Iron	SW-846 6010B	1	111125708004	04/28/2011 01:50	Tara L Snyder	1
06955	Lead	SW-846 6010B	1	111125708004	04/28/2011 01:50	Tara L Snyder	1
01657	Magnesium	SW-846 6010B	1	111125708004	04/28/2011 01:50	Tara L Snyder	1
06958	Manganese	SW-846 6010B	1	111125708004	04/28/2011 01:50	Tara L Snyder	1
06961	Nickel	SW-846 6010B	1	111125708004	04/28/2011 01:50	Tara L Snyder	1
01662	Potassium	SW-846 6010B	1	111125708004	04/28/2011 01:50	Tara L Snyder	1
06936	Selenium	SW-846 6010B	1	111125708004	04/28/2011 08:57	Joanne M Gates	1
06966	Silver	SW-846 6010B	1	111125708004	04/28/2011 01:50	Tara L Snyder	1
01667	Sodium	SW-846 6010B	1	111125708004	04/28/2011 01:50	Tara L Snyder	1
06925	Thallium	SW-846 6010B	1	111125708004	04/28/2011 01:50	Tara L Snyder	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-77-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-77-WC_0-2'

LLI Sample # SW 6262278
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 10:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

77-02

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06971	Vanadium	SW-846 6010B	1	111125708004	04/28/2011 01:50	Tara L Snyder	1
06972	Zinc	SW-846 6010B	1	111125708004	04/28/2011 01:50	Tara L Snyder	1
00159	Mercury	SW-846 7471A	1	111125711004	04/25/2011 09:57	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111125708004	04/23/2011 10:17	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111125711004	04/23/2011 12:05	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820002B	04/22/2011 18:41	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-77-WC_10-12' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-77-WC_10-12'

LLI Sample # SW 6262279
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 10:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

77-12

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	N.D.		8,300	24,000	725.69
10950	Benzene	71-43-2	2,400	J	590	5,900	725.69
10950	Bromodichloromethane	75-27-4	N.D.		1,200	5,900	725.69
10950	Bromoform	75-25-2	N.D.		1,200	5,900	725.69
10950	Bromomethane	74-83-9	N.D.		2,400	5,900	725.69
10950	2-Butanone	78-93-3	N.D.		4,700	12,000	725.69
10950	Carbon Disulfide	75-15-0	N.D.		1,200	5,900	725.69
10950	Carbon Tetrachloride	56-23-5	N.D.		1,200	5,900	725.69
10950	Chlorobenzene	108-90-7	N.D.		1,200	5,900	725.69
10950	Chloroethane	75-00-3	N.D.		2,400	5,900	725.69
10950	Chloroform	67-66-3	N.D.		1,200	5,900	725.69
10950	Chloromethane	74-87-3	N.D.		2,400	5,900	725.69
10950	Cyclohexane	110-82-7	N.D.		1,200	5,900	725.69
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		2,400	5,900	725.69
10950	Dibromochloromethane	124-48-1	N.D.		1,200	5,900	725.69
10950	1,2-Dibromoethane	106-93-4	N.D.		1,200	5,900	725.69
10950	1,2-Dichlorobenzene	95-50-1	N.D.		1,200	5,900	725.69
10950	1,3-Dichlorobenzene	541-73-1	N.D.		1,200	5,900	725.69
10950	1,4-Dichlorobenzene	106-46-7	N.D.		1,200	5,900	725.69
10950	Dichlorodifluoromethane	75-71-8	N.D.		2,400	5,900	725.69
10950	1,1-Dichloroethane	75-34-3	N.D.		1,200	5,900	725.69
10950	1,2-Dichloroethane	107-06-2	N.D.		1,200	5,900	725.69
10950	1,1-Dichloroethene	75-35-4	N.D.		1,200	5,900	725.69
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		1,200	5,900	725.69
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		1,200	5,900	725.69
10950	1,2-Dichloropropane	78-87-5	N.D.		1,200	5,900	725.69
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		1,200	5,900	725.69
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		1,200	5,900	725.69
10950	Ethylbenzene	100-41-4	1,500	J	1,200	5,900	725.69
10950	Freon 113	76-13-1	N.D.		2,400	12,000	725.69
10950	2-Hexanone	591-78-6	N.D.		3,500	12,000	725.69
10950	Isopropylbenzene	98-82-8	N.D.		1,200	5,900	725.69
10950	Methyl Acetate	79-20-9	N.D.		2,400	5,900	725.69
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		590	5,900	725.69
10950	4-Methyl-2-pentanone	108-10-1	6,200	J	3,500	12,000	725.69
10950	Methylcyclohexane	108-87-2	N.D.		1,200	5,900	725.69
10950	Methylene Chloride	75-09-2	N.D.		2,400	5,900	725.69
10950	Styrene	100-42-5	N.D.		1,200	5,900	725.69
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		1,200	5,900	725.69
10950	Tetrachloroethene	127-18-4	N.D.		1,200	5,900	725.69
10950	Toluene	108-88-3	3,200	J	1,200	5,900	725.69
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		1,200	5,900	725.69
10950	1,1,1-Trichloroethane	71-55-6	N.D.		1,200	5,900	725.69
10950	1,1,2-Trichloroethane	79-00-5	N.D.		1,200	5,900	725.69
10950	Trichloroethene	79-01-6	N.D.		1,200	5,900	725.69
10950	Trichlorofluoromethane	75-69-4	N.D.		2,400	5,900	725.69
10950	Vinyl Chloride	75-01-4	N.D.		1,200	5,900	725.69
10950	Xylene (Total)	1330-20-7	9,900		1,200	5,900	725.69

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

Sample Description: BH-10-77-WC_10-12' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-77-WC_10-12'

LLI Sample # SW 6262279
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 10:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

77-12

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**		**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	N.D.		1,300	6,700	5
10727	Acenaphthylene	208-96-8	N.D.		1,300	6,700	5
10727	Acetophenone	98-86-2	N.D.		2,700	6,700	5
10727	Anthracene	120-12-7	N.D.		1,300	6,700	5
10727	Atrazine	1912-24-9	N.D.		1,300	6,700	5
10727	Benzaldehyde	100-52-7	N.D.		2,700	6,700	5
10727	Benzo(a)anthracene	56-55-3	N.D.		1,300	6,700	5
10727	Benzo(a)pyrene	50-32-8	N.D.		1,300	6,700	5
10727	Benzo(b)fluoranthene	205-99-2	N.D.		1,300	6,700	5
10727	Benzo(g,h,i)perylene	191-24-2	N.D.		1,300	6,700	5
10727	Benzo(k)fluoranthene	207-08-9	N.D.		1,300	6,700	5
10727	1,1'-Biphenyl	92-52-4	N.D.		1,300	6,700	5
10727	4-Bromophenyl-phenylether	101-55-3	N.D.		1,300	6,700	5
10727	Butylbenzylphthalate	85-68-7	N.D.		2,700	6,700	5
10727	Di-n-butylphthalate	84-74-2	N.D.		2,700	6,700	5
10727	Caprolactam	105-60-2	N.D.		1,300	6,700	5
10727	Carbazole	86-74-8	N.D.		1,300	6,700	5
10727	4-Chloro-3-methylphenol	59-50-7	N.D.		2,700	6,700	5
10727	4-Chloroaniline	106-47-8	N.D.		2,700	6,700	5
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.		1,300	6,700	5
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.		1,300	6,700	5
10727	2-Chloronaphthalene	91-58-7	N.D.		1,300	6,700	5
10727	2-Chlorophenol	95-57-8	N.D.		1,300	6,700	5
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.		1,300	6,700	5
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.		1,300	6,700	5
10727	Chrysene	218-01-9	N.D.		1,300	6,700	5
10727	Dibenz(a,h)anthracene	53-70-3	N.D.		1,300	6,700	5
10727	Dibenzofuran	132-64-9	N.D.		1,300	6,700	5
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.		4,000	13,000	5
10727	2,4-Dichlorophenol	120-83-2	N.D.		1,300	6,700	5
10727	Diethylphthalate	84-66-2	N.D.		2,700	6,700	5
10727	2,4-Dimethylphenol	105-67-9	N.D.		2,700	6,700	5
10727	Dimethylphthalate	131-11-3	N.D.		2,700	6,700	5
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.		6,700	20,000	5
10727	2,4-Dinitrophenol	51-28-5	N.D.		13,000	40,000	5
10727	2,4-Dinitrotoluene	121-14-2	N.D.		2,700	6,700	5
10727	2,6-Dinitrotoluene	606-20-2	N.D.		1,300	6,700	5
10727	bis(2-Ethylhexyl)phthalate	117-81-7	3,500	J	2,700	13,000	5
10727	Fluoranthene	206-44-0	N.D.		1,300	6,700	5
10727	Fluorene	86-73-7	1,500	J	1,300	6,700	5
10727	Hexachlorobenzene	118-74-1	N.D.		1,300	6,700	5
10727	Hexachlorobutadiene	87-68-3	N.D.		2,700	6,700	5
10727	Hexachlorocyclopentadiene	77-47-4	N.D.		6,700	20,000	5
10727	Hexachloroethane	67-72-1	N.D.		1,300	6,700	5
10727	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.		1,300	6,700	5
10727	Isophorone	78-59-1	N.D.		1,300	6,700	5
10727	2-Methylnaphthalene	91-57-6	8,700		1,300	6,700	5
10727	2-Methylphenol	95-48-7	N.D.		2,700	6,700	5
10727	4-Methylphenol	106-44-5	6,200	J	2,700	6,700	5

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

Sample Description: BH-10-77-WC_10-12' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-77-WC_10-12'

LLI Sample # SW 6262279
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 10:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

77-12

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	4,500	J	1,300	6,700	5
10727	2-Nitroaniline	88-74-4	N.D.		1,300	6,700	5
10727	3-Nitroaniline	99-09-2	N.D.		2,700	6,700	5
10727	4-Nitroaniline	100-01-6	N.D.		2,700	6,700	5
10727	Nitrobenzene	98-95-3	N.D.		1,300	6,700	5
10727	2-Nitrophenol	88-75-5	N.D.		1,300	6,700	5
10727	4-Nitrophenol	100-02-7	N.D.		6,700	20,000	5
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		1,300	6,700	5
10727	N-Nitrosodiphenylamine	86-30-6	N.D.		1,300	6,700	5
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		2,700	6,700	5
10727	Pentachlorophenol	87-86-5	N.D.		6,700	20,000	5
10727	Phenanthrene	85-01-8	4,700	J	1,300	6,700	5
10727	Phenol	108-95-2	N.D.		1,300	6,700	5
10727	Pyrene	129-00-0	N.D.		1,300	6,700	5
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		2,700	6,700	5
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		1,300	6,700	5
	Reporting limits were raised due to interference from the sample matrix.						
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	21,500		8.02	31.9	1
06944	Antimony	7440-36-0	N.D.		1.59	3.19	1
06935	Arsenic	7440-38-2	10.9		1.51	3.19	1
06946	Barium	7440-39-3	1,020		0.0638	0.797	1
06947	Beryllium	7440-41-7	0.872		0.108	0.797	1
06949	Cadmium	7440-43-9	1.97		0.223	0.797	1
01650	Calcium	7440-70-2	16,100		9.77	31.9	1
06951	Chromium	7440-47-3	77.4		0.941	2.39	1
06952	Cobalt	7440-48-4	9.53		0.303	0.797	1
06953	Copper	7440-50-8	163		0.351	1.59	1
01654	Iron	7439-89-6	32,500		7.51	31.9	1
06955	Lead	7439-92-1	208		0.956	2.39	1
01657	Magnesium	7439-95-4	19,400		4.05	15.9	1
06958	Manganese	7439-96-5	399		0.124	0.797	1
06961	Nickel	7440-02-0	50.2		0.303	1.59	1
01662	Potassium	7440-09-7	3,290		28.7	79.7	1
06936	Selenium	7782-49-2	N.D.		1.56	3.19	1
06966	Silver	7440-22-4	N.D.		0.287	0.797	1
01667	Sodium	7440-23-5	1,200		59.5	159	1
06925	Thallium	7440-28-0	N.D.		2.31	4.78	1
06971	Vanadium	7440-62-2	121		0.303	0.797	1
06972	Zinc	7440-66-6	215		1.05	3.19	1
	SW-846 7471A		**mg/kg**		**mg/kg**	**mg/kg**	

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-77-WC_10-12' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-77-WC_10-12'

LLI Sample # SW 6262279
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 10:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

77-12

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	24.4	0.217	7.56	50
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	38.5	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	Q111121AA	04/22/2011 06:51	Stephanie A Selis	725.69
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/13/2011 10:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/13/2011 10:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/13/2011 10:30	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLD026	04/25/2011 08:52	Brian K Graham	5
10809	BNA Soil Microwave	SW-846 3546	1	11110SLD026	04/21/2011 09:30	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111125708004	04/28/2011 01:53	Tara L Snyder	1
06944	Antimony	SW-846 6010B	1	111125708004	04/28/2011 01:53	Tara L Snyder	1
06935	Arsenic	SW-846 6010B	1	111125708004	04/28/2011 01:53	Tara L Snyder	1
06946	Barium	SW-846 6010B	1	111125708004	04/28/2011 01:53	Tara L Snyder	1
06947	Beryllium	SW-846 6010B	1	111125708004	04/28/2011 01:53	Tara L Snyder	1
06949	Cadmium	SW-846 6010B	1	111125708004	04/28/2011 01:53	Tara L Snyder	1
01650	Calcium	SW-846 6010B	1	111125708004	04/28/2011 01:53	Tara L Snyder	1
06951	Chromium	SW-846 6010B	1	111125708004	04/28/2011 01:53	Tara L Snyder	1
06952	Cobalt	SW-846 6010B	1	111125708004	04/28/2011 01:53	Tara L Snyder	1
06953	Copper	SW-846 6010B	1	111125708004	04/28/2011 01:53	Tara L Snyder	1
01654	Iron	SW-846 6010B	1	111125708004	04/28/2011 01:53	Tara L Snyder	1
06955	Lead	SW-846 6010B	1	111125708004	04/28/2011 01:53	Tara L Snyder	1
01657	Magnesium	SW-846 6010B	1	111125708004	04/28/2011 01:53	Tara L Snyder	1
06958	Manganese	SW-846 6010B	1	111125708004	04/28/2011 01:53	Tara L Snyder	1
06961	Nickel	SW-846 6010B	1	111125708004	04/28/2011 01:53	Tara L Snyder	1
01662	Potassium	SW-846 6010B	1	111125708004	04/28/2011 01:53	Tara L Snyder	1
06936	Selenium	SW-846 6010B	1	111125708004	04/28/2011 09:00	Joanne M Gates	1
06966	Silver	SW-846 6010B	1	111125708004	04/28/2011 01:53	Tara L Snyder	1
01667	Sodium	SW-846 6010B	1	111125708004	04/28/2011 01:53	Tara L Snyder	1
06925	Thallium	SW-846 6010B	1	111125708004	04/28/2011 01:53	Tara L Snyder	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-77-WC_10-12' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-77-WC_10-12'

LLI Sample # SW 6262279
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 10:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

77-12

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06971	Vanadium	SW-846 6010B	1	111125708004	04/28/2011 01:53	Tara L Snyder	1
06972	Zinc	SW-846 6010B	1	111125708004	04/28/2011 01:53	Tara L Snyder	1
00159	Mercury	SW-846 7471A	1	111125711004	04/25/2011 10:01	Damary Valentin	50
05708	SW SW846 ICP Digest	SW-846 3050B	1	111125708004	04/23/2011 10:17	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111125711004	04/23/2011 12:05	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820002B	04/22/2011 18:41	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-77-WC_20-22' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-77-WC_20-22'

LLI Sample # SW 6262280
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 11:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

77-22

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	N.D.		730	2,100	69.09
10950	Benzene	71-43-2	N.D.		52	520	69.09
10950	Bromodichloromethane	75-27-4	N.D.		100	520	69.09
10950	Bromoform	75-25-2	N.D.		100	520	69.09
10950	Bromomethane	74-83-9	N.D.		210	520	69.09
10950	2-Butanone	78-93-3	N.D.		420	1,000	69.09
10950	Carbon Disulfide	75-15-0	N.D.		100	520	69.09
10950	Carbon Tetrachloride	56-23-5	N.D.		100	520	69.09
10950	Chlorobenzene	108-90-7	N.D.		100	520	69.09
10950	Chloroethane	75-00-3	N.D.		210	520	69.09
10950	Chloroform	67-66-3	N.D.		100	520	69.09
10950	Chloromethane	74-87-3	N.D.		210	520	69.09
10950	Cyclohexane	110-82-7	1,600		100	520	69.09
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		210	520	69.09
10950	Dibromochloromethane	124-48-1	N.D.		100	520	69.09
10950	1,2-Dibromoethane	106-93-4	N.D.		100	520	69.09
10950	1,2-Dichlorobenzene	95-50-1	N.D.		100	520	69.09
10950	1,3-Dichlorobenzene	541-73-1	N.D.		100	520	69.09
10950	1,4-Dichlorobenzene	106-46-7	N.D.		100	520	69.09
10950	Dichlorodifluoromethane	75-71-8	N.D.		210	520	69.09
10950	1,1-Dichloroethane	75-34-3	N.D.		100	520	69.09
10950	1,2-Dichloroethane	107-06-2	N.D.		100	520	69.09
10950	1,1-Dichloroethene	75-35-4	N.D.		100	520	69.09
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		100	520	69.09
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		100	520	69.09
10950	1,2-Dichloropropane	78-87-5	N.D.		100	520	69.09
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		100	520	69.09
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		100	520	69.09
10950	Ethylbenzene	100-41-4	N.D.		100	520	69.09
10950	Freon 113	76-13-1	N.D.		210	1,000	69.09
10950	2-Hexanone	591-78-6	N.D.		310	1,000	69.09
10950	Isopropylbenzene	98-82-8	670		100	520	69.09
10950	Methyl Acetate	79-20-9	700		210	520	69.09
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		52	520	69.09
10950	4-Methyl-2-pentanone	108-10-1	N.D.		310	1,000	69.09
10950	Methylcyclohexane	108-87-2	9,600		100	520	69.09
10950	Methylene Chloride	75-09-2	N.D.		210	520	69.09
10950	Styrene	100-42-5	N.D.		100	520	69.09
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		100	520	69.09
10950	Tetrachloroethene	127-18-4	N.D.		100	520	69.09
10950	Toluene	108-88-3	110	J	100	520	69.09
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		100	520	69.09
10950	1,1,1-Trichloroethane	71-55-6	N.D.		100	520	69.09
10950	1,1,2-Trichloroethane	79-00-5	N.D.		100	520	69.09
10950	Trichloroethene	79-01-6	N.D.		100	520	69.09
10950	Trichlorofluoromethane	75-69-4	N.D.		210	520	69.09
10950	Vinyl Chloride	75-01-4	N.D.		100	520	69.09
10950	Xylene (Total)	1330-20-7	540		100	520	69.09

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

Sample Description: BH-10-77-WC_20-22' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-77-WC_20-22'

LLI Sample # SW 6262280
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 11:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

77-22

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**		**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	3,200	J	2,500	13,000	5
10727	Acenaphthylene	208-96-8	N.D.		2,500	13,000	5
10727	Acetophenone	98-86-2	N.D.		5,000	13,000	5
10727	Anthracene	120-12-7	5,300	J	2,500	13,000	5
10727	Atrazine	1912-24-9	N.D.		2,500	13,000	5
10727	Benzaldehyde	100-52-7	N.D.		5,000	13,000	5
10727	Benzo(a)anthracene	56-55-3	5,300	J	2,500	13,000	5
10727	Benzo(a)pyrene	50-32-8	4,400	J	2,500	13,000	5
10727	Benzo(b)fluoranthene	205-99-2	3,100	J	2,500	13,000	5
10727	Benzo(g,h,i)perylene	191-24-2	3,000	J	2,500	13,000	5
10727	Benzo(k)fluoranthene	207-08-9	N.D.		2,500	13,000	5
10727	1,1'-Biphenyl	92-52-4	N.D.		2,500	13,000	5
10727	4-Bromophenyl-phenylether	101-55-3	N.D.		2,500	13,000	5
10727	Butylbenzylphthalate	85-68-7	N.D.		5,000	13,000	5
10727	Di-n-butylphthalate	84-74-2	N.D.		5,000	13,000	5
10727	Caprolactam	105-60-2	N.D.		2,500	13,000	5
10727	Carbazole	86-74-8	N.D.		2,500	13,000	5
10727	4-Chloro-3-methylphenol	59-50-7	N.D.		5,000	13,000	5
10727	4-Chloroaniline	106-47-8	N.D.		5,000	13,000	5
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.		2,500	13,000	5
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.		2,500	13,000	5
10727	2-Chloronaphthalene	91-58-7	N.D.		2,500	13,000	5
10727	2-Chlorophenol	95-57-8	N.D.		2,500	13,000	5
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.		2,500	13,000	5
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.		2,500	13,000	5
10727	Chrysene	218-01-9	9,700	J	2,500	13,000	5
10727	Dibenz(a,h)anthracene	53-70-3	N.D.		2,500	13,000	5
10727	Dibenzofuran	132-64-9	N.D.		2,500	13,000	5
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.		7,500	25,000	5
10727	2,4-Dichlorophenol	120-83-2	N.D.		2,500	13,000	5
10727	Diethylphthalate	84-66-2	N.D.		5,000	13,000	5
10727	2,4-Dimethylphenol	105-67-9	N.D.		5,000	13,000	5
10727	Dimethylphthalate	131-11-3	N.D.		5,000	13,000	5
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.		13,000	38,000	5
10727	2,4-Dinitrophenol	51-28-5	N.D.		25,000	75,000	5
10727	2,4-Dinitrotoluene	121-14-2	N.D.		5,000	13,000	5
10727	2,6-Dinitrotoluene	606-20-2	N.D.		2,500	13,000	5
10727	bis(2-Ethylhexyl)phthalate	117-81-7	N.D.		5,000	25,000	5
10727	Fluoranthene	206-44-0	3,900	J	2,500	13,000	5
10727	Fluorene	86-73-7	4,900	J	2,500	13,000	5
10727	Hexachlorobenzene	118-74-1	N.D.		2,500	13,000	5
10727	Hexachlorobutadiene	87-68-3	N.D.		5,000	13,000	5
10727	Hexachlorocyclopentadiene	77-47-4	N.D.		13,000	38,000	5
10727	Hexachloroethane	67-72-1	N.D.		2,500	13,000	5
10727	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.		2,500	13,000	5
10727	Isophorone	78-59-1	N.D.		2,500	13,000	5
10727	2-Methylnaphthalene	91-57-6	3,500	J	2,500	13,000	5
10727	2-Methylphenol	95-48-7	N.D.		5,000	13,000	5
10727	4-Methylphenol	106-44-5	N.D.		5,000	13,000	5

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

Sample Description: BH-10-77-WC_20-22' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-77-WC_20-22'

LLI Sample # SW 6262280
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 11:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

77-22

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	2,900	J	2,500	13,000	5
10727	2-Nitroaniline	88-74-4	N.D.		2,500	13,000	5
10727	3-Nitroaniline	99-09-2	N.D.		5,000	13,000	5
10727	4-Nitroaniline	100-01-6	N.D.		5,000	13,000	5
10727	Nitrobenzene	98-95-3	N.D.		2,500	13,000	5
10727	2-Nitrophenol	88-75-5	N.D.		2,500	13,000	5
10727	4-Nitrophenol	100-02-7	N.D.		13,000	38,000	5
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		2,500	13,000	5
10727	N-Nitrosodiphenylamine	86-30-6	N.D.		2,500	13,000	5
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		5,000	13,000	5
10727	Pentachlorophenol	87-86-5	N.D.		13,000	38,000	5
10727	Phenanthrene	85-01-8	7,300	J	2,500	13,000	5
10727	Phenol	108-95-2	N.D.		2,500	13,000	5
10727	Pyrene	129-00-0	13,000	J	2,500	13,000	5
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		5,000	13,000	5
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		2,500	13,000	5
	Reporting limits were raised due to interference from the sample matrix.						
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	25,700		7.57	30.1	1
06944	Antimony	7440-36-0	N.D.		1.50	3.01	1
06935	Arsenic	7440-38-2	29.8		1.43	3.01	1
06946	Barium	7440-39-3	114		0.0602	0.752	1
06947	Beryllium	7440-41-7	1.10		0.102	0.752	1
06949	Cadmium	7440-43-9	0.730	J	0.211	0.752	1
01650	Calcium	7440-70-2	25,900		9.22	30.1	1
06951	Chromium	7440-47-3	67.8		0.888	2.26	1
06952	Cobalt	7440-48-4	4.70		0.286	0.752	1
06953	Copper	7440-50-8	26.1		0.331	1.50	1
01654	Iron	7439-89-6	18,500		7.09	30.1	1
06955	Lead	7439-92-1	259		0.903	2.26	1
01657	Magnesium	7439-95-4	23,000		3.82	15.0	1
06958	Manganese	7439-96-5	259		0.117	0.752	1
06961	Nickel	7440-02-0	17.8		0.286	1.50	1
01662	Potassium	7440-09-7	2,790		27.1	75.2	1
06936	Selenium	7782-49-2	N.D.		1.47	3.01	1
06966	Silver	7440-22-4	N.D.		0.271	0.752	1
01667	Sodium	7440-23-5	921		56.1	150	1
06925	Thallium	7440-28-0	N.D.		2.18	4.51	1
06971	Vanadium	7440-62-2	73.0		0.286	0.752	1
06972	Zinc	7440-66-6	136		0.993	3.01	1
	SW-846 7471A		**mg/kg**		**mg/kg**	**mg/kg**	

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-77-WC_20-22' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-77-WC_20-22'

LLI Sample # SW 6262280
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 11:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

77-22

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.422	0.0043	0.151	1
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	34.2	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	Q111121AA	04/22/2011 12:26	Stephanie A Selis	69.09
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/13/2011 11:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/13/2011 11:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/13/2011 11:00	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLD026	04/25/2011 09:18	Brian K Graham	5
10809	BNA Soil Microwave	SW-846 3546	1	11110SLD026	04/21/2011 09:30	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111125708004	04/28/2011 02:04	Tara L Snyder	1
06944	Antimony	SW-846 6010B	1	111125708004	04/28/2011 02:04	Tara L Snyder	1
06935	Arsenic	SW-846 6010B	1	111125708004	04/28/2011 02:04	Tara L Snyder	1
06946	Barium	SW-846 6010B	1	111125708004	04/28/2011 02:04	Tara L Snyder	1
06947	Beryllium	SW-846 6010B	1	111125708004	04/28/2011 02:04	Tara L Snyder	1
06949	Cadmium	SW-846 6010B	1	111125708004	04/28/2011 02:04	Tara L Snyder	1
01650	Calcium	SW-846 6010B	1	111125708004	04/28/2011 02:04	Tara L Snyder	1
06951	Chromium	SW-846 6010B	1	111125708004	04/28/2011 02:04	Tara L Snyder	1
06952	Cobalt	SW-846 6010B	1	111125708004	04/28/2011 02:04	Tara L Snyder	1
06953	Copper	SW-846 6010B	1	111125708004	04/28/2011 02:04	Tara L Snyder	1
01654	Iron	SW-846 6010B	1	111125708004	04/28/2011 02:04	Tara L Snyder	1
06955	Lead	SW-846 6010B	1	111125708004	04/28/2011 02:04	Tara L Snyder	1
01657	Magnesium	SW-846 6010B	1	111125708004	04/28/2011 02:04	Tara L Snyder	1
06958	Manganese	SW-846 6010B	1	111125708004	04/28/2011 02:04	Tara L Snyder	1
06961	Nickel	SW-846 6010B	1	111125708004	04/28/2011 02:04	Tara L Snyder	1
01662	Potassium	SW-846 6010B	1	111125708004	04/28/2011 02:04	Tara L Snyder	1
06936	Selenium	SW-846 6010B	1	111125708004	04/28/2011 09:10	Joanne M Gates	1
06966	Silver	SW-846 6010B	1	111125708004	04/28/2011 02:04	Tara L Snyder	1
01667	Sodium	SW-846 6010B	1	111125708004	04/28/2011 02:04	Tara L Snyder	1
06925	Thallium	SW-846 6010B	1	111125708004	04/28/2011 02:04	Tara L Snyder	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-77-WC_20-22' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-77-WC_20-22'

LLI Sample # SW 6262280
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 11:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

77-22

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06971	Vanadium	SW-846 6010B	1	111125708004	04/28/2011 02:04	Tara L Snyder	1
06972	Zinc	SW-846 6010B	1	111125708004	04/28/2011 02:04	Tara L Snyder	1
00159	Mercury	SW-846 7471A	1	111125711004	04/25/2011 10:06	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111125708004	04/23/2011 10:17	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111125711004	04/23/2011 12:05	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820001A	04/22/2011 18:08	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-63-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-63-WC_0-2'

LLI Sample # SW 6262281
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 14:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

63-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	150		6	17	0.75
10950	Benzene	71-43-2	6		0.4	4	0.75
10950	Bromodichloromethane	75-27-4	N.D.		0.9	4	0.75
10950	Bromoform	75-25-2	N.D.		0.9	4	0.75
10950	Bromomethane	74-83-9	N.D.		2	4	0.75
10950	2-Butanone	78-93-3	7	J	3	9	0.75
10950	Carbon Disulfide	75-15-0	N.D.		0.9	4	0.75
10950	Carbon Tetrachloride	56-23-5	N.D.		0.9	4	0.75
10950	Chlorobenzene	108-90-7	N.D.		0.9	4	0.75
10950	Chloroethane	75-00-3	N.D.		2	4	0.75
10950	Chloroform	67-66-3	N.D.		0.9	4	0.75
10950	Chloromethane	74-87-3	N.D.		2	4	0.75
10950	Cyclohexane	110-82-7	1	J	0.9	4	0.75
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		2	4	0.75
10950	Dibromochloromethane	124-48-1	N.D.		0.9	4	0.75
10950	1,2-Dibromoethane	106-93-4	N.D.		0.9	4	0.75
10950	1,2-Dichlorobenzene	95-50-1	N.D.		0.9	4	0.75
10950	1,3-Dichlorobenzene	541-73-1	N.D.		0.9	4	0.75
10950	1,4-Dichlorobenzene	106-46-7	N.D.		0.9	4	0.75
10950	Dichlorodifluoromethane	75-71-8	N.D.		2	4	0.75
10950	1,1-Dichloroethane	75-34-3	N.D.		0.9	4	0.75
10950	1,2-Dichloroethane	107-06-2	N.D.		0.9	4	0.75
10950	1,1-Dichloroethene	75-35-4	N.D.		0.9	4	0.75
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		0.9	4	0.75
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		0.9	4	0.75
10950	1,2-Dichloropropane	78-87-5	N.D.		0.9	4	0.75
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		0.9	4	0.75
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		0.9	4	0.75
10950	Ethylbenzene	100-41-4	N.D.		0.9	4	0.75
10950	Freon 113	76-13-1	N.D.		2	9	0.75
10950	2-Hexanone	591-78-6	N.D.		3	9	0.75
10950	Isopropylbenzene	98-82-8	N.D.		0.9	4	0.75
10950	Methyl Acetate	79-20-9	N.D.		2	4	0.75
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.4	4	0.75
10950	4-Methyl-2-pentanone	108-10-1	N.D.		3	9	0.75
10950	Methylcyclohexane	108-87-2	3	J	0.9	4	0.75
10950	Methylene Chloride	75-09-2	N.D.		2	4	0.75
10950	Styrene	100-42-5	N.D.		0.9	4	0.75
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		0.9	4	0.75
10950	Tetrachloroethene	127-18-4	N.D.		0.9	4	0.75
10950	Toluene	108-88-3	N.D.		0.9	4	0.75
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		0.9	4	0.75
10950	1,1,1-Trichloroethane	71-55-6	N.D.		0.9	4	0.75
10950	1,1,2-Trichloroethane	79-00-5	N.D.		0.9	4	0.75
10950	Trichloroethene	79-01-6	N.D.		0.9	4	0.75
10950	Trichlorofluoromethane	75-69-4	N.D.		2	4	0.75
10950	Vinyl Chloride	75-01-4	N.D.		0.9	4	0.75
10950	Xylene (Total)	1330-20-7	N.D.		0.9	4	0.75

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

Sample Description: BH-10-63-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-63-WC_0-2'

LLI Sample # SW 6262281
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 14:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

63-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**	**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	N.D.	190	950	5
10727	Acenaphthylene	208-96-8	N.D.	190	950	5
10727	Acetophenone	98-86-2	N.D.	380	950	5
10727	Anthracene	120-12-7	N.D.	190	950	5
10727	Atrazine	1912-24-9	N.D.	190	950	5
10727	Benzaldehyde	100-52-7	N.D.	380	950	5
10727	Benzo(a)anthracene	56-55-3	N.D.	190	950	5
10727	Benzo(a)pyrene	50-32-8	N.D.	190	950	5
10727	Benzo(b)fluoranthene	205-99-2	N.D.	190	950	5
10727	Benzo(g,h,i)perylene	191-24-2	N.D.	190	950	5
10727	Benzo(k)fluoranthene	207-08-9	N.D.	190	950	5
10727	1,1'-Biphenyl	92-52-4	N.D.	190	950	5
10727	4-Bromophenyl-phenylether	101-55-3	N.D.	190	950	5
10727	Butylbenzylphthalate	85-68-7	N.D.	380	950	5
10727	Di-n-butylphthalate	84-74-2	N.D.	380	950	5
10727	Caprolactam	105-60-2	N.D.	190	950	5
10727	Carbazole	86-74-8	N.D.	190	950	5
10727	4-Chloro-3-methylphenol	59-50-7	N.D.	380	950	5
10727	4-Chloroaniline	106-47-8	N.D.	380	950	5
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.	190	950	5
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.	190	950	5
10727	2-Chloronaphthalene	91-58-7	N.D.	190	950	5
10727	2-Chlorophenol	95-57-8	N.D.	190	950	5
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.	190	950	5
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.	190	950	5
10727	Chrysene	218-01-9	N.D.	190	950	5
10727	Dibenz(a,h)anthracene	53-70-3	N.D.	190	950	5
10727	Dibenzofuran	132-64-9	N.D.	190	950	5
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.	570	1,900	5
10727	2,4-Dichlorophenol	120-83-2	N.D.	190	950	5
10727	Diethylphthalate	84-66-2	N.D.	380	950	5
10727	2,4-Dimethylphenol	105-67-9	N.D.	380	950	5
10727	Dimethylphthalate	131-11-3	N.D.	380	950	5
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.	950	2,900	5
10727	2,4-Dinitrophenol	51-28-5	N.D.	1,900	5,700	5
10727	2,4-Dinitrotoluene	121-14-2	N.D.	380	950	5
10727	2,6-Dinitrotoluene	606-20-2	N.D.	190	950	5
10727	bis(2-Ethylhexyl)phthalate	117-81-7	N.D.	380	1,900	5
10727	Fluoranthene	206-44-0	N.D.	190	950	5
10727	Fluorene	86-73-7	N.D.	190	950	5
10727	Hexachlorobenzene	118-74-1	N.D.	190	950	5
10727	Hexachlorobutadiene	87-68-3	N.D.	380	950	5
10727	Hexachlorocyclopentadiene	77-47-4	N.D.	950	2,900	5
10727	Hexachloroethane	67-72-1	N.D.	190	950	5
10727	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.	190	950	5
10727	Isophorone	78-59-1	N.D.	190	950	5
10727	2-Methylnaphthalene	91-57-6	N.D.	190	950	5
10727	2-Methylphenol	95-48-7	N.D.	380	950	5
10727	4-Methylphenol	106-44-5	N.D.	380	950	5

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

Sample Description: BH-10-63-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-63-WC_0-2'

LLI Sample # SW 6262281
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 14:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

63-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	N.D.		190	950	5
10727	2-Nitroaniline	88-74-4	N.D.		190	950	5
10727	3-Nitroaniline	99-09-2	N.D.		380	950	5
10727	4-Nitroaniline	100-01-6	N.D.		380	950	5
10727	Nitrobenzene	98-95-3	N.D.		190	950	5
10727	2-Nitrophenol	88-75-5	N.D.		190	950	5
10727	4-Nitrophenol	100-02-7	N.D.		950	2,900	5
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		190	950	5
10727	N-Nitrosodiphenylamine	86-30-6	N.D.		190	950	5
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		380	950	5
10727	Pentachlorophenol	87-86-5	N.D.		950	2,900	5
10727	Phenanthrene	85-01-8	N.D.		190	950	5
10727	Phenol	108-95-2	N.D.		190	950	5
10727	Pyrene	129-00-0	N.D.		190	950	5
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		380	950	5
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		190	950	5
	Reporting limits were raised due to interference from the sample matrix.						
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	13,000		5.76	22.9	1
06944	Antimony	7440-36-0	N.D.		1.15	2.29	1
06935	Arsenic	7440-38-2	6.21		1.09	2.29	1
06946	Barium	7440-39-3	49.5		0.0458	0.573	1
06947	Beryllium	7440-41-7	0.550	J	0.0779	0.573	1
06949	Cadmium	7440-43-9	N.D.		0.160	0.573	1
01650	Calcium	7440-70-2	962		7.02	22.9	1
06951	Chromium	7440-47-3	21.0		0.676	1.72	1
06952	Cobalt	7440-48-4	7.43		0.218	0.573	1
06953	Copper	7440-50-8	20.4		0.252	1.15	1
01654	Iron	7439-89-6	18,700		5.40	22.9	1
06955	Lead	7439-92-1	25.2		0.687	1.72	1
01657	Magnesium	7439-95-4	2,500		2.91	11.5	1
06958	Manganese	7439-96-5	302		0.0893	0.573	1
06961	Nickel	7440-02-0	14.4		0.218	1.15	1
01662	Potassium	7440-09-7	1,240		20.6	57.3	1
06936	Selenium	7782-49-2	N.D.		1.12	2.29	1
06966	Silver	7440-22-4	N.D.		0.206	0.573	1
01667	Sodium	7440-23-5	51.2	J	42.7	115	1
06925	Thallium	7440-28-0	N.D.		1.66	3.44	1
06971	Vanadium	7440-62-2	26.5		0.218	0.573	1
06972	Zinc	7440-66-6	55.4		0.756	2.29	1
	SW-846 7471A		**mg/kg**		**mg/kg**	**mg/kg**	

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-63-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-63-WC_0-2'

LLI Sample # SW 6262281
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 14:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

63-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.0720 J	0.0031	0.109	1
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	12.7	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	X111131AA	04/23/2011 04:02	Stephanie A Selis	0.75
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/13/2011 14:15	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/13/2011 14:15	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/13/2011 14:15	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLD026	04/25/2011 09:43	Brian K Graham	5
10809	BNA Soil Microwave	SW-846 3546	1	11110SLD026	04/21/2011 09:30	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111125708004	04/28/2011 02:07	Tara L Snyder	1
06944	Antimony	SW-846 6010B	1	111125708004	04/28/2011 02:07	Tara L Snyder	1
06935	Arsenic	SW-846 6010B	1	111125708004	04/28/2011 02:07	Tara L Snyder	1
06946	Barium	SW-846 6010B	1	111125708004	04/28/2011 02:07	Tara L Snyder	1
06947	Beryllium	SW-846 6010B	1	111125708004	04/28/2011 02:07	Tara L Snyder	1
06949	Cadmium	SW-846 6010B	1	111125708004	04/28/2011 02:07	Tara L Snyder	1
01650	Calcium	SW-846 6010B	1	111125708004	04/28/2011 02:07	Tara L Snyder	1
06951	Chromium	SW-846 6010B	1	111125708004	04/28/2011 02:07	Tara L Snyder	1
06952	Cobalt	SW-846 6010B	1	111125708004	04/28/2011 02:07	Tara L Snyder	1
06953	Copper	SW-846 6010B	1	111125708004	04/28/2011 02:07	Tara L Snyder	1
01654	Iron	SW-846 6010B	1	111125708004	04/28/2011 02:07	Tara L Snyder	1
06955	Lead	SW-846 6010B	1	111125708004	04/28/2011 02:07	Tara L Snyder	1
01657	Magnesium	SW-846 6010B	1	111125708004	04/28/2011 02:07	Tara L Snyder	1
06958	Manganese	SW-846 6010B	1	111125708004	04/28/2011 02:07	Tara L Snyder	1
06961	Nickel	SW-846 6010B	1	111125708004	04/28/2011 02:07	Tara L Snyder	1
01662	Potassium	SW-846 6010B	1	111125708004	04/28/2011 02:07	Tara L Snyder	1
06936	Selenium	SW-846 6010B	1	111125708004	04/28/2011 09:14	Joanne M Gates	1
06966	Silver	SW-846 6010B	1	111125708004	04/28/2011 02:07	Tara L Snyder	1
01667	Sodium	SW-846 6010B	1	111125708004	04/28/2011 02:07	Tara L Snyder	1
06925	Thallium	SW-846 6010B	1	111125708004	04/28/2011 02:07	Tara L Snyder	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: **BH-10-63-WC_0-2' Grab Soil**
Philadelphia Refinery AOI-10
COC: 259438 BH-10-63-WC_0-2'

LLI Sample # SW 6262281
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 14:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

63-02

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06971	Vanadium	SW-846 6010B	1	111125708004	04/28/2011 02:07	Tara L Snyder	1
06972	Zinc	SW-846 6010B	1	111125708004	04/28/2011 02:07	Tara L Snyder	1
00159	Mercury	SW-846 7471A	1	111125711004	04/25/2011 10:09	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111125708004	04/23/2011 10:17	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111125711004	04/23/2011 12:05	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820001A	04/22/2011 18:08	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-63-WC_12-14' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-63-WC_12-14'

LLI Sample # SW 6262282
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 14:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

63-12

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	470	J	450	1,300	50.69
10950	Benzene	71-43-2	1,900		32	320	50.69
10950	Bromodichloromethane	75-27-4	N.D.		64	320	50.69
10950	Bromoform	75-25-2	N.D.		64	320	50.69
10950	Bromomethane	74-83-9	N.D.		130	320	50.69
10950	2-Butanone	78-93-3	N.D.		260	640	50.69
10950	Carbon Disulfide	75-15-0	N.D.		64	320	50.69
10950	Carbon Tetrachloride	56-23-5	N.D.		64	320	50.69
10950	Chlorobenzene	108-90-7	N.D.		64	320	50.69
10950	Chloroethane	75-00-3	N.D.		130	320	50.69
10950	Chloroform	67-66-3	N.D.		64	320	50.69
10950	Chloromethane	74-87-3	N.D.		130	320	50.69
10950	Cyclohexane	110-82-7	1,900		64	320	50.69
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		130	320	50.69
10950	Dibromochloromethane	124-48-1	N.D.		64	320	50.69
10950	1,2-Dibromoethane	106-93-4	N.D.		64	320	50.69
10950	1,2-Dichlorobenzene	95-50-1	N.D.		64	320	50.69
10950	1,3-Dichlorobenzene	541-73-1	N.D.		64	320	50.69
10950	1,4-Dichlorobenzene	106-46-7	N.D.		64	320	50.69
10950	Dichlorodifluoromethane	75-71-8	N.D.		130	320	50.69
10950	1,1-Dichloroethane	75-34-3	N.D.		64	320	50.69
10950	1,2-Dichloroethane	107-06-2	N.D.		64	320	50.69
10950	1,1-Dichloroethene	75-35-4	N.D.		64	320	50.69
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		64	320	50.69
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		64	320	50.69
10950	1,2-Dichloropropane	78-87-5	N.D.		64	320	50.69
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		64	320	50.69
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		64	320	50.69
10950	Ethylbenzene	100-41-4	80	J	64	320	50.69
10950	Freon 113	76-13-1	N.D.		130	640	50.69
10950	2-Hexanone	591-78-6	N.D.		190	640	50.69
10950	Isopropylbenzene	98-82-8	1,400		64	320	50.69
10950	Methyl Acetate	79-20-9	330		130	320	50.69
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		32	320	50.69
10950	4-Methyl-2-pentanone	108-10-1	N.D.		190	640	50.69
10950	Methylcyclohexane	108-87-2	11,000		64	320	50.69
10950	Methylene Chloride	75-09-2	N.D.		130	320	50.69
10950	Styrene	100-42-5	N.D.		64	320	50.69
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		64	320	50.69
10950	Tetrachloroethene	127-18-4	N.D.		64	320	50.69
10950	Toluene	108-88-3	N.D.		64	320	50.69
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		64	320	50.69
10950	1,1,1-Trichloroethane	71-55-6	N.D.		64	320	50.69
10950	1,1,2-Trichloroethane	79-00-5	N.D.		64	320	50.69
10950	Trichloroethene	79-01-6	N.D.		64	320	50.69
10950	Trichlorofluoromethane	75-69-4	N.D.		130	320	50.69
10950	Vinyl Chloride	75-01-4	N.D.		64	320	50.69
10950	Xylene (Total)	1330-20-7	92	J	64	320	50.69

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

Sample Description: BH-10-63-WC_12-14' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-63-WC_12-14'

LLI Sample # SW 6262282
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 14:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

63-12

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	2,000	J	1,000	5,200	5
10727	Acenaphthylene	208-96-8	N.D.		1,000	5,200	5
10727	Acetophenone	98-86-2	N.D.		2,100	5,200	5
10727	Anthracene	120-12-7	1,700	J	1,000	5,200	5
10727	Atrazine	1912-24-9	N.D.		1,000	5,200	5
10727	Benzaldehyde	100-52-7	N.D.		2,100	5,200	5
10727	Benzo(a)anthracene	56-55-3	3,100	J	1,000	5,200	5
10727	Benzo(a)pyrene	50-32-8	3,500	J	1,000	5,200	5
10727	Benzo(b)fluoranthene	205-99-2	3,000	J	1,000	5,200	5
10727	Benzo(g,h,i)perylene	191-24-2	3,700	J	1,000	5,200	5
10727	Benzo(k)fluoranthene	207-08-9	N.D.		1,000	5,200	5
10727	1,1'-Biphenyl	92-52-4	1,900	J	1,000	5,200	5
10727	4-Bromophenyl-phenylether	101-55-3	N.D.		1,000	5,200	5
10727	Butylbenzylphthalate	85-68-7	N.D.		2,100	5,200	5
10727	Di-n-butylphthalate	84-74-2	N.D.		2,100	5,200	5
10727	Caprolactam	105-60-2	N.D.		1,000	5,200	5
10727	Carbazole	86-74-8	N.D.		1,000	5,200	5
10727	4-Chloro-3-methylphenol	59-50-7	N.D.		2,100	5,200	5
10727	4-Chloroaniline	106-47-8	N.D.		2,100	5,200	5
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.		1,000	5,200	5
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.		1,000	5,200	5
10727	2-Chloronaphthalene	91-58-7	N.D.		1,000	5,200	5
10727	2-Chlorophenol	95-57-8	N.D.		1,000	5,200	5
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.		1,000	5,200	5
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.		1,000	5,200	5
10727	Chrysene	218-01-9	9,000		1,000	5,200	5
10727	Dibenz(a,h)anthracene	53-70-3	1,200	J	1,000	5,200	5
10727	Dibenzofuran	132-64-9	3,800	J	1,000	5,200	5
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.		3,100	10,000	5
10727	2,4-Dichlorophenol	120-83-2	N.D.		1,000	5,200	5
10727	Diethylphthalate	84-66-2	N.D.		2,100	5,200	5
10727	2,4-Dimethylphenol	105-67-9	N.D.		2,100	5,200	5
10727	Dimethylphthalate	131-11-3	N.D.		2,100	5,200	5
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.		5,200	16,000	5
10727	2,4-Dinitrophenol	51-28-5	N.D.		10,000	31,000	5
10727	2,4-Dinitrotoluene	121-14-2	N.D.		2,100	5,200	5
10727	2,6-Dinitrotoluene	606-20-2	N.D.		1,000	5,200	5
10727	bis(2-Ethylhexyl)phthalate	117-81-7	4,400	J	2,100	10,000	5
10727	Fluoranthene	206-44-0	2,300	J	1,000	5,200	5
10727	Fluorene	86-73-7	6,500		1,000	5,200	5
10727	Hexachlorobenzene	118-74-1	N.D.		1,000	5,200	5
10727	Hexachlorobutadiene	87-68-3	N.D.		2,100	5,200	5
10727	Hexachlorocyclopentadiene	77-47-4	N.D.		5,200	16,000	5
10727	Hexachloroethane	67-72-1	N.D.		1,000	5,200	5
10727	Indeno(1,2,3-cd)pyrene	193-39-5	1,200	J	1,000	5,200	5
10727	Isophorone	78-59-1	N.D.		1,000	5,200	5
10727	2-Methylnaphthalene	91-57-6	57,000		1,000	5,200	5
10727	2-Methylphenol	95-48-7	N.D.		2,100	5,200	5
10727	4-Methylphenol	106-44-5	N.D.		2,100	5,200	5

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

Sample Description: BH-10-63-WC_12-14' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-63-WC_12-14'

LLI Sample # SW 6262282
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 14:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

63-12

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	5,400		1,000	5,200	5
10727	2-Nitroaniline	88-74-4	N.D.		1,000	5,200	5
10727	3-Nitroaniline	99-09-2	N.D.		2,100	5,200	5
10727	4-Nitroaniline	100-01-6	N.D.		2,100	5,200	5
10727	Nitrobenzene	98-95-3	N.D.		1,000	5,200	5
10727	2-Nitrophenol	88-75-5	N.D.		1,000	5,200	5
10727	4-Nitrophenol	100-02-7	N.D.		5,200	16,000	5
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		1,000	5,200	5
10727	N-Nitrosodiphenylamine	86-30-6	N.D.		1,000	5,200	5
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		2,100	5,200	5
10727	Pentachlorophenol	87-86-5	N.D.		5,200	16,000	5
10727	Phenanthrene	85-01-8	14,000		1,000	5,200	5
10727	Phenol	108-95-2	N.D.		1,000	5,200	5
10727	Pyrene	129-00-0	3,900	J	1,000	5,200	5
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		2,100	5,200	5
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		1,000	5,200	5
	Reporting limits were raised due to interference from the sample matrix.						
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	6,070		6.32	25.1	1
06944	Antimony	7440-36-0	2.61		1.26	2.51	1
06935	Arsenic	7440-38-2	12.0		1.19	2.51	1
06946	Barium	7440-39-3	91.6		0.0503	0.628	1
06947	Beryllium	7440-41-7	0.426	J	0.0854	0.628	1
06949	Cadmium	7440-43-9	N.D.		0.176	0.628	1
01650	Calcium	7440-70-2	9,710		7.70	25.1	1
06951	Chromium	7440-47-3	225		0.741	1.88	1
06952	Cobalt	7440-48-4	10.7		0.239	0.628	1
06953	Copper	7440-50-8	275		0.276	1.26	1
01654	Iron	7439-89-6	65,000		29.6	126	5
06955	Lead	7439-92-1	161		0.754	1.88	1
01657	Magnesium	7439-95-4	5,420		3.19	12.6	1
06958	Manganese	7439-96-5	707		0.0980	0.628	1
06961	Nickel	7440-02-0	35.0		0.239	1.26	1
01662	Potassium	7440-09-7	817		22.6	62.8	1
06936	Selenium	7782-49-2	N.D.		6.16	12.6	5
	Reporting limits were raised due to interference from the sample matrix.						
06966	Silver	7440-22-4	N.D.		0.226	0.628	1
01667	Sodium	7440-23-5	290		46.9	126	1
06925	Thallium	7440-28-0	1.84	J	1.82	3.77	1
06971	Vanadium	7440-62-2	35.7		0.239	0.628	1
06972	Zinc	7440-66-6	404		0.829	2.51	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-63-WC_12-14' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-63-WC_12-14'

LLI Sample # SW 6262282
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 14:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

63-12

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.670	0.0034	0.118	1
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	21.2	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

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

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	Q111121AA	04/22/2011 07:36	Stephanie A Selis	50.69
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/13/2011 14:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/13/2011 14:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/13/2011 14:30	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLD026	04/25/2011 10:09	Brian K Graham	5
10809	BNA Soil Microwave	SW-846 3546	1	11110SLD026	04/21/2011 09:30	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111125708004	04/28/2011 02:11	Tara L Snyder	1
06944	Antimony	SW-846 6010B	1	111125708004	04/28/2011 02:11	Tara L Snyder	1
06935	Arsenic	SW-846 6010B	1	111125708004	04/28/2011 02:11	Tara L Snyder	1
06946	Barium	SW-846 6010B	1	111125708004	04/28/2011 02:11	Tara L Snyder	1
06947	Beryllium	SW-846 6010B	1	111125708004	04/28/2011 02:11	Tara L Snyder	1
06949	Cadmium	SW-846 6010B	1	111125708004	04/28/2011 02:11	Tara L Snyder	1
01650	Calcium	SW-846 6010B	1	111125708004	04/28/2011 02:11	Tara L Snyder	1
06951	Chromium	SW-846 6010B	1	111125708004	04/28/2011 02:11	Tara L Snyder	1
06952	Cobalt	SW-846 6010B	1	111125708004	04/28/2011 02:11	Tara L Snyder	1
06953	Copper	SW-846 6010B	1	111125708004	04/28/2011 02:11	Tara L Snyder	1
01654	Iron	SW-846 6010B	1	111125708004	04/28/2011 09:20	Joanne M Gates	5
06955	Lead	SW-846 6010B	1	111125708004	04/28/2011 02:11	Tara L Snyder	1
01657	Magnesium	SW-846 6010B	1	111125708004	04/28/2011 02:11	Tara L Snyder	1
06958	Manganese	SW-846 6010B	1	111125708004	04/28/2011 02:11	Tara L Snyder	1
06961	Nickel	SW-846 6010B	1	111125708004	04/28/2011 02:11	Tara L Snyder	1
01662	Potassium	SW-846 6010B	1	111125708004	04/28/2011 02:11	Tara L Snyder	1
06936	Selenium	SW-846 6010B	1	111125708004	04/28/2011 09:20	Joanne M Gates	5
06966	Silver	SW-846 6010B	1	111125708004	04/28/2011 02:11	Tara L Snyder	1
01667	Sodium	SW-846 6010B	1	111125708004	04/28/2011 02:11	Tara L Snyder	1
06925	Thallium	SW-846 6010B	1	111125708004	04/28/2011 02:11	Tara L Snyder	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-63-WC_12-14' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-63-WC_12-14'

LLI Sample # SW 6262282
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 14:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

63-12

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06971	Vanadium	SW-846 6010B	1	111125708004	04/28/2011 02:11	Tara L Snyder	1
06972	Zinc	SW-846 6010B	1	111125708004	04/28/2011 02:11	Tara L Snyder	1
00159	Mercury	SW-846 7471A	1	111125711004	04/25/2011 10:10	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111125708004	04/23/2011 10:17	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111125711004	04/23/2011 12:05	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820001A	04/22/2011 18:08	Scott W Freisher	1

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

Lancaster Laboratories

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

Analysis Report

Sample Description: BH-10-63-WC_21-23' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-63-WC_21-23'

LLI Sample # SW 6262283
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 15:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

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

63-21

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	N.D.		620	1,800	62.74
10950	Benzene	71-43-2	510		44	440	62.74
10950	Bromodichloromethane	75-27-4	N.D.		88	440	62.74
10950	Bromoform	75-25-2	N.D.		88	440	62.74
10950	Bromomethane	74-83-9	N.D.		180	440	62.74
10950	2-Butanone	78-93-3	N.D.		350	880	62.74
10950	Carbon Disulfide	75-15-0	N.D.		88	440	62.74
10950	Carbon Tetrachloride	56-23-5	N.D.		88	440	62.74
10950	Chlorobenzene	108-90-7	N.D.		88	440	62.74
10950	Chloroethane	75-00-3	N.D.		180	440	62.74
10950	Chloroform	67-66-3	N.D.		88	440	62.74
10950	Chloromethane	74-87-3	N.D.		180	440	62.74
10950	Cyclohexane	110-82-7	1,900		88	440	62.74
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		180	440	62.74
10950	Dibromochloromethane	124-48-1	N.D.		88	440	62.74
10950	1,2-Dibromoethane	106-93-4	N.D.		88	440	62.74
10950	1,2-Dichlorobenzene	95-50-1	N.D.		88	440	62.74
10950	1,3-Dichlorobenzene	541-73-1	N.D.		88	440	62.74
10950	1,4-Dichlorobenzene	106-46-7	N.D.		88	440	62.74
10950	Dichlorodifluoromethane	75-71-8	N.D.		180	440	62.74
10950	1,1-Dichloroethane	75-34-3	N.D.		88	440	62.74
10950	1,2-Dichloroethane	107-06-2	N.D.		88	440	62.74
10950	1,1-Dichloroethene	75-35-4	N.D.		88	440	62.74
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		88	440	62.74
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		88	440	62.74
10950	1,2-Dichloropropane	78-87-5	N.D.		88	440	62.74
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		88	440	62.74
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		88	440	62.74
10950	Ethylbenzene	100-41-4	120	J	88	440	62.74
10950	Freon 113	76-13-1	N.D.		180	880	62.74
10950	2-Hexanone	591-78-6	N.D.		270	880	62.74
10950	Isopropylbenzene	98-82-8	1,000		88	440	62.74
10950	Methyl Acetate	79-20-9	N.D.		180	440	62.74
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		44	440	62.74
10950	4-Methyl-2-pentanone	108-10-1	N.D.		270	880	62.74
10950	Methylcyclohexane	108-87-2	10,000		88	440	62.74
10950	Methylene Chloride	75-09-2	N.D.		180	440	62.74
10950	Styrene	100-42-5	N.D.		88	440	62.74
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		88	440	62.74
10950	Tetrachloroethene	127-18-4	N.D.		88	440	62.74
10950	Toluene	108-88-3	N.D.		88	440	62.74
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		88	440	62.74
10950	1,1,1-Trichloroethane	71-55-6	N.D.		88	440	62.74
10950	1,1,2-Trichloroethane	79-00-5	N.D.		88	440	62.74
10950	Trichloroethene	79-01-6	N.D.		88	440	62.74
10950	Trichlorofluoromethane	75-69-4	N.D.		180	440	62.74
10950	Vinyl Chloride	75-01-4	N.D.		88	440	62.74
10950	Xylene (Total)	1330-20-7	230	J	88	440	62.74

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

Sample Description: BH-10-63-WC_21-23' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-63-WC_21-23'

LLI Sample # SW 6262283
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 15:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

63-21

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**		**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	1,200		230	1,200	5
10727	Acenaphthylene	208-96-8	N.D.		230	1,200	5
10727	Acetophenone	98-86-2	N.D.		460	1,200	5
10727	Anthracene	120-12-7	740	J	230	1,200	5
10727	Atrazine	1912-24-9	N.D.		230	1,200	5
10727	Benzaldehyde	100-52-7	N.D.		460	1,200	5
10727	Benzo(a)anthracene	56-55-3	930	J	230	1,200	5
10727	Benzo(a)pyrene	50-32-8	770	J	230	1,200	5
10727	Benzo(b)fluoranthene	205-99-2	780	J	230	1,200	5
10727	Benzo(g,h,i)perylene	191-24-2	670	J	230	1,200	5
10727	Benzo(k)fluoranthene	207-08-9	N.D.		230	1,200	5
10727	1,1'-Biphenyl	92-52-4	320	J	230	1,200	5
10727	4-Bromophenyl-phenylether	101-55-3	N.D.		230	1,200	5
10727	Butylbenzylphthalate	85-68-7	N.D.		460	1,200	5
10727	Di-n-butylphthalate	84-74-2	N.D.		460	1,200	5
10727	Caprolactam	105-60-2	N.D.		230	1,200	5
10727	Carbazole	86-74-8	240	J	230	1,200	5
10727	4-Chloro-3-methylphenol	59-50-7	N.D.		460	1,200	5
10727	4-Chloroaniline	106-47-8	N.D.		460	1,200	5
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.		230	1,200	5
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.		230	1,200	5
10727	2-Chloronaphthalene	91-58-7	N.D.		230	1,200	5
10727	2-Chlorophenol	95-57-8	N.D.		230	1,200	5
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.		230	1,200	5
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.		230	1,200	5
10727	Chrysene	218-01-9	1,600		230	1,200	5
10727	Dibenz(a,h)anthracene	53-70-3	340	J	230	1,200	5
10727	Dibenzofuran	132-64-9	950	J	230	1,200	5
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.		690	2,300	5
10727	2,4-Dichlorophenol	120-83-2	N.D.		230	1,200	5
10727	Diethylphthalate	84-66-2	N.D.		460	1,200	5
10727	2,4-Dimethylphenol	105-67-9	850	J	460	1,200	5
10727	Dimethylphthalate	131-11-3	N.D.		460	1,200	5
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.		1,200	3,500	5
10727	2,4-Dinitrophenol	51-28-5	N.D.		2,300	6,900	5
10727	2,4-Dinitrotoluene	121-14-2	N.D.		460	1,200	5
10727	2,6-Dinitrotoluene	606-20-2	N.D.		230	1,200	5
10727	bis(2-Ethylhexyl)phthalate	117-81-7	1,600	J	460	2,300	5
10727	Fluoranthene	206-44-0	870	J	230	1,200	5
10727	Fluorene	86-73-7	1,600		230	1,200	5
10727	Hexachlorobenzene	118-74-1	N.D.		230	1,200	5
10727	Hexachlorobutadiene	87-68-3	N.D.		460	1,200	5
10727	Hexachlorocyclopentadiene	77-47-4	N.D.		1,200	3,500	5
10727	Hexachloroethane	67-72-1	N.D.		230	1,200	5
10727	Indeno(1,2,3-cd)pyrene	193-39-5	370	J	230	1,200	5
10727	Isophorone	78-59-1	N.D.		230	1,200	5
10727	2-Methylnaphthalene	91-57-6	4,000		230	1,200	5
10727	2-Methylphenol	95-48-7	N.D.		460	1,200	5
10727	4-Methylphenol	106-44-5	N.D.		460	1,200	5

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-63-WC_21-23' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-63-WC_21-23'

LLI Sample # SW 6262283
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 15:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

63-21

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	1,100	J	230	1,200	5
10727	2-Nitroaniline	88-74-4	N.D.		230	1,200	5
10727	3-Nitroaniline	99-09-2	N.D.		460	1,200	5
10727	4-Nitroaniline	100-01-6	N.D.		460	1,200	5
10727	Nitrobenzene	98-95-3	N.D.		230	1,200	5
10727	2-Nitrophenol	88-75-5	N.D.		230	1,200	5
10727	4-Nitrophenol	100-02-7	N.D.		1,200	3,500	5
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		230	1,200	5
10727	N-Nitrosodiphenylamine	86-30-6	N.D.		230	1,200	5
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		460	1,200	5
10727	Pentachlorophenol	87-86-5	N.D.		1,200	3,500	5
10727	Phenanthrene	85-01-8	3,700		230	1,200	5
10727	Phenol	108-95-2	N.D.		230	1,200	5
10727	Pyrene	129-00-0	1,600		230	1,200	5
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		460	1,200	5
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		230	1,200	5
	Reporting limits were raised due to interference from the sample matrix.						
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	8,110		6.95	27.6	1
06944	Antimony	7440-36-0	N.D.		1.38	2.76	1
06935	Arsenic	7440-38-2	8.88		1.31	2.76	1
06946	Barium	7440-39-3	140		0.0552	0.690	1
06947	Beryllium	7440-41-7	0.452	J	0.0939	0.690	1
06949	Cadmium	7440-43-9	0.229	J	0.193	0.690	1
01650	Calcium	7440-70-2	19,200		8.46	27.6	1
06951	Chromium	7440-47-3	42.1		0.815	2.07	1
06952	Cobalt	7440-48-4	5.36		0.262	0.690	1
06953	Copper	7440-50-8	61.3		0.304	1.38	1
01654	Iron	7439-89-6	19,500		6.50	27.6	1
06955	Lead	7439-92-1	115		0.829	2.07	1
01657	Magnesium	7439-95-4	9,560		3.51	13.8	1
06958	Manganese	7439-96-5	387		0.108	0.690	1
06961	Nickel	7440-02-0	67.4		0.262	1.38	1
01662	Potassium	7440-09-7	1,200		24.9	69.0	1
06936	Selenium	7782-49-2	N.D.		1.35	2.76	1
06966	Silver	7440-22-4	N.D.		0.249	0.690	1
01667	Sodium	7440-23-5	491		51.5	138	1
06925	Thallium	7440-28-0	N.D.		2.00	4.14	1
06971	Vanadium	7440-62-2	31.1		0.262	0.690	1
06972	Zinc	7440-66-6	110		0.911	2.76	1
	SW-846 7471A		**mg/kg**		**mg/kg**	**mg/kg**	

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 •717-656-2300 Fax:717-656-2681• www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-63-WC_21-23' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-63-WC_21-23'

LLI Sample # SW 6262283
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 15:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

63-21

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	2.36	0.0200	0.696	5
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	29.0	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	Q111121AA	04/22/2011 12:49	Stephanie A Selis	62.74
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/13/2011 15:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/13/2011 15:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/13/2011 15:00	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLD026	04/25/2011 10:35	Brian K Graham	5
10809	BNA Soil Microwave	SW-846 3546	1	11110SLD026	04/21/2011 09:30	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111125708004	04/28/2011 02:14	Tara L Snyder	1
06944	Antimony	SW-846 6010B	1	111125708004	04/28/2011 02:14	Tara L Snyder	1
06935	Arsenic	SW-846 6010B	1	111125708004	04/28/2011 02:14	Tara L Snyder	1
06946	Barium	SW-846 6010B	1	111125708004	04/28/2011 02:14	Tara L Snyder	1
06947	Beryllium	SW-846 6010B	1	111125708004	04/28/2011 02:14	Tara L Snyder	1
06949	Cadmium	SW-846 6010B	1	111125708004	04/28/2011 02:14	Tara L Snyder	1
01650	Calcium	SW-846 6010B	1	111125708004	04/28/2011 02:14	Tara L Snyder	1
06951	Chromium	SW-846 6010B	1	111125708004	04/28/2011 02:14	Tara L Snyder	1
06952	Cobalt	SW-846 6010B	1	111125708004	04/28/2011 02:14	Tara L Snyder	1
06953	Copper	SW-846 6010B	1	111125708004	04/28/2011 02:14	Tara L Snyder	1
01654	Iron	SW-846 6010B	1	111125708004	04/28/2011 02:14	Tara L Snyder	1
06955	Lead	SW-846 6010B	1	111125708004	04/28/2011 02:14	Tara L Snyder	1
01657	Magnesium	SW-846 6010B	1	111125708004	04/28/2011 02:14	Tara L Snyder	1
06958	Manganese	SW-846 6010B	1	111125708004	04/28/2011 02:14	Tara L Snyder	1
06961	Nickel	SW-846 6010B	1	111125708004	04/28/2011 02:14	Tara L Snyder	1
01662	Potassium	SW-846 6010B	1	111125708004	04/28/2011 02:14	Tara L Snyder	1
06936	Selenium	SW-846 6010B	1	111125708004	04/28/2011 09:24	Joanne M Gates	1
06966	Silver	SW-846 6010B	1	111125708004	04/28/2011 02:14	Tara L Snyder	1
01667	Sodium	SW-846 6010B	1	111125708004	04/28/2011 02:14	Tara L Snyder	1
06925	Thallium	SW-846 6010B	1	111125708004	04/28/2011 02:14	Tara L Snyder	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-63-WC_21-23' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-63-WC_21-23'

LLI Sample # SW 6262283
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 15:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

63-21

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06971	Vanadium	SW-846 6010B	1	111125708004	04/28/2011 02:14	Tara L Snyder	1
06972	Zinc	SW-846 6010B	1	111125708004	04/28/2011 02:14	Tara L Snyder	1
00159	Mercury	SW-846 7471A	1	111125711004	04/25/2011 11:32	Damary Valentin	5
05708	SW SW846 ICP Digest	SW-846 3050B	1	111125708004	04/23/2011 10:17	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111125711004	04/23/2011 12:05	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820001A	04/22/2011 18:08	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-64-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-64-WC_0-2'

LLI Sample # SW 6262284
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 15:20 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

64-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	310		8	24	1.01
10950	Benzene	71-43-2	150		0.6	6	1.01
10950	Bromodichloromethane	75-27-4	N.D.		1	6	1.01
10950	Bromoform	75-25-2	N.D.		1	6	1.01
10950	Bromomethane	74-83-9	N.D.		2	6	1.01
10950	2-Butanone	78-93-3	26		5	12	1.01
10950	Carbon Disulfide	75-15-0	3	J	1	6	1.01
10950	Carbon Tetrachloride	56-23-5	N.D.		1	6	1.01
10950	Chlorobenzene	108-90-7	N.D.		1	6	1.01
10950	Chloroethane	75-00-3	N.D.		2	6	1.01
10950	Chloroform	67-66-3	N.D.		1	6	1.01
10950	Chloromethane	74-87-3	N.D.		2	6	1.01
10950	Cyclohexane	110-82-7	39		1	6	1.01
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		2	6	1.01
10950	Dibromochloromethane	124-48-1	N.D.		1	6	1.01
10950	1,2-Dibromoethane	106-93-4	N.D.		1	6	1.01
10950	1,2-Dichlorobenzene	95-50-1	N.D.		1	6	1.01
10950	1,3-Dichlorobenzene	541-73-1	N.D.		1	6	1.01
10950	1,4-Dichlorobenzene	106-46-7	N.D.		1	6	1.01
10950	Dichlorodifluoromethane	75-71-8	N.D.		2	6	1.01
10950	1,1-Dichloroethane	75-34-3	N.D.		1	6	1.01
10950	1,2-Dichloroethane	107-06-2	N.D.		1	6	1.01
10950	1,1-Dichloroethene	75-35-4	N.D.		1	6	1.01
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		1	6	1.01
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		1	6	1.01
10950	1,2-Dichloropropane	78-87-5	N.D.		1	6	1.01
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		1	6	1.01
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		1	6	1.01
10950	Ethylbenzene	100-41-4	21		1	6	1.01
10950	Freon 113	76-13-1	N.D.		2	12	1.01
10950	2-Hexanone	591-78-6	N.D.		4	12	1.01
10950	Isopropylbenzene	98-82-8	19		1	6	1.01
10950	Methyl Acetate	79-20-9	N.D.		2	6	1.01
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.6	6	1.01
10950	4-Methyl-2-pentanone	108-10-1	N.D.		4	12	1.01
10950	Methylcyclohexane	108-87-2	99		1	6	1.01
10950	Methylene Chloride	75-09-2	N.D.		2	6	1.01
10950	Styrene	100-42-5	N.D.		1	6	1.01
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		1	6	1.01
10950	Tetrachloroethene	127-18-4	N.D.		1	6	1.01
10950	Toluene	108-88-3	13		1	6	1.01
10950	1,2,4-Trichlorobenzene	120-82-1	1	J	1	6	1.01
10950	1,1,1-Trichloroethane	71-55-6	N.D.		1	6	1.01
10950	1,1,2-Trichloroethane	79-00-5	N.D.		1	6	1.01
10950	Trichloroethene	79-01-6	N.D.		1	6	1.01
10950	Trichlorofluoromethane	75-69-4	N.D.		2	6	1.01
10950	Vinyl Chloride	75-01-4	N.D.		1	6	1.01
10950	Xylene (Total)	1330-20-7	43		1	6	1.01

The GC/MS volatile internal standard peak areas were outside the QC limits. A re-analysis was performed, and the matrix effect

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-64-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-64-WC_0-2'

LLI Sample # SW 6262284
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 15:20 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

64-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
was confirmed.							
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	N.D.		2,000	9,800	5
10727	Acenaphthylene	208-96-8	N.D.		2,000	9,800	5
10727	Acetophenone	98-86-2	N.D.		3,900	9,800	5
10727	Anthracene	120-12-7	N.D.		2,000	9,800	5
10727	Atrazine	1912-24-9	N.D.		2,000	9,800	5
10727	Benzaldehyde	100-52-7	N.D.		3,900	9,800	5
10727	Benzo(a)anthracene	56-55-3	41,000		2,000	9,800	5
10727	Benzo(a)pyrene	50-32-8	120,000		2,000	9,800	5
10727	Benzo(b)fluoranthene	205-99-2	54,000		2,000	9,800	5
10727	Benzo(g,h,i)perylene	191-24-2	96,000		2,000	9,800	5
10727	Benzo(k)fluoranthene	207-08-9	10,000		2,000	9,800	5
10727	1,1'-Biphenyl	92-52-4	N.D.		2,000	9,800	5
10727	4-Bromophenyl-phenylether	101-55-3	N.D.		2,000	9,800	5
10727	Butylbenzylphthalate	85-68-7	N.D.		3,900	9,800	5
10727	Di-n-butylphthalate	84-74-2	N.D.		3,900	9,800	5
10727	Caprolactam	105-60-2	N.D.		2,000	9,800	5
10727	Carbazole	86-74-8	N.D.		2,000	9,800	5
10727	4-Chloro-3-methylphenol	59-50-7	N.D.		3,900	9,800	5
10727	4-Chloroaniline	106-47-8	N.D.		3,900	9,800	5
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.		2,000	9,800	5
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.		2,000	9,800	5
10727	2-Chloronaphthalene	91-58-7	N.D.		2,000	9,800	5
10727	2-Chlorophenol	95-57-8	N.D.		2,000	9,800	5
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.		2,000	9,800	5
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.		2,000	9,800	5
10727	Chrysene	218-01-9	83,000		2,000	9,800	5
10727	Dibenz(a,h)anthracene	53-70-3	73,000		2,000	9,800	5
10727	Dibenzofuran	132-64-9	N.D.		2,000	9,800	5
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.		5,900	20,000	5
10727	2,4-Dichlorophenol	120-83-2	N.D.		2,000	9,800	5
10727	Diethylphthalate	84-66-2	N.D.		3,900	9,800	5
10727	2,4-Dimethylphenol	105-67-9	N.D.		3,900	9,800	5
10727	Dimethylphthalate	131-11-3	N.D.		3,900	9,800	5
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.		9,800	29,000	5
10727	2,4-Dinitrophenol	51-28-5	N.D.		20,000	59,000	5
10727	2,4-Dinitrotoluene	121-14-2	N.D.		3,900	9,800	5
10727	2,6-Dinitrotoluene	606-20-2	N.D.		2,000	9,800	5
10727	bis(2-Ethylhexyl)phthalate	117-81-7	N.D.		3,900	20,000	5
10727	Fluoranthene	206-44-0	2,200	J	2,000	9,800	5
10727	Fluorene	86-73-7	N.D.		2,000	9,800	5
10727	Hexachlorobenzene	118-74-1	N.D.		2,000	9,800	5
10727	Hexachlorobutadiene	87-68-3	N.D.		3,900	9,800	5
10727	Hexachlorocyclopentadiene	77-47-4	N.D.		9,800	29,000	5
10727	Hexachloroethane	67-72-1	N.D.		2,000	9,800	5
10727	Indeno(1,2,3-cd)pyrene	193-39-5	59,000		2,000	9,800	5
10727	Isophorone	78-59-1	N.D.		2,000	9,800	5
10727	2-Methylnaphthalene	91-57-6	N.D.		2,000	9,800	5
10727	2-Methylphenol	95-48-7	N.D.		3,900	9,800	5
10727	4-Methylphenol	106-44-5	N.D.		3,900	9,800	5

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-64-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-64-WC_0-2'

LLI Sample # SW 6262284
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 15:20 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

64-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	N.D.		2,000	9,800	5
10727	2-Nitroaniline	88-74-4	N.D.		2,000	9,800	5
10727	3-Nitroaniline	99-09-2	N.D.		3,900	9,800	5
10727	4-Nitroaniline	100-01-6	N.D.		3,900	9,800	5
10727	Nitrobenzene	98-95-3	N.D.		2,000	9,800	5
10727	2-Nitrophenol	88-75-5	N.D.		2,000	9,800	5
10727	4-Nitrophenol	100-02-7	N.D.		9,800	29,000	5
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		2,000	9,800	5
10727	N-Nitrosodiphenylamine	86-30-6	N.D.		2,000	9,800	5
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		3,900	9,800	5
10727	Pentachlorophenol	87-86-5	N.D.		9,800	29,000	5
10727	Phenanthrene	85-01-8	2,100	J	2,000	9,800	5
10727	Phenol	108-95-2	N.D.		2,000	9,800	5
10727	Pyrene	129-00-0	8,400	J	2,000	9,800	5
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		3,900	9,800	5
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		2,000	9,800	5
	Reporting limits were raised due to interference from the sample matrix.						
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	10,200		5.70	22.7	1
06944	Antimony	7440-36-0	N.D.		1.13	2.27	1
06935	Arsenic	7440-38-2	10.1		1.08	2.27	1
06946	Barium	7440-39-3	114		0.0454	0.567	1
06947	Beryllium	7440-41-7	0.427	J	0.0771	0.567	1
06949	Cadmium	7440-43-9	0.193	J	0.159	0.567	1
01650	Calcium	7440-70-2	7,050		6.95	22.7	1
06951	Chromium	7440-47-3	69.5		0.669	1.70	1
06952	Cobalt	7440-48-4	6.70		0.215	0.567	1
06953	Copper	7440-50-8	59.9		0.249	1.13	1
01654	Iron	7439-89-6	31,600		26.7	113	5
06955	Lead	7439-92-1	229		0.680	1.70	1
01657	Magnesium	7439-95-4	4,450		2.88	11.3	1
06958	Manganese	7439-96-5	413		0.0884	0.567	1
06961	Nickel	7440-02-0	63.1		0.215	1.13	1
01662	Potassium	7440-09-7	1,260		20.4	56.7	1
06936	Selenium	7782-49-2	N.D.		1.11	2.27	1
06966	Silver	7440-22-4	N.D.		0.204	0.567	1
01667	Sodium	7440-23-5	122		42.3	113	1
06925	Thallium	7440-28-0	N.D.		1.64	3.40	1
06971	Vanadium	7440-62-2	163		0.215	0.567	1
06972	Zinc	7440-66-6	234		0.748	2.27	1
	SW-846 7471A		**mg/kg**		**mg/kg**	**mg/kg**	

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-64-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-64-WC_0-2'

LLI Sample # SW 6262284
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 15:20 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

64-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	2.24	0.0162	0.565	5
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	15.2	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	X111131AA	04/23/2011 08:10	Stephanie A Selis	1.01
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/13/2011 15:20	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/13/2011 15:20	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/13/2011 15:20	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLD026	04/25/2011 11:01	Brian K Graham	5
10809	BNA Soil Microwave	SW-846 3546	1	11110SLD026	04/21/2011 09:30	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111125708004	04/28/2011 02:18	Tara L Snyder	1
06944	Antimony	SW-846 6010B	1	111125708004	04/28/2011 02:18	Tara L Snyder	1
06935	Arsenic	SW-846 6010B	1	111125708004	04/28/2011 02:18	Tara L Snyder	1
06946	Barium	SW-846 6010B	1	111125708004	04/28/2011 02:18	Tara L Snyder	1
06947	Beryllium	SW-846 6010B	1	111125708004	04/28/2011 02:18	Tara L Snyder	1
06949	Cadmium	SW-846 6010B	1	111125708004	04/28/2011 02:18	Tara L Snyder	1
01650	Calcium	SW-846 6010B	1	111125708004	04/28/2011 02:18	Tara L Snyder	1
06951	Chromium	SW-846 6010B	1	111125708004	04/28/2011 02:18	Tara L Snyder	1
06952	Cobalt	SW-846 6010B	1	111125708004	04/28/2011 02:18	Tara L Snyder	1
06953	Copper	SW-846 6010B	1	111125708004	04/28/2011 02:18	Tara L Snyder	1
01654	Iron	SW-846 6010B	1	111125708004	04/28/2011 09:31	Joanne M Gates	5
06955	Lead	SW-846 6010B	1	111125708004	04/28/2011 02:18	Tara L Snyder	1
01657	Magnesium	SW-846 6010B	1	111125708004	04/28/2011 02:18	Tara L Snyder	1
06958	Manganese	SW-846 6010B	1	111125708004	04/28/2011 02:18	Tara L Snyder	1
06961	Nickel	SW-846 6010B	1	111125708004	04/28/2011 02:18	Tara L Snyder	1
01662	Potassium	SW-846 6010B	1	111125708004	04/28/2011 02:18	Tara L Snyder	1
06936	Selenium	SW-846 6010B	1	111125708004	04/28/2011 09:27	Joanne M Gates	1
06966	Silver	SW-846 6010B	1	111125708004	04/28/2011 02:18	Tara L Snyder	1
01667	Sodium	SW-846 6010B	1	111125708004	04/28/2011 02:18	Tara L Snyder	1
06925	Thallium	SW-846 6010B	1	111125708004	04/28/2011 02:18	Tara L Snyder	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-64-WC_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-64-WC_0-2'

LLI Sample # SW 6262284
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 15:20 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

64-02

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06971	Vanadium	SW-846 6010B	1	111125708004	04/28/2011 02:18	Tara L Snyder	1
06972	Zinc	SW-846 6010B	1	111125708004	04/28/2011 02:18	Tara L Snyder	1
00159	Mercury	SW-846 7471A	1	111125711004	04/25/2011 11:33	Damary Valentin	5
05708	SW SW846 ICP Digest	SW-846 3050B	1	111125708004	04/23/2011 10:17	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111125711004	04/23/2011 12:05	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820001A	04/22/2011 18:08	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-64-WC_11-13' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-64-WC_11-13'

LLI Sample # SW 6262285
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 15:40 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

64-11

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	N.D.		900	2,600	104.58
10950	Benzene	71-43-2	19,000		65	650	104.58
10950	Bromodichloromethane	75-27-4	N.D.		130	650	104.58
10950	Bromoform	75-25-2	N.D.		130	650	104.58
10950	Bromomethane	74-83-9	N.D.		260	650	104.58
10950	2-Butanone	78-93-3	N.D.		520	1,300	104.58
10950	Carbon Disulfide	75-15-0	N.D.		130	650	104.58
10950	Carbon Tetrachloride	56-23-5	N.D.		130	650	104.58
10950	Chlorobenzene	108-90-7	N.D.		130	650	104.58
10950	Chloroethane	75-00-3	N.D.		260	650	104.58
10950	Chloroform	67-66-3	N.D.		130	650	104.58
10950	Chloromethane	74-87-3	N.D.		260	650	104.58
10950	Cyclohexane	110-82-7	2,800		130	650	104.58
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		260	650	104.58
10950	Dibromochloromethane	124-48-1	N.D.		130	650	104.58
10950	1,2-Dibromoethane	106-93-4	N.D.		130	650	104.58
10950	1,2-Dichlorobenzene	95-50-1	N.D.		130	650	104.58
10950	1,3-Dichlorobenzene	541-73-1	N.D.		130	650	104.58
10950	1,4-Dichlorobenzene	106-46-7	N.D.		130	650	104.58
10950	Dichlorodifluoromethane	75-71-8	N.D.		260	650	104.58
10950	1,1-Dichloroethane	75-34-3	N.D.		130	650	104.58
10950	1,2-Dichloroethane	107-06-2	9,300		130	650	104.58
10950	1,1-Dichloroethene	75-35-4	N.D.		130	650	104.58
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		130	650	104.58
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		130	650	104.58
10950	1,2-Dichloropropane	78-87-5	N.D.		130	650	104.58
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		130	650	104.58
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		130	650	104.58
10950	Ethylbenzene	100-41-4	2,400		130	650	104.58
10950	Freon 113	76-13-1	N.D.		260	1,300	104.58
10950	2-Hexanone	591-78-6	N.D.		390	1,300	104.58
10950	Isopropylbenzene	98-82-8	4,500		130	650	104.58
10950	Methyl Acetate	79-20-9	330	J	260	650	104.58
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		65	650	104.58
10950	4-Methyl-2-pentanone	108-10-1	N.D.		390	1,300	104.58
10950	Methylcyclohexane	108-87-2	16,000		130	650	104.58
10950	Methylene Chloride	75-09-2	N.D.		260	650	104.58
10950	Styrene	100-42-5	N.D.		130	650	104.58
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		130	650	104.58
10950	Tetrachloroethene	127-18-4	N.D.		130	650	104.58
10950	Toluene	108-88-3	640	J	130	650	104.58
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		130	650	104.58
10950	1,1,1-Trichloroethane	71-55-6	N.D.		130	650	104.58
10950	1,1,2-Trichloroethane	79-00-5	N.D.		130	650	104.58
10950	Trichloroethene	79-01-6	N.D.		130	650	104.58
10950	Trichlorofluoromethane	75-69-4	N.D.		260	650	104.58
10950	Vinyl Chloride	75-01-4	N.D.		130	650	104.58
10950	Xylene (Total)	1330-20-7	5,700		130	650	104.58

The percent recovery for cyclohexane was outside QC limits high in the LCS associated with this sample. Since the recovery was high and this compound was

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-64-WC_11-13' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-64-WC_11-13'

LLI Sample # SW 6262285
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 15:40 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

64-11

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
detected in the sample, the result reported may be biased high.							
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	3,400		200	1,000	5
10727	Acenaphthylene	208-96-8	N.D.		200	1,000	5
10727	Acetophenone	98-86-2	N.D.		410	1,000	5
10727	Anthracene	120-12-7	2,900		200	1,000	5
10727	Atrazine	1912-24-9	N.D.		200	1,000	5
10727	Benzaldehyde	100-52-7	N.D.		410	1,000	5
10727	Benzo(a)anthracene	56-55-3	3,400		200	1,000	5
10727	Benzo(a)pyrene	50-32-8	2,800		200	1,000	5
10727	Benzo(b)fluoranthene	205-99-2	3,300		200	1,000	5
10727	Benzo(g,h,i)perylene	191-24-2	1,800		200	1,000	5
10727	Benzo(k)fluoranthene	207-08-9	1,100		200	1,000	5
10727	1,1'-Biphenyl	92-52-4	2,100		200	1,000	5
10727	4-Bromophenyl-phenylether	101-55-3	N.D.		200	1,000	5
10727	Butylbenzylphthalate	85-68-7	N.D.		410	1,000	5
10727	Di-n-butylphthalate	84-74-2	N.D.		410	1,000	5
10727	Caprolactam	105-60-2	N.D.		200	1,000	5
10727	Carbazole	86-74-8	480	J	200	1,000	5
10727	4-Chloro-3-methylphenol	59-50-7	N.D.		410	1,000	5
10727	4-Chloroaniline	106-47-8	N.D.		410	1,000	5
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.		200	1,000	5
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.		200	1,000	5
10727	2-Chloronaphthalene	91-58-7	N.D.		200	1,000	5
10727	2-Chlorophenol	95-57-8	N.D.		200	1,000	5
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.		200	1,000	5
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.		200	1,000	5
10727	Chrysene	218-01-9	4,000		200	1,000	5
10727	Dibenz(a,h)anthracene	53-70-3	640	J	200	1,000	5
10727	Dibenzofuran	132-64-9	2,200		200	1,000	5
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.		610	2,000	5
10727	2,4-Dichlorophenol	120-83-2	N.D.		200	1,000	5
10727	Diethylphthalate	84-66-2	N.D.		410	1,000	5
10727	2,4-Dimethylphenol	105-67-9	2,200		410	1,000	5
10727	Dimethylphthalate	131-11-3	N.D.		410	1,000	5
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.		1,000	3,100	5
10727	2,4-Dinitrophenol	51-28-5	N.D.		2,000	6,100	5
10727	2,4-Dinitrotoluene	121-14-2	N.D.		410	1,000	5
10727	2,6-Dinitrotoluene	606-20-2	N.D.		200	1,000	5
10727	bis(2-Ethylhexyl)phthalate	117-81-7	N.D.		410	2,000	5
10727	Fluoranthene	206-44-0	7,500		200	1,000	5
10727	Fluorene	86-73-7	4,300		200	1,000	5
10727	Hexachlorobenzene	118-74-1	N.D.		200	1,000	5
10727	Hexachlorobutadiene	87-68-3	N.D.		410	1,000	5
10727	Hexachlorocyclopentadiene	77-47-4	N.D.		1,000	3,100	5
10727	Hexachloroethane	67-72-1	N.D.		200	1,000	5
10727	Indeno(1,2,3-cd)pyrene	193-39-5	1,400		200	1,000	5
10727	Isophorone	78-59-1	N.D.		200	1,000	5
10727	2-Methylnaphthalene	91-57-6	38,000		2,000	10,000	50
10727	2-Methylphenol	95-48-7	N.D.		410	1,000	5
10727	4-Methylphenol	106-44-5	N.D.		410	1,000	5

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-64-WC_11-13' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-64-WC_11-13'

LLI Sample # SW 6262285
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 15:40 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

64-11

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.					
10727	Naphthalene	91-20-3	8,400	200	1,000	5
10727	2-Nitroaniline	88-74-4	N.D.	200	1,000	5
10727	3-Nitroaniline	99-09-2	N.D.	410	1,000	5
10727	4-Nitroaniline	100-01-6	N.D.	410	1,000	5
10727	Nitrobenzene	98-95-3	N.D.	200	1,000	5
10727	2-Nitrophenol	88-75-5	N.D.	200	1,000	5
10727	4-Nitrophenol	100-02-7	N.D.	1,000	3,100	5
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.	200	1,000	5
10727	N-Nitrosodiphenylamine	86-30-6	N.D.	200	1,000	5
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.					
10727	Di-n-octylphthalate	117-84-0	N.D.	410	1,000	5
10727	Pentachlorophenol	87-86-5	N.D.	1,000	3,100	5
10727	Phenanthrene	85-01-8	14,000	200	1,000	5
10727	Phenol	108-95-2	N.D.	200	1,000	5
10727	Pyrene	129-00-0	7,300	200	1,000	5
10727	2,4,5-Trichlorophenol	95-95-4	N.D.	410	1,000	5
10727	2,4,6-Trichlorophenol	88-06-2	N.D.	200	1,000	5
	Reporting limits were raised due to interference from the sample matrix.					
Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	11,600	6.10	24.2	1
06944	Antimony	7440-36-0	N.D.	1.21	2.42	1
06935	Arsenic	7440-38-2	11.0	1.15	2.42	1
06946	Barium	7440-39-3	215	0.0485	0.606	1
06947	Beryllium	7440-41-7	0.648	0.0824	0.606	1
06949	Cadmium	7440-43-9	0.175 J	0.170	0.606	1
01650	Calcium	7440-70-2	5,670	7.43	24.2	1
06951	Chromium	7440-47-3	23.6	0.715	1.82	1
06952	Cobalt	7440-48-4	6.67	0.230	0.606	1
06953	Copper	7440-50-8	53.2	0.267	1.21	1
01654	Iron	7439-89-6	17,500	5.71	24.2	1
06955	Lead	7439-92-1	330	0.727	1.82	1
01657	Magnesium	7439-95-4	2,330	3.08	12.1	1
06958	Manganese	7439-96-5	153	0.0945	0.606	1
06961	Nickel	7440-02-0	15.9	0.230	1.21	1
01662	Potassium	7440-09-7	1,510	21.8	60.6	1
06936	Selenium	7782-49-2	N.D.	1.19	2.42	1
06966	Silver	7440-22-4	N.D.	0.218	0.606	1
01667	Sodium	7440-23-5	276	45.2	121	1
06925	Thallium	7440-28-0	N.D.	1.76	3.64	1
06971	Vanadium	7440-62-2	30.6	0.230	0.606	1
06972	Zinc	7440-66-6	196	0.800	2.42	1
	SW-846 7471A		**mg/kg**	**mg/kg**	**mg/kg**	

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-64-WC_11-13' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-64-WC_11-13'

LLI Sample # SW 6262285
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 15:40 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

64-11

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	N.D.	0.0035	0.122	1
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	19.1	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	Q111162AA	04/27/2011 02:27	Stephanie A Selis	104.58
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/13/2011 15:40	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/13/2011 15:40	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/13/2011 15:40	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLD026	04/25/2011 11:27	Brian K Graham	5
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLD026	04/26/2011 02:34	Brian K Graham	50
10809	BNA Soil Microwave	SW-846 3546	1	11110SLD026	04/21/2011 09:30	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111125708004	04/28/2011 02:21	Tara L Snyder	1
06944	Antimony	SW-846 6010B	1	111125708004	04/28/2011 02:21	Tara L Snyder	1
06935	Arsenic	SW-846 6010B	1	111125708004	04/28/2011 02:21	Tara L Snyder	1
06946	Barium	SW-846 6010B	1	111125708004	04/28/2011 02:21	Tara L Snyder	1
06947	Beryllium	SW-846 6010B	1	111125708004	04/28/2011 02:21	Tara L Snyder	1
06949	Cadmium	SW-846 6010B	1	111125708004	04/28/2011 02:21	Tara L Snyder	1
01650	Calcium	SW-846 6010B	1	111125708004	04/28/2011 02:21	Tara L Snyder	1
06951	Chromium	SW-846 6010B	1	111125708004	04/28/2011 02:21	Tara L Snyder	1
06952	Cobalt	SW-846 6010B	1	111125708004	04/28/2011 02:21	Tara L Snyder	1
06953	Copper	SW-846 6010B	1	111125708004	04/28/2011 02:21	Tara L Snyder	1
01654	Iron	SW-846 6010B	1	111125708004	04/28/2011 02:21	Tara L Snyder	1
06955	Lead	SW-846 6010B	1	111125708004	04/28/2011 02:21	Tara L Snyder	1
01657	Magnesium	SW-846 6010B	1	111125708004	04/28/2011 02:21	Tara L Snyder	1
06958	Manganese	SW-846 6010B	1	111125708004	04/28/2011 02:21	Tara L Snyder	1
06961	Nickel	SW-846 6010B	1	111125708004	04/28/2011 02:21	Tara L Snyder	1
01662	Potassium	SW-846 6010B	1	111125708004	04/28/2011 02:21	Tara L Snyder	1
06936	Selenium	SW-846 6010B	1	111125708004	04/28/2011 09:34	Joanne M Gates	1
06966	Silver	SW-846 6010B	1	111125708004	04/28/2011 02:21	Tara L Snyder	1
01667	Sodium	SW-846 6010B	1	111125708004	04/28/2011 02:21	Tara L Snyder	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-64-WC_11-13' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-64-WC_11-13'

LLI Sample # SW 6262285
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 15:40 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

64-11

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06925	Thallium	SW-846 6010B	1	111125708004	04/28/2011 02:21	Tara L Snyder	1
06971	Vanadium	SW-846 6010B	1	111125708004	04/28/2011 02:21	Tara L Snyder	1
06972	Zinc	SW-846 6010B	1	111125708004	04/28/2011 02:21	Tara L Snyder	1
00159	Mercury	SW-846 7471A	1	111125711004	04/25/2011 10:14	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111125708004	04/23/2011 10:17	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111125711004	04/23/2011 12:05	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820001A	04/22/2011 18:08	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-64-WC_24-26' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-64-WC_24-26'

LLI Sample # SW 6262286
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 16:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

64-24

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	140		12	35	1.02
10950	Benzene	71-43-2	30		0.9	9	1.02
10950	Bromodichloromethane	75-27-4	N.D.		2	9	1.02
10950	Bromoform	75-25-2	N.D.		2	9	1.02
10950	Bromomethane	74-83-9	N.D.		4	9	1.02
10950	2-Butanone	78-93-3	13	J	7	18	1.02
10950	Carbon Disulfide	75-15-0	N.D.		2	9	1.02
10950	Carbon Tetrachloride	56-23-5	N.D.		2	9	1.02
10950	Chlorobenzene	108-90-7	N.D.		2	9	1.02
10950	Chloroethane	75-00-3	N.D.		4	9	1.02
10950	Chloroform	67-66-3	N.D.		2	9	1.02
10950	Chloromethane	74-87-3	N.D.		4	9	1.02
10950	Cyclohexane	110-82-7	81		2	9	1.02
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		4	9	1.02
10950	Dibromochloromethane	124-48-1	N.D.		2	9	1.02
10950	1,2-Dibromoethane	106-93-4	N.D.		2	9	1.02
10950	1,2-Dichlorobenzene	95-50-1	N.D.		2	9	1.02
10950	1,3-Dichlorobenzene	541-73-1	N.D.		2	9	1.02
10950	1,4-Dichlorobenzene	106-46-7	N.D.		2	9	1.02
10950	Dichlorodifluoromethane	75-71-8	N.D.		4	9	1.02
10950	1,1-Dichloroethane	75-34-3	N.D.		2	9	1.02
10950	1,2-Dichloroethane	107-06-2	N.D.		2	9	1.02
10950	1,1-Dichloroethene	75-35-4	N.D.		2	9	1.02
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		2	9	1.02
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		2	9	1.02
10950	1,2-Dichloropropane	78-87-5	N.D.		2	9	1.02
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		2	9	1.02
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		2	9	1.02
10950	Ethylbenzene	100-41-4	N.D.		2	9	1.02
10950	Freon 113	76-13-1	N.D.		4	18	1.02
10950	2-Hexanone	591-78-6	N.D.		5	18	1.02
10950	Isopropylbenzene	98-82-8	3	J	2	9	1.02
10950	Methyl Acetate	79-20-9	N.D.		4	9	1.02
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.9	9	1.02
10950	4-Methyl-2-pentanone	108-10-1	N.D.		5	18	1.02
10950	Methylcyclohexane	108-87-2	110		2	9	1.02
10950	Methylene Chloride	75-09-2	N.D.		4	9	1.02
10950	Styrene	100-42-5	N.D.		2	9	1.02
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		2	9	1.02
10950	Tetrachloroethene	127-18-4	N.D.		2	9	1.02
10950	Toluene	108-88-3	N.D.		2	9	1.02
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		2	9	1.02
10950	1,1,1-Trichloroethane	71-55-6	N.D.		2	9	1.02
10950	1,1,2-Trichloroethane	79-00-5	N.D.		2	9	1.02
10950	Trichloroethene	79-01-6	N.D.		2	9	1.02
10950	Trichlorofluoromethane	75-69-4	N.D.		4	9	1.02
10950	Vinyl Chloride	75-01-4	N.D.		2	9	1.02
10950	Xylene (Total)	1330-20-7	2	J	2	9	1.02

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-64-WC_24-26' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-64-WC_24-26'

LLI Sample # SW 6262286
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 16:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

64-24

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**	**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	N.D.	290	1,400	5
10727	Acenaphthylene	208-96-8	N.D.	290	1,400	5
10727	Acetophenone	98-86-2	N.D.	570	1,400	5
10727	Anthracene	120-12-7	N.D.	290	1,400	5
10727	Atrazine	1912-24-9	N.D.	290	1,400	5
10727	Benzaldehyde	100-52-7	N.D.	570	1,400	5
10727	Benzo(a)anthracene	56-55-3	N.D.	290	1,400	5
10727	Benzo(a)pyrene	50-32-8	N.D.	290	1,400	5
10727	Benzo(b)fluoranthene	205-99-2	N.D.	290	1,400	5
10727	Benzo(g,h,i)perylene	191-24-2	N.D.	290	1,400	5
10727	Benzo(k)fluoranthene	207-08-9	N.D.	290	1,400	5
10727	1,1'-Biphenyl	92-52-4	N.D.	290	1,400	5
10727	4-Bromophenyl-phenylether	101-55-3	N.D.	290	1,400	5
10727	Butylbenzylphthalate	85-68-7	N.D.	570	1,400	5
10727	Di-n-butylphthalate	84-74-2	N.D.	570	1,400	5
10727	Caprolactam	105-60-2	N.D.	290	1,400	5
10727	Carbazole	86-74-8	N.D.	290	1,400	5
10727	4-Chloro-3-methylphenol	59-50-7	N.D.	570	1,400	5
10727	4-Chloroaniline	106-47-8	N.D.	570	1,400	5
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.	290	1,400	5
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.	290	1,400	5
10727	2-Chloronaphthalene	91-58-7	N.D.	290	1,400	5
10727	2-Chlorophenol	95-57-8	N.D.	290	1,400	5
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.	290	1,400	5
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.	290	1,400	5
10727	Chrysene	218-01-9	N.D.	290	1,400	5
10727	Dibenz(a,h)anthracene	53-70-3	N.D.	290	1,400	5
10727	Dibenzofuran	132-64-9	N.D.	290	1,400	5
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.	860	2,900	5
10727	2,4-Dichlorophenol	120-83-2	N.D.	290	1,400	5
10727	Diethylphthalate	84-66-2	N.D.	570	1,400	5
10727	2,4-Dimethylphenol	105-67-9	N.D.	570	1,400	5
10727	Dimethylphthalate	131-11-3	N.D.	570	1,400	5
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.	1,400	4,300	5
10727	2,4-Dinitrophenol	51-28-5	N.D.	2,900	8,600	5
10727	2,4-Dinitrotoluene	121-14-2	N.D.	570	1,400	5
10727	2,6-Dinitrotoluene	606-20-2	N.D.	290	1,400	5
10727	bis(2-Ethylhexyl)phthalate	117-81-7	N.D.	570	2,900	5
10727	Fluoranthene	206-44-0	N.D.	290	1,400	5
10727	Fluorene	86-73-7	N.D.	290	1,400	5
10727	Hexachlorobenzene	118-74-1	N.D.	290	1,400	5
10727	Hexachlorobutadiene	87-68-3	N.D.	570	1,400	5
10727	Hexachlorocyclopentadiene	77-47-4	N.D.	1,400	4,300	5
10727	Hexachloroethane	67-72-1	N.D.	290	1,400	5
10727	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.	290	1,400	5
10727	Isophorone	78-59-1	N.D.	290	1,400	5
10727	2-Methylnaphthalene	91-57-6	N.D.	290	1,400	5
10727	2-Methylphenol	95-48-7	N.D.	570	1,400	5
10727	4-Methylphenol	106-44-5	N.D.	570	1,400	5

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-64-WC_24-26' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-64-WC_24-26'

LLI Sample # SW 6262286
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 16:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

64-24

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.					
10727	Naphthalene	91-20-3	N.D.	290	1,400	5
10727	2-Nitroaniline	88-74-4	N.D.	290	1,400	5
10727	3-Nitroaniline	99-09-2	N.D.	570	1,400	5
10727	4-Nitroaniline	100-01-6	N.D.	570	1,400	5
10727	Nitrobenzene	98-95-3	N.D.	290	1,400	5
10727	2-Nitrophenol	88-75-5	N.D.	290	1,400	5
10727	4-Nitrophenol	100-02-7	N.D.	1,400	4,300	5
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.	290	1,400	5
10727	N-Nitrosodiphenylamine	86-30-6	N.D.	290	1,400	5
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.					
10727	Di-n-octylphthalate	117-84-0	N.D.	570	1,400	5
10727	Pentachlorophenol	87-86-5	N.D.	1,400	4,300	5
10727	Phenanthrene	85-01-8	N.D.	290	1,400	5
10727	Phenol	108-95-2	N.D.	290	1,400	5
10727	Pyrene	129-00-0	N.D.	290	1,400	5
10727	2,4,5-Trichlorophenol	95-95-4	N.D.	570	1,400	5
10727	2,4,6-Trichlorophenol	88-06-2	N.D.	290	1,400	5
	Reporting limits were raised due to interference from the sample matrix.					
Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	26,600	8.64	34.4	1
06944	Antimony	7440-36-0	N.D.	1.72	3.44	1
06935	Arsenic	7440-38-2	7.70	1.63	3.44	1
06946	Barium	7440-39-3	186	0.0687	0.859	1
06947	Beryllium	7440-41-7	1.18	0.117	0.859	1
06949	Cadmium	7440-43-9	N.D.	0.241	0.859	1
01650	Calcium	7440-70-2	3,910	10.5	34.4	1
06951	Chromium	7440-47-3	51.8	1.01	2.58	1
06952	Cobalt	7440-48-4	11.4	0.326	0.859	1
06953	Copper	7440-50-8	8.22	0.378	1.72	1
01654	Iron	7439-89-6	29,500	8.09	34.4	1
06955	Lead	7439-92-1	17.4	1.03	2.58	1
01657	Magnesium	7439-95-4	6,980	4.36	17.2	1
06958	Manganese	7439-96-5	407	0.134	0.859	1
06961	Nickel	7440-02-0	27.2	0.326	1.72	1
01662	Potassium	7440-09-7	2,690	30.9	85.9	1
06936	Selenium	7782-49-2	N.D.	1.68	3.44	1
06966	Silver	7440-22-4	0.832 J	0.309	0.859	1
01667	Sodium	7440-23-5	299	64.1	172	1
06925	Thallium	7440-28-0	N.D.	2.49	5.15	1
06971	Vanadium	7440-62-2	59.0	0.326	0.859	1
06972	Zinc	7440-66-6	66.7	1.13	3.44	1
	SW-846 7471A		**mg/kg**	**mg/kg**	**mg/kg**	

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-64-WC_24-26' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-64-WC_24-26'

LLI Sample # SW 6262286
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 16:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

64-24

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.0127 J	0.0048	0.166	1
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	41.8	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	X111131AA	04/23/2011 08:33	Stephanie A Selis	1.02
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/13/2011 16:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/13/2011 16:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/13/2011 16:00	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLD026	04/25/2011 11:53	Brian K Graham	5
10809	BNA Soil Microwave	SW-846 3546	1	11110SLD026	04/21/2011 09:30	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111125708004	04/28/2011 02:24	Tara L Snyder	1
06944	Antimony	SW-846 6010B	1	111125708004	04/28/2011 02:24	Tara L Snyder	1
06935	Arsenic	SW-846 6010B	1	111125708004	04/28/2011 02:24	Tara L Snyder	1
06946	Barium	SW-846 6010B	1	111125708004	04/28/2011 02:24	Tara L Snyder	1
06947	Beryllium	SW-846 6010B	1	111125708004	04/28/2011 02:24	Tara L Snyder	1
06949	Cadmium	SW-846 6010B	1	111125708004	04/28/2011 02:24	Tara L Snyder	1
01650	Calcium	SW-846 6010B	1	111125708004	04/28/2011 02:24	Tara L Snyder	1
06951	Chromium	SW-846 6010B	1	111125708004	04/28/2011 02:24	Tara L Snyder	1
06952	Cobalt	SW-846 6010B	1	111125708004	04/28/2011 02:24	Tara L Snyder	1
06953	Copper	SW-846 6010B	1	111125708004	04/28/2011 02:24	Tara L Snyder	1
01654	Iron	SW-846 6010B	1	111125708004	04/28/2011 02:24	Tara L Snyder	1
06955	Lead	SW-846 6010B	1	111125708004	04/28/2011 02:24	Tara L Snyder	1
01657	Magnesium	SW-846 6010B	1	111125708004	04/28/2011 02:24	Tara L Snyder	1
06958	Manganese	SW-846 6010B	1	111125708004	04/28/2011 02:24	Tara L Snyder	1
06961	Nickel	SW-846 6010B	1	111125708004	04/28/2011 02:24	Tara L Snyder	1
01662	Potassium	SW-846 6010B	1	111125708004	04/28/2011 02:24	Tara L Snyder	1
06936	Selenium	SW-846 6010B	1	111125708004	04/28/2011 09:37	Joanne M Gates	1
06966	Silver	SW-846 6010B	1	111125708004	04/28/2011 09:37	Joanne M Gates	1
01667	Sodium	SW-846 6010B	1	111125708004	04/28/2011 02:24	Tara L Snyder	1
06925	Thallium	SW-846 6010B	1	111125708004	04/28/2011 02:24	Tara L Snyder	1

*=This limit was used in the evaluation of the final result

Sample Description: **BH-10-64-WC_24-26' Grab Soil**
Philadelphia Refinery AOI-10
COC: 259438 BH-10-64-WC_24-26'

LLI Sample # SW 6262286
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 16:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

64-24

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06971	Vanadium	SW-846 6010B	1	111125708004	04/28/2011 02:24	Tara L Snyder	1
06972	Zinc	SW-846 6010B	1	111125708004	04/28/2011 02:24	Tara L Snyder	1
00159	Mercury	SW-846 7471A	1	111125711004	04/25/2011 10:15	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111125708004	04/23/2011 10:17	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111125711004	04/23/2011 12:05	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820001B	04/22/2011 18:08	Scott W Freisher	1

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-77-WC_6.5-7' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-77-WC_6.5-7'

LLI Sample # SW 6262287
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 10:45 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

77-65

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	N.D.		790	2,300	86.54
10950	Benzene	71-43-2	120	J	56	560	86.54
10950	Bromodichloromethane	75-27-4	N.D.		110	560	86.54
10950	Bromoform	75-25-2	N.D.		110	560	86.54
10950	Bromomethane	74-83-9	N.D.		230	560	86.54
10950	2-Butanone	78-93-3	N.D.		450	1,100	86.54
10950	Carbon Disulfide	75-15-0	N.D.		110	560	86.54
10950	Carbon Tetrachloride	56-23-5	N.D.		110	560	86.54
10950	Chlorobenzene	108-90-7	N.D.		110	560	86.54
10950	Chloroethane	75-00-3	N.D.		230	560	86.54
10950	Chloroform	67-66-3	N.D.		110	560	86.54
10950	Chloromethane	74-87-3	N.D.		230	560	86.54
10950	Cyclohexane	110-82-7	320	J	110	560	86.54
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		230	560	86.54
10950	Dibromochloromethane	124-48-1	N.D.		110	560	86.54
10950	1,2-Dibromoethane	106-93-4	N.D.		110	560	86.54
10950	1,2-Dichlorobenzene	95-50-1	N.D.		110	560	86.54
10950	1,3-Dichlorobenzene	541-73-1	N.D.		110	560	86.54
10950	1,4-Dichlorobenzene	106-46-7	N.D.		110	560	86.54
10950	Dichlorodifluoromethane	75-71-8	N.D.		230	560	86.54
10950	1,1-Dichloroethane	75-34-3	N.D.		110	560	86.54
10950	1,2-Dichloroethane	107-06-2	N.D.		110	560	86.54
10950	1,1-Dichloroethene	75-35-4	N.D.		110	560	86.54
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		110	560	86.54
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		110	560	86.54
10950	1,2-Dichloropropane	78-87-5	N.D.		110	560	86.54
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		110	560	86.54
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		110	560	86.54
10950	Ethylbenzene	100-41-4	210	J	110	560	86.54
10950	Freon 113	76-13-1	N.D.		230	1,100	86.54
10950	2-Hexanone	591-78-6	N.D.		340	1,100	86.54
10950	Isopropylbenzene	98-82-8	280	J	110	560	86.54
10950	Methyl Acetate	79-20-9	290	J	230	560	86.54
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		56	560	86.54
10950	4-Methyl-2-pentanone	108-10-1	N.D.		340	1,100	86.54
10950	Methylcyclohexane	108-87-2	1,600		110	560	86.54
10950	Methylene Chloride	75-09-2	N.D.		230	560	86.54
10950	Styrene	100-42-5	N.D.		110	560	86.54
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		110	560	86.54
10950	Tetrachloroethene	127-18-4	N.D.		110	560	86.54
10950	Toluene	108-88-3	210	J	110	560	86.54
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		110	560	86.54
10950	1,1,1-Trichloroethane	71-55-6	N.D.		110	560	86.54
10950	1,1,2-Trichloroethane	79-00-5	N.D.		110	560	86.54
10950	Trichloroethene	79-01-6	N.D.		110	560	86.54
10950	Trichlorofluoromethane	75-69-4	N.D.		230	560	86.54
10950	Vinyl Chloride	75-01-4	N.D.		110	560	86.54
10950	Xylene (Total)	1330-20-7	1,500		110	560	86.54

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-77-WC_6.5-7' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-77-WC_6.5-7'

LLI Sample # SW 6262287
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 10:45 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

77-65

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**	**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	N.D.	2,200	11,000	1
10727	Acenaphthylene	208-96-8	N.D.	2,200	11,000	1
10727	Acetophenone	98-86-2	N.D.	4,400	11,000	1
10727	Anthracene	120-12-7	N.D.	2,200	11,000	1
10727	Atrazine	1912-24-9	N.D.	2,200	11,000	1
10727	Benzaldehyde	100-52-7	N.D.	4,400	11,000	1
10727	Benzo(a)anthracene	56-55-3	N.D.	2,200	11,000	1
10727	Benzo(a)pyrene	50-32-8	N.D.	2,200	11,000	1
10727	Benzo(b)fluoranthene	205-99-2	N.D.	2,200	11,000	1
10727	Benzo(g,h,i)perylene	191-24-2	N.D.	2,200	11,000	1
10727	Benzo(k)fluoranthene	207-08-9	N.D.	2,200	11,000	1
10727	1,1'-Biphenyl	92-52-4	N.D.	2,200	11,000	1
10727	4-Bromophenyl-phenylether	101-55-3	N.D.	2,200	11,000	1
10727	Butylbenzylphthalate	85-68-7	N.D.	4,400	11,000	1
10727	Di-n-butylphthalate	84-74-2	N.D.	4,400	11,000	1
10727	Caprolactam	105-60-2	N.D.	2,200	11,000	1
10727	Carbazole	86-74-8	N.D.	2,200	11,000	1
10727	4-Chloro-3-methylphenol	59-50-7	N.D.	4,400	11,000	1
10727	4-Chloroaniline	106-47-8	N.D.	4,400	11,000	1
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.	2,200	11,000	1
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.	2,200	11,000	1
10727	2-Chloronaphthalene	91-58-7	N.D.	2,200	11,000	1
10727	2-Chlorophenol	95-57-8	N.D.	2,200	11,000	1
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.	2,200	11,000	1
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.	2,200	11,000	1
10727	Chrysene	218-01-9	N.D.	2,200	11,000	1
10727	Dibenz(a,h)anthracene	53-70-3	N.D.	2,200	11,000	1
10727	Dibenzofuran	132-64-9	N.D.	2,200	11,000	1
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.	6,500	22,000	1
10727	2,4-Dichlorophenol	120-83-2	N.D.	2,200	11,000	1
10727	Diethylphthalate	84-66-2	N.D.	4,400	11,000	1
10727	2,4-Dimethylphenol	105-67-9	N.D.	4,400	11,000	1
10727	Dimethylphthalate	131-11-3	N.D.	4,400	11,000	1
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.	11,000	33,000	1
10727	2,4-Dinitrophenol	51-28-5	N.D.	22,000	65,000	1
10727	2,4-Dinitrotoluene	121-14-2	N.D.	4,400	11,000	1
10727	2,6-Dinitrotoluene	606-20-2	N.D.	2,200	11,000	1
10727	bis(2-Ethylhexyl)phthalate	117-81-7	N.D.	4,400	22,000	1
10727	Fluoranthene	206-44-0	N.D.	2,200	11,000	1
10727	Fluorene	86-73-7	N.D.	2,200	11,000	1
10727	Hexachlorobenzene	118-74-1	N.D.	2,200	11,000	1
10727	Hexachlorobutadiene	87-68-3	N.D.	4,400	11,000	1
10727	Hexachlorocyclopentadiene	77-47-4	N.D.	11,000	33,000	1
10727	Hexachloroethane	67-72-1	N.D.	2,200	11,000	1
10727	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.	2,200	11,000	1
10727	Isophorone	78-59-1	N.D.	2,200	11,000	1
10727	2-Methylnaphthalene	91-57-6	N.D.	2,200	11,000	1
10727	2-Methylphenol	95-48-7	N.D.	4,400	11,000	1
10727	4-Methylphenol	106-44-5	N.D.	4,400	11,000	1

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-77-WC_6.5-7' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-77-WC_6.5-7'

LLI Sample # SW 6262287
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 10:45 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

77-65

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	N.D.		2,200	11,000	1
10727	2-Nitroaniline	88-74-4	N.D.		2,200	11,000	1
10727	3-Nitroaniline	99-09-2	N.D.		4,400	11,000	1
10727	4-Nitroaniline	100-01-6	N.D.		4,400	11,000	1
10727	Nitrobenzene	98-95-3	N.D.		2,200	11,000	1
10727	2-Nitrophenol	88-75-5	N.D.		2,200	11,000	1
10727	4-Nitrophenol	100-02-7	N.D.		11,000	33,000	1
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		2,200	11,000	1
10727	N-Nitrosodiphenylamine	86-30-6	N.D.		2,200	11,000	1
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		4,400	11,000	1
10727	Pentachlorophenol	87-86-5	N.D.		11,000	33,000	1
10727	Phenanthrene	85-01-8	N.D.		2,200	11,000	1
10727	Phenol	108-95-2	N.D.		2,200	11,000	1
10727	Pyrene	129-00-0	N.D.		2,200	11,000	1
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		4,400	11,000	1
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		2,200	11,000	1
	Reporting limits were raised due to interference from the sample matrix.						
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	1,270		6.31	25.1	1
06944	Antimony	7440-36-0	N.D.		1.26	2.51	1
06935	Arsenic	7440-38-2	2.14	J	1.19	2.51	1
06946	Barium	7440-39-3	62.9		0.0502	0.628	1
06947	Beryllium	7440-41-7	N.D.		0.0854	0.628	1
06949	Cadmium	7440-43-9	N.D.		0.176	0.628	1
01650	Calcium	7440-70-2	3,610		7.69	25.1	1
06951	Chromium	7440-47-3	4.81		0.741	1.88	1
06952	Cobalt	7440-48-4	0.443	J	0.239	0.628	1
06953	Copper	7440-50-8	3.41		0.276	1.26	1
01654	Iron	7439-89-6	2,280		5.91	25.1	1
06955	Lead	7439-92-1	131		0.753	1.88	1
01657	Magnesium	7439-95-4	2,830		3.19	12.6	1
06958	Manganese	7439-96-5	33.5		0.0979	0.628	1
06961	Nickel	7440-02-0	4.97		0.239	1.26	1
01662	Potassium	7440-09-7	151		22.6	62.8	1
06936	Selenium	7782-49-2	N.D.		1.23	2.51	1
06966	Silver	7440-22-4	N.D.		0.226	0.628	1
01667	Sodium	7440-23-5	48.1	J	46.8	126	1
06925	Thallium	7440-28-0	N.D.		1.82	3.77	1
06971	Vanadium	7440-62-2	7.82		0.239	0.628	1
06972	Zinc	7440-66-6	15.7		0.828	2.51	1
	SW-846 7471A		**mg/kg**		**mg/kg**	**mg/kg**	

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-77-WC_6.5-7' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-77-WC_6.5-7'

LLI Sample # SW 6262287
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 10:45 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

77-65

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.264	0.0035	0.123	1
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	23.4	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	Q111161AA	04/26/2011 10:09	Stephanie A Selis	86.54
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/13/2011 10:45	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/13/2011 10:45	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/13/2011 10:45	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLD026	04/25/2011 12:18	Brian K Graham	1
10809	BNA Soil Microwave	SW-846 3546	1	11110SLD026	04/21/2011 09:30	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111125708004	04/28/2011 02:28	Tara L Snyder	1
06944	Antimony	SW-846 6010B	1	111125708004	04/28/2011 02:28	Tara L Snyder	1
06935	Arsenic	SW-846 6010B	1	111125708004	04/28/2011 02:28	Tara L Snyder	1
06946	Barium	SW-846 6010B	1	111125708004	04/28/2011 02:28	Tara L Snyder	1
06947	Beryllium	SW-846 6010B	1	111125708004	04/28/2011 02:28	Tara L Snyder	1
06949	Cadmium	SW-846 6010B	1	111125708004	04/28/2011 02:28	Tara L Snyder	1
01650	Calcium	SW-846 6010B	1	111125708004	04/28/2011 02:28	Tara L Snyder	1
06951	Chromium	SW-846 6010B	1	111125708004	04/28/2011 02:28	Tara L Snyder	1
06952	Cobalt	SW-846 6010B	1	111125708004	04/28/2011 02:28	Tara L Snyder	1
06953	Copper	SW-846 6010B	1	111125708004	04/28/2011 02:28	Tara L Snyder	1
01654	Iron	SW-846 6010B	1	111125708004	04/28/2011 02:28	Tara L Snyder	1
06955	Lead	SW-846 6010B	1	111125708004	04/28/2011 02:28	Tara L Snyder	1
01657	Magnesium	SW-846 6010B	1	111125708004	04/28/2011 02:28	Tara L Snyder	1
06958	Manganese	SW-846 6010B	1	111125708004	04/28/2011 02:28	Tara L Snyder	1
06961	Nickel	SW-846 6010B	1	111125708004	04/28/2011 02:28	Tara L Snyder	1
01662	Potassium	SW-846 6010B	1	111125708004	04/28/2011 02:28	Tara L Snyder	1
06936	Selenium	SW-846 6010B	1	111125708004	04/28/2011 09:51	Joanne M Gates	1
06966	Silver	SW-846 6010B	1	111125708004	04/28/2011 02:28	Tara L Snyder	1
01667	Sodium	SW-846 6010B	1	111125708004	04/28/2011 02:28	Tara L Snyder	1
06925	Thallium	SW-846 6010B	1	111125708004	04/28/2011 02:28	Tara L Snyder	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-77-WC_6.5-7' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-77-WC_6.5-7'

LLI Sample # SW 6262287
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/13/2011 10:45 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

77-65

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06971	Vanadium	SW-846 6010B	1	111125708004	04/28/2011 02:28	Tara L Snyder	1
06972	Zinc	SW-846 6010B	1	111125708004	04/28/2011 02:28	Tara L Snyder	1
00159	Mercury	SW-846 7471A	1	111125711004	04/25/2011 10:17	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111125708004	04/23/2011 10:17	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111125711004	04/23/2011 12:05	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820001B	04/22/2011 18:08	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-43_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-43_0-2'

LLI Sample # SW 6262288
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 09:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

43-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	91		6	18	0.74
10950	Benzene	71-43-2	12		0.4	4	0.74
10950	Bromodichloromethane	75-27-4	N.D.		0.9	4	0.74
10950	Bromoform	75-25-2	N.D.		0.9	4	0.74
10950	Bromomethane	74-83-9	N.D.		2	4	0.74
10950	2-Butanone	78-93-3	11		4	9	0.74
10950	Carbon Disulfide	75-15-0	4	J	0.9	4	0.74
10950	Carbon Tetrachloride	56-23-5	N.D.		0.9	4	0.74
10950	Chlorobenzene	108-90-7	N.D.		0.9	4	0.74
10950	Chloroethane	75-00-3	N.D.		2	4	0.74
10950	Chloroform	67-66-3	N.D.		0.9	4	0.74
10950	Chloromethane	74-87-3	N.D.		2	4	0.74
10950	Cyclohexane	110-82-7	N.D.		0.9	4	0.74
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		2	4	0.74
10950	Dibromochloromethane	124-48-1	N.D.		0.9	4	0.74
10950	1,2-Dibromoethane	106-93-4	N.D.		0.9	4	0.74
10950	1,2-Dichlorobenzene	95-50-1	N.D.		0.9	4	0.74
10950	1,3-Dichlorobenzene	541-73-1	N.D.		0.9	4	0.74
10950	1,4-Dichlorobenzene	106-46-7	N.D.		0.9	4	0.74
10950	Dichlorodifluoromethane	75-71-8	N.D.		2	4	0.74
10950	1,1-Dichloroethane	75-34-3	N.D.		0.9	4	0.74
10950	1,2-Dichloroethane	107-06-2	N.D.		0.9	4	0.74
10950	1,1-Dichloroethene	75-35-4	N.D.		0.9	4	0.74
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		0.9	4	0.74
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		0.9	4	0.74
10950	1,2-Dichloropropane	78-87-5	N.D.		0.9	4	0.74
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		0.9	4	0.74
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		0.9	4	0.74
10950	Ethylbenzene	100-41-4	1	J	0.9	4	0.74
10950	Freon 113	76-13-1	N.D.		2	9	0.74
10950	2-Hexanone	591-78-6	N.D.		3	9	0.74
10950	Isopropylbenzene	98-82-8	N.D.		0.9	4	0.74
10950	Methyl Acetate	79-20-9	N.D.		2	4	0.74
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.4	4	0.74
10950	4-Methyl-2-pentanone	108-10-1	N.D.		3	9	0.74
10950	Methylcyclohexane	108-87-2	1	J	0.9	4	0.74
10950	Methylene Chloride	75-09-2	N.D.		2	4	0.74
10950	Styrene	100-42-5	N.D.		0.9	4	0.74
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		0.9	4	0.74
10950	Tetrachloroethene	127-18-4	N.D.		0.9	4	0.74
10950	Toluene	108-88-3	2	J	0.9	4	0.74
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		0.9	4	0.74
10950	1,1,1-Trichloroethane	71-55-6	N.D.		0.9	4	0.74
10950	1,1,2-Trichloroethane	79-00-5	N.D.		0.9	4	0.74
10950	Trichloroethene	79-01-6	N.D.		0.9	4	0.74
10950	Trichlorofluoromethane	75-69-4	N.D.		2	4	0.74
10950	Vinyl Chloride	75-01-4	N.D.		0.9	4	0.74
10950	Xylene (Total)	1330-20-7	N.D.		0.9	4	0.74

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-43_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-43_0-2'

LLI Sample # SW 6262288
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 09:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

43-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**	**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	N.D.	200	980	5
10727	Acenaphthylene	208-96-8	N.D.	200	980	5
10727	Acetophenone	98-86-2	N.D.	390	980	5
10727	Anthracene	120-12-7	N.D.	200	980	5
10727	Atrazine	1912-24-9	N.D.	200	980	5
10727	Benzaldehyde	100-52-7	N.D.	390	980	5
10727	Benzo(a)anthracene	56-55-3	N.D.	200	980	5
10727	Benzo(a)pyrene	50-32-8	N.D.	200	980	5
10727	Benzo(b)fluoranthene	205-99-2	N.D.	200	980	5
10727	Benzo(g,h,i)perylene	191-24-2	N.D.	200	980	5
10727	Benzo(k)fluoranthene	207-08-9	N.D.	200	980	5
10727	1,1'-Biphenyl	92-52-4	N.D.	200	980	5
10727	4-Bromophenyl-phenylether	101-55-3	N.D.	200	980	5
10727	Butylbenzylphthalate	85-68-7	N.D.	390	980	5
10727	Di-n-butylphthalate	84-74-2	N.D.	390	980	5
10727	Caprolactam	105-60-2	N.D.	200	980	5
10727	Carbazole	86-74-8	N.D.	200	980	5
10727	4-Chloro-3-methylphenol	59-50-7	N.D.	390	980	5
10727	4-Chloroaniline	106-47-8	N.D.	390	980	5
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.	200	980	5
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.	200	980	5
10727	2-Chloronaphthalene	91-58-7	N.D.	200	980	5
10727	2-Chlorophenol	95-57-8	N.D.	200	980	5
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.	200	980	5
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.	200	980	5
10727	Chrysene	218-01-9	N.D.	200	980	5
10727	Dibenz(a,h)anthracene	53-70-3	N.D.	200	980	5
10727	Dibenzofuran	132-64-9	N.D.	200	980	5
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.	590	2,000	5
10727	2,4-Dichlorophenol	120-83-2	N.D.	200	980	5
10727	Diethylphthalate	84-66-2	N.D.	390	980	5
10727	2,4-Dimethylphenol	105-67-9	N.D.	390	980	5
10727	Dimethylphthalate	131-11-3	N.D.	390	980	5
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.	980	2,900	5
10727	2,4-Dinitrophenol	51-28-5	N.D.	2,000	5,900	5
10727	2,4-Dinitrotoluene	121-14-2	N.D.	390	980	5
10727	2,6-Dinitrotoluene	606-20-2	N.D.	200	980	5
10727	bis(2-Ethylhexyl)phthalate	117-81-7	N.D.	390	2,000	5
10727	Fluoranthene	206-44-0	N.D.	200	980	5
10727	Fluorene	86-73-7	N.D.	200	980	5
10727	Hexachlorobenzene	118-74-1	N.D.	200	980	5
10727	Hexachlorobutadiene	87-68-3	N.D.	390	980	5
10727	Hexachlorocyclopentadiene	77-47-4	N.D.	980	2,900	5
10727	Hexachloroethane	67-72-1	N.D.	200	980	5
10727	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.	200	980	5
10727	Isophorone	78-59-1	N.D.	200	980	5
10727	2-Methylnaphthalene	91-57-6	N.D.	200	980	5
10727	2-Methylphenol	95-48-7	N.D.	390	980	5
10727	4-Methylphenol	106-44-5	N.D.	390	980	5

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-43_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-43_0-2'

LLI Sample # SW 6262288
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 09:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

43-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.					
10727	Naphthalene	91-20-3	N.D.	200	980	5
10727	2-Nitroaniline	88-74-4	N.D.	200	980	5
10727	3-Nitroaniline	99-09-2	N.D.	390	980	5
10727	4-Nitroaniline	100-01-6	N.D.	390	980	5
10727	Nitrobenzene	98-95-3	N.D.	200	980	5
10727	2-Nitrophenol	88-75-5	N.D.	200	980	5
10727	4-Nitrophenol	100-02-7	N.D.	980	2,900	5
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.	200	980	5
10727	N-Nitrosodiphenylamine	86-30-6	N.D.	200	980	5
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.					
10727	Di-n-octylphthalate	117-84-0	N.D.	390	980	5
10727	Pentachlorophenol	87-86-5	N.D.	980	2,900	5
10727	Phenanthrene	85-01-8	N.D.	200	980	5
10727	Phenol	108-95-2	N.D.	200	980	5
10727	Pyrene	129-00-0	N.D.	200	980	5
10727	2,4,5-Trichlorophenol	95-95-4	N.D.	390	980	5
10727	2,4,6-Trichlorophenol	88-06-2	N.D.	200	980	5
	Reporting limits were raised due to interference from the sample matrix.					
Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	18,800	5.79	23.0	1
06944	Antimony	7440-36-0	N.D.	1.15	2.30	1
06935	Arsenic	7440-38-2	14.7	1.09	2.30	1
06946	Barium	7440-39-3	212	0.0460	0.575	1
06947	Beryllium	7440-41-7	0.692	0.0782	0.575	1
06949	Cadmium	7440-43-9	N.D.	0.161	0.575	1
01650	Calcium	7440-70-2	18,100	7.05	23.0	1
06951	Chromium	7440-47-3	56.0	0.679	1.73	1
06952	Cobalt	7440-48-4	8.32	0.219	0.575	1
06953	Copper	7440-50-8	98.2	0.253	1.15	1
01654	Iron	7439-89-6	23,000	5.42	23.0	1
06955	Lead	7439-92-1	167	0.690	1.73	1
01657	Magnesium	7439-95-4	6,630	2.92	11.5	1
06958	Manganese	7439-96-5	451	0.0897	0.575	1
06961	Nickel	7440-02-0	37.6	0.219	1.15	1
01662	Potassium	7440-09-7	1,430	20.7	57.5	1
06936	Selenium	7782-49-2	N.D.	1.13	2.30	1
06966	Silver	7440-22-4	N.D.	0.207	0.575	1
01667	Sodium	7440-23-5	130	42.9	115	1
06925	Thallium	7440-28-0	N.D.	1.67	3.45	1
06971	Vanadium	7440-62-2	84.8	0.219	0.575	1
06972	Zinc	7440-66-6	113	0.759	2.30	1
	SW-846 7471A		**mg/kg**	**mg/kg**	**mg/kg**	

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-43_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-43_0-2'

LLI Sample # SW 6262288
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 09:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

43-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**		**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.111	J	0.0033	0.116	1
Wet Chemistry	**SM20 2540 G**		**%**		**%**	**%**	
00111	Moisture	n.a.	15.6		0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	X111151AA	04/25/2011 21:33	Sara E Johnson	0.74
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/14/2011 09:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/14/2011 09:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/14/2011 09:00	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLD026	04/25/2011 12:44	Brian K Graham	5
10809	BNA Soil Microwave	SW-846 3546	1	11110SLD026	04/21/2011 09:30	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111125708004	04/28/2011 02:32	Tara L Snyder	1
06944	Antimony	SW-846 6010B	1	111125708004	04/28/2011 02:32	Tara L Snyder	1
06935	Arsenic	SW-846 6010B	1	111125708004	04/28/2011 02:32	Tara L Snyder	1
06946	Barium	SW-846 6010B	1	111125708004	04/28/2011 02:32	Tara L Snyder	1
06947	Beryllium	SW-846 6010B	1	111125708004	04/28/2011 02:32	Tara L Snyder	1
06949	Cadmium	SW-846 6010B	1	111125708004	04/28/2011 02:32	Tara L Snyder	1
01650	Calcium	SW-846 6010B	1	111125708004	04/28/2011 02:32	Tara L Snyder	1
06951	Chromium	SW-846 6010B	1	111125708004	04/28/2011 02:32	Tara L Snyder	1
06952	Cobalt	SW-846 6010B	1	111125708004	04/28/2011 02:32	Tara L Snyder	1
06953	Copper	SW-846 6010B	1	111125708004	04/28/2011 02:32	Tara L Snyder	1
01654	Iron	SW-846 6010B	1	111125708004	04/28/2011 02:32	Tara L Snyder	1
06955	Lead	SW-846 6010B	1	111125708004	04/28/2011 02:32	Tara L Snyder	1
01657	Magnesium	SW-846 6010B	1	111125708004	04/28/2011 02:32	Tara L Snyder	1
06958	Manganese	SW-846 6010B	1	111125708004	04/28/2011 02:32	Tara L Snyder	1
06961	Nickel	SW-846 6010B	1	111125708004	04/28/2011 02:32	Tara L Snyder	1
01662	Potassium	SW-846 6010B	1	111125708004	04/28/2011 02:32	Tara L Snyder	1
06936	Selenium	SW-846 6010B	1	111125708004	04/28/2011 09:54	Joanne M Gates	1
06966	Silver	SW-846 6010B	1	111125708004	04/28/2011 02:32	Tara L Snyder	1
01667	Sodium	SW-846 6010B	1	111125708004	04/28/2011 02:32	Tara L Snyder	1
06925	Thallium	SW-846 6010B	1	111125708004	04/28/2011 02:32	Tara L Snyder	1

*=This limit was used in the evaluation of the final result

Sample Description: **BH-10-43_0-2' Grab Soil**
Philadelphia Refinery AOI-10
COC: 259438 BH-10-43_0-2'

LLI Sample # SW 6262288
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 09:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

43-02

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06971	Vanadium	SW-846 6010B	1	111125708004	04/28/2011 02:32	Tara L Snyder	1
06972	Zinc	SW-846 6010B	1	111125708004	04/28/2011 02:32	Tara L Snyder	1
00159	Mercury	SW-846 7471A	1	111125711004	04/25/2011 10:18	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111125708004	04/23/2011 10:17	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111125711004	04/23/2011 12:05	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820001B	04/22/2011 18:08	Scott W Freisher	1

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-48_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-48_0-2'

LLI Sample # SW 6262289
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 09:45 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

48-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	110		7	19	0.76
10950	Benzene	71-43-2	7		0.5	5	0.76
10950	Bromodichloromethane	75-27-4	N.D.		1	5	0.76
10950	Bromoform	75-25-2	N.D.		1	5	0.76
10950	Bromomethane	74-83-9	N.D.		2	5	0.76
10950	2-Butanone	78-93-3	17		4	10	0.76
10950	Carbon Disulfide	75-15-0	2	J	1	5	0.76
10950	Carbon Tetrachloride	56-23-5	N.D.		1	5	0.76
10950	Chlorobenzene	108-90-7	N.D.		1	5	0.76
10950	Chloroethane	75-00-3	N.D.		2	5	0.76
10950	Chloroform	67-66-3	N.D.		1	5	0.76
10950	Chloromethane	74-87-3	N.D.		2	5	0.76
10950	Cyclohexane	110-82-7	16		1	5	0.76
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		2	5	0.76
10950	Dibromochloromethane	124-48-1	N.D.		1	5	0.76
10950	1,2-Dibromoethane	106-93-4	N.D.		1	5	0.76
10950	1,2-Dichlorobenzene	95-50-1	N.D.		1	5	0.76
10950	1,3-Dichlorobenzene	541-73-1	N.D.		1	5	0.76
10950	1,4-Dichlorobenzene	106-46-7	N.D.		1	5	0.76
10950	Dichlorodifluoromethane	75-71-8	N.D.		2	5	0.76
10950	1,1-Dichloroethane	75-34-3	N.D.		1	5	0.76
10950	1,2-Dichloroethane	107-06-2	N.D.		1	5	0.76
10950	1,1-Dichloroethene	75-35-4	N.D.		1	5	0.76
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		1	5	0.76
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		1	5	0.76
10950	1,2-Dichloropropane	78-87-5	N.D.		1	5	0.76
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		1	5	0.76
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		1	5	0.76
10950	Ethylbenzene	100-41-4	1	J	1	5	0.76
10950	Freon 113	76-13-1	N.D.		2	10	0.76
10950	2-Hexanone	591-78-6	N.D.		3	10	0.76
10950	Isopropylbenzene	98-82-8	13		1	5	0.76
10950	Methyl Acetate	79-20-9	N.D.		2	5	0.76
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.5	5	0.76
10950	4-Methyl-2-pentanone	108-10-1	N.D.		3	10	0.76
10950	Methylcyclohexane	108-87-2	81		1	5	0.76
10950	Methylene Chloride	75-09-2	N.D.		2	5	0.76
10950	Styrene	100-42-5	N.D.		1	5	0.76
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		1	5	0.76
10950	Tetrachloroethene	127-18-4	N.D.		1	5	0.76
10950	Toluene	108-88-3	2	J	1	5	0.76
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		1	5	0.76
10950	1,1,1-Trichloroethane	71-55-6	N.D.		1	5	0.76
10950	1,1,2-Trichloroethane	79-00-5	N.D.		1	5	0.76
10950	Trichloroethene	79-01-6	N.D.		1	5	0.76
10950	Trichlorofluoromethane	75-69-4	N.D.		2	5	0.76
10950	Vinyl Chloride	75-01-4	N.D.		1	5	0.76
10950	Xylene (Total)	1330-20-7	14		1	5	0.76

The GC/MS volatile internal standard peak areas were outside the QC limits. A re-analysis was performed, and the matrix effect

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-48_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-48_0-2'

LLI Sample # SW 6262289
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 09:45 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

48-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
was confirmed.							
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	N.D.		210	1,000	5
10727	Acenaphthylene	208-96-8	N.D.		210	1,000	5
10727	Acetophenone	98-86-2	N.D.		420	1,000	5
10727	Anthracene	120-12-7	N.D.		210	1,000	5
10727	Atrazine	1912-24-9	N.D.		210	1,000	5
10727	Benzaldehyde	100-52-7	N.D.		420	1,000	5
10727	Benzo(a)anthracene	56-55-3	390	J	210	1,000	5
10727	Benzo(a)pyrene	50-32-8	420	J	210	1,000	5
10727	Benzo(b)fluoranthene	205-99-2	610	J	210	1,000	5
10727	Benzo(g,h,i)perylene	191-24-2	420	J	210	1,000	5
10727	Benzo(k)fluoranthene	207-08-9	N.D.		210	1,000	5
10727	1,1'-Biphenyl	92-52-4	N.D.		210	1,000	5
10727	4-Bromophenyl-phenylether	101-55-3	N.D.		210	1,000	5
10727	Butylbenzylphthalate	85-68-7	N.D.		420	1,000	5
10727	Di-n-butylphthalate	84-74-2	N.D.		420	1,000	5
10727	Caprolactam	105-60-2	N.D.		210	1,000	5
10727	Carbazole	86-74-8	N.D.		210	1,000	5
10727	4-Chloro-3-methylphenol	59-50-7	N.D.		420	1,000	5
10727	4-Chloroaniline	106-47-8	N.D.		420	1,000	5
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.		210	1,000	5
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.		210	1,000	5
10727	2-Chloronaphthalene	91-58-7	N.D.		210	1,000	5
10727	2-Chlorophenol	95-57-8	N.D.		210	1,000	5
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.		210	1,000	5
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.		210	1,000	5
10727	Chrysene	218-01-9	430	J	210	1,000	5
10727	Dibenz(a,h)anthracene	53-70-3	N.D.		210	1,000	5
10727	Dibenzofuran	132-64-9	N.D.		210	1,000	5
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.		620	2,100	5
10727	2,4-Dichlorophenol	120-83-2	N.D.		210	1,000	5
10727	Diethylphthalate	84-66-2	N.D.		420	1,000	5
10727	2,4-Dimethylphenol	105-67-9	N.D.		420	1,000	5
10727	Dimethylphthalate	131-11-3	N.D.		420	1,000	5
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.		1,000	3,100	5
10727	2,4-Dinitrophenol	51-28-5	N.D.		2,100	6,200	5
10727	2,4-Dinitrotoluene	121-14-2	N.D.		420	1,000	5
10727	2,6-Dinitrotoluene	606-20-2	N.D.		210	1,000	5
10727	bis(2-Ethylhexyl)phthalate	117-81-7	N.D.		420	2,100	5
10727	Fluoranthene	206-44-0	510	J	210	1,000	5
10727	Fluorene	86-73-7	N.D.		210	1,000	5
10727	Hexachlorobenzene	118-74-1	N.D.		210	1,000	5
10727	Hexachlorobutadiene	87-68-3	N.D.		420	1,000	5
10727	Hexachlorocyclopentadiene	77-47-4	N.D.		1,000	3,100	5
10727	Hexachloroethane	67-72-1	N.D.		210	1,000	5
10727	Indeno(1,2,3-cd)pyrene	193-39-5	310	J	210	1,000	5
10727	Isophorone	78-59-1	N.D.		210	1,000	5
10727	2-Methylnaphthalene	91-57-6	580	J	210	1,000	5
10727	2-Methylphenol	95-48-7	N.D.		420	1,000	5
10727	4-Methylphenol	106-44-5	N.D.		420	1,000	5

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-48_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-48_0-2'

LLI Sample # SW 6262289
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 09:45 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

48-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	230	J	210	1,000	5
10727	2-Nitroaniline	88-74-4	N.D.		210	1,000	5
10727	3-Nitroaniline	99-09-2	N.D.		420	1,000	5
10727	4-Nitroaniline	100-01-6	N.D.		420	1,000	5
10727	Nitrobenzene	98-95-3	N.D.		210	1,000	5
10727	2-Nitrophenol	88-75-5	N.D.		210	1,000	5
10727	4-Nitrophenol	100-02-7	N.D.		1,000	3,100	5
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		210	1,000	5
10727	N-Nitrosodiphenylamine	86-30-6	N.D.		210	1,000	5
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		420	1,000	5
10727	Pentachlorophenol	87-86-5	N.D.		1,000	3,100	5
10727	Phenanthrene	85-01-8	420	J	210	1,000	5
10727	Phenol	108-95-2	N.D.		210	1,000	5
10727	Pyrene	129-00-0	470	J	210	1,000	5
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		420	1,000	5
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		210	1,000	5
	Reporting limits were raised due to interference from the sample matrix.						
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	22,200		6.06	24.1	1
06944	Antimony	7440-36-0	N.D.		1.21	2.41	1
06935	Arsenic	7440-38-2	20.0		1.15	2.41	1
06946	Barium	7440-39-3	317		0.0482	0.603	1
06947	Beryllium	7440-41-7	0.857		0.0820	0.603	1
06949	Cadmium	7440-43-9	2.22		0.169	0.603	1
01650	Calcium	7440-70-2	93,700		36.9	121	5
06951	Chromium	7440-47-3	250		0.711	1.81	1
06952	Cobalt	7440-48-4	8.12		0.229	0.603	1
06953	Copper	7440-50-8	187		0.265	1.21	1
01654	Iron	7439-89-6	42,300		28.4	121	5
06955	Lead	7439-92-1	278		0.723	1.81	1
01657	Magnesium	7439-95-4	36,900		3.06	12.1	1
06958	Manganese	7439-96-5	2,810		0.470	3.01	5
06961	Nickel	7440-02-0	52.0		0.229	1.21	1
01662	Potassium	7440-09-7	1,260		21.7	60.3	1
06936	Selenium	7782-49-2	2.58		1.18	2.41	1
06966	Silver	7440-22-4	N.D.		0.217	0.603	1
01667	Sodium	7440-23-5	748		45.0	121	1
06925	Thallium	7440-28-0	N.D.		1.75	3.62	1
06971	Vanadium	7440-62-2	233		0.229	0.603	1
06972	Zinc	7440-66-6	750		0.796	2.41	1
	SW-846 7471A		**mg/kg**		**mg/kg**	**mg/kg**	

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-48_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-48_0-2'

LLI Sample # SW 6262289
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 09:45 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

48-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		mg/kg	mg/kg	mg/kg	
00159	Mercury	7439-97-6	0.0867 J	0.0035	0.121	1
Wet Chemistry	**SM20 2540 G**		%	%	%	
00111	Moisture	n.a.	21.0	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	X111131AA	04/23/2011 08:55	Stephanie A Selis	0.76
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/14/2011 09:45	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/14/2011 09:45	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/14/2011 09:45	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11110SLD026	04/25/2011 13:10	Brian K Graham	5
10809	BNA Soil Microwave	SW-846 3546	1	11110SLD026	04/21/2011 09:30	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111125708004	04/28/2011 02:35	Tara L Snyder	1
06944	Antimony	SW-846 6010B	1	111125708004	04/28/2011 02:35	Tara L Snyder	1
06935	Arsenic	SW-846 6010B	1	111125708004	04/28/2011 02:35	Tara L Snyder	1
06946	Barium	SW-846 6010B	1	111125708004	04/28/2011 02:35	Tara L Snyder	1
06947	Beryllium	SW-846 6010B	1	111125708004	04/28/2011 02:35	Tara L Snyder	1
06949	Cadmium	SW-846 6010B	1	111125708004	04/28/2011 02:35	Tara L Snyder	1
01650	Calcium	SW-846 6010B	1	111125708004	04/28/2011 10:01	Joanne M Gates	5
06951	Chromium	SW-846 6010B	1	111125708004	04/28/2011 02:35	Tara L Snyder	1
06952	Cobalt	SW-846 6010B	1	111125708004	04/28/2011 02:35	Tara L Snyder	1
06953	Copper	SW-846 6010B	1	111125708004	04/28/2011 02:35	Tara L Snyder	1
01654	Iron	SW-846 6010B	1	111125708004	04/28/2011 10:01	Joanne M Gates	5
06955	Lead	SW-846 6010B	1	111125708004	04/28/2011 02:35	Tara L Snyder	1
01657	Magnesium	SW-846 6010B	1	111125708004	04/28/2011 02:35	Tara L Snyder	1
06958	Manganese	SW-846 6010B	1	111125708004	04/28/2011 10:01	Joanne M Gates	5
06961	Nickel	SW-846 6010B	1	111125708004	04/28/2011 02:35	Tara L Snyder	1
01662	Potassium	SW-846 6010B	1	111125708004	04/28/2011 02:35	Tara L Snyder	1
06936	Selenium	SW-846 6010B	1	111125708004	04/28/2011 09:58	Joanne M Gates	1
06966	Silver	SW-846 6010B	1	111125708004	04/28/2011 02:35	Tara L Snyder	1
01667	Sodium	SW-846 6010B	1	111125708004	04/28/2011 02:35	Tara L Snyder	1
06925	Thallium	SW-846 6010B	1	111125708004	04/28/2011 02:35	Tara L Snyder	1

*=This limit was used in the evaluation of the final result

Sample Description: **BH-10-48_0-2' Grab Soil**
Philadelphia Refinery AOI-10
COC: 259438 BH-10-48_0-2'

LLI Sample # SW 6262289
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 09:45 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

48-02

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06971	Vanadium	SW-846 6010B	1	111125708004	04/28/2011 02:35	Tara L Snyder	1
06972	Zinc	SW-846 6010B	1	111125708004	04/28/2011 02:35	Tara L Snyder	1
00159	Mercury	SW-846 7471A	1	111125711004	04/25/2011 10:19	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111125708004	04/23/2011 10:17	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111125711004	04/23/2011 12:05	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820001B	04/22/2011 18:08	Scott W Freisher	1

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-51_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-51_0-2'

LLI Sample # SW 6262290
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 10:20 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

51-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	210		9	27	0.99
10950	Benzene	71-43-2	6	J	0.7	7	0.99
10950	Bromodichloromethane	75-27-4	N.D.		1	7	0.99
10950	Bromoform	75-25-2	N.D.		1	7	0.99
10950	Bromomethane	74-83-9	N.D.		3	7	0.99
10950	2-Butanone	78-93-3	34		5	14	0.99
10950	Carbon Disulfide	75-15-0	5	J	1	7	0.99
10950	Carbon Tetrachloride	56-23-5	N.D.		1	7	0.99
10950	Chlorobenzene	108-90-7	N.D.		1	7	0.99
10950	Chloroethane	75-00-3	N.D.		3	7	0.99
10950	Chloroform	67-66-3	N.D.		1	7	0.99
10950	Chloromethane	74-87-3	N.D.		3	7	0.99
10950	Cyclohexane	110-82-7	7		1	7	0.99
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		3	7	0.99
10950	Dibromochloromethane	124-48-1	N.D.		1	7	0.99
10950	1,2-Dibromoethane	106-93-4	N.D.		1	7	0.99
10950	1,2-Dichlorobenzene	95-50-1	N.D.		1	7	0.99
10950	1,3-Dichlorobenzene	541-73-1	N.D.		1	7	0.99
10950	1,4-Dichlorobenzene	106-46-7	N.D.		1	7	0.99
10950	Dichlorodifluoromethane	75-71-8	N.D.		3	7	0.99
10950	1,1-Dichloroethane	75-34-3	N.D.		1	7	0.99
10950	1,2-Dichloroethane	107-06-2	N.D.		1	7	0.99
10950	1,1-Dichloroethene	75-35-4	N.D.		1	7	0.99
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		1	7	0.99
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		1	7	0.99
10950	1,2-Dichloropropane	78-87-5	N.D.		1	7	0.99
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		1	7	0.99
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		1	7	0.99
10950	Ethylbenzene	100-41-4	3	J	1	7	0.99
10950	Freon 113	76-13-1	N.D.		3	14	0.99
10950	2-Hexanone	591-78-6	N.D.		4	14	0.99
10950	Isopropylbenzene	98-82-8	4	J	1	7	0.99
10950	Methyl Acetate	79-20-9	N.D.		3	7	0.99
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.7	7	0.99
10950	4-Methyl-2-pentanone	108-10-1	N.D.		4	14	0.99
10950	Methylcyclohexane	108-87-2	81		1	7	0.99
10950	Methylene Chloride	75-09-2	N.D.		3	7	0.99
10950	Styrene	100-42-5	N.D.		1	7	0.99
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		1	7	0.99
10950	Tetrachloroethene	127-18-4	3	J	1	7	0.99
10950	Toluene	108-88-3	5	J	1	7	0.99
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		1	7	0.99
10950	1,1,1-Trichloroethane	71-55-6	N.D.		1	7	0.99
10950	1,1,2-Trichloroethane	79-00-5	N.D.		1	7	0.99
10950	Trichloroethene	79-01-6	N.D.		1	7	0.99
10950	Trichlorofluoromethane	75-69-4	N.D.		3	7	0.99
10950	Vinyl Chloride	75-01-4	N.D.		1	7	0.99
10950	Xylene (Total)	1330-20-7	27		1	7	0.99

The GC/MS volatile internal standard peak areas were outside the QC limits. A re-analysis was performed, and the matrix effect

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-51_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-51_0-2'

LLI Sample # SW 6262290
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 10:20 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

51-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
was confirmed.							
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	N.D.		220	1,100	5
10727	Acenaphthylene	208-96-8	N.D.		220	1,100	5
10727	Acetophenone	98-86-2	N.D.		450	1,100	5
10727	Anthracene	120-12-7	N.D.		220	1,100	5
10727	Atrazine	1912-24-9	N.D.		220	1,100	5
10727	Benzaldehyde	100-52-7	N.D.		450	1,100	5
10727	Benzo(a)anthracene	56-55-3	N.D.		220	1,100	5
10727	Benzo(a)pyrene	50-32-8	450	J	220	1,100	5
10727	Benzo(b)fluoranthene	205-99-2	330	J	220	1,100	5
10727	Benzo(g,h,i)perylene	191-24-2	580	J	220	1,100	5
10727	Benzo(k)fluoranthene	207-08-9	N.D.		220	1,100	5
10727	1,1'-Biphenyl	92-52-4	N.D.		220	1,100	5
10727	4-Bromophenyl-phenylether	101-55-3	N.D.		220	1,100	5
10727	Butylbenzylphthalate	85-68-7	N.D.		450	1,100	5
10727	Di-n-butylphthalate	84-74-2	N.D.		450	1,100	5
10727	Caprolactam	105-60-2	N.D.		220	1,100	5
10727	Carbazole	86-74-8	N.D.		220	1,100	5
10727	4-Chloro-3-methylphenol	59-50-7	N.D.		450	1,100	5
10727	4-Chloroaniline	106-47-8	N.D.		450	1,100	5
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.		220	1,100	5
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.		220	1,100	5
10727	2-Chloronaphthalene	91-58-7	N.D.		220	1,100	5
10727	2-Chlorophenol	95-57-8	N.D.		220	1,100	5
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.		220	1,100	5
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.		220	1,100	5
10727	Chrysene	218-01-9	790	J	220	1,100	5
10727	Dibenz(a,h)anthracene	53-70-3	N.D.		220	1,100	5
10727	Dibenzofuran	132-64-9	N.D.		220	1,100	5
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.		670	2,200	5
10727	2,4-Dichlorophenol	120-83-2	N.D.		220	1,100	5
10727	Diethylphthalate	84-66-2	N.D.		450	1,100	5
10727	2,4-Dimethylphenol	105-67-9	N.D.		450	1,100	5
10727	Dimethylphthalate	131-11-3	N.D.		450	1,100	5
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.		1,100	3,400	5
10727	2,4-Dinitrophenol	51-28-5	N.D.		2,200	6,700	5
10727	2,4-Dinitrotoluene	121-14-2	N.D.		450	1,100	5
10727	2,6-Dinitrotoluene	606-20-2	N.D.		220	1,100	5
10727	bis(2-Ethylhexyl)phthalate	117-81-7	N.D.		450	2,200	5
10727	Fluoranthene	206-44-0	N.D.		220	1,100	5
10727	Fluorene	86-73-7	N.D.		220	1,100	5
10727	Hexachlorobenzene	118-74-1	N.D.		220	1,100	5
10727	Hexachlorobutadiene	87-68-3	N.D.		450	1,100	5
10727	Hexachlorocyclopentadiene	77-47-4	N.D.		1,100	3,400	5
10727	Hexachloroethane	67-72-1	N.D.		220	1,100	5
10727	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.		220	1,100	5
10727	Isophorone	78-59-1	N.D.		220	1,100	5
10727	2-Methylnaphthalene	91-57-6	960	J	220	1,100	5
10727	2-Methylphenol	95-48-7	N.D.		450	1,100	5
10727	4-Methylphenol	106-44-5	N.D.		450	1,100	5

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-51_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-51_0-2'

LLI Sample # SW 6262290
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 10:20 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

51-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	240	J	220	1,100	5
10727	2-Nitroaniline	88-74-4	N.D.		220	1,100	5
10727	3-Nitroaniline	99-09-2	N.D.		450	1,100	5
10727	4-Nitroaniline	100-01-6	N.D.		450	1,100	5
10727	Nitrobenzene	98-95-3	N.D.		220	1,100	5
10727	2-Nitrophenol	88-75-5	N.D.		220	1,100	5
10727	4-Nitrophenol	100-02-7	N.D.		1,100	3,400	5
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		220	1,100	5
10727	N-Nitrosodiphenylamine	86-30-6	N.D.		220	1,100	5
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		450	1,100	5
10727	Pentachlorophenol	87-86-5	N.D.		1,100	3,400	5
10727	Phenanthrene	85-01-8	680	J	220	1,100	5
10727	Phenol	108-95-2	N.D.		220	1,100	5
10727	Pyrene	129-00-0	590	J	220	1,100	5
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		450	1,100	5
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		220	1,100	5
	Reporting limits were raised due to interference from the sample matrix.						
	The GC/MS semivolatile surrogate recoveries are outside of QC limits. The matrix spike sample was analyzed and surrogate recoveries are again outside of QC limits, indicating a matrix effect.						
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	20,100		6.76	26.9	1
06944	Antimony	7440-36-0	13.5		1.34	2.69	1
06935	Arsenic	7440-38-2	21.3		1.28	2.69	1
06946	Barium	7440-39-3	271		0.0537	0.672	1
06947	Beryllium	7440-41-7	0.767		0.0913	0.672	1
06949	Cadmium	7440-43-9	0.945		0.188	0.672	1
01650	Calcium	7440-70-2	112,000		41.2	134	5
06951	Chromium	7440-47-3	1,880		0.792	2.01	1
06952	Cobalt	7440-48-4	10.2		0.255	0.672	1
06953	Copper	7440-50-8	246		0.295	1.34	1
01654	Iron	7439-89-6	23,400		6.33	26.9	1
06955	Lead	7439-92-1	1,720		4.03	10.1	5
01657	Magnesium	7439-95-4	43,400		3.41	13.4	1
06958	Manganese	7439-96-5	602		0.105	0.672	1
06961	Nickel	7440-02-0	100		0.255	1.34	1
01662	Potassium	7440-09-7	874		24.2	67.2	1
06936	Selenium	7782-49-2	N.D.		1.32	2.69	1
06966	Silver	7440-22-4	N.D.		0.242	0.672	1
01667	Sodium	7440-23-5	323		50.1	134	1
06925	Thallium	7440-28-0	N.D.		1.95	4.03	1
06971	Vanadium	7440-62-2	259		0.255	0.672	1

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-51_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-51_0-2'

LLI Sample # SW 6262290
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 10:20 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

51-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
06972	Zinc	7440-66-6	893	0.886	2.69	1
	SW-846 7471A		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	1.52	0.0189	0.659	5
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	27.0	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	X111131AA	04/23/2011 09:18	Stephanie A Selis	0.99
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/14/2011 10:20	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/14/2011 10:20	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/14/2011 10:20	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11111SLA026	04/25/2011 08:10	Brian K Graham	5
10809	BNA Soil Microwave	SW-846 3546	1	11111SLA026	04/22/2011 09:00	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111125708004	04/28/2011 02:46	Tara L Snyder	1
06944	Antimony	SW-846 6010B	1	111125708004	04/28/2011 02:46	Tara L Snyder	1
06935	Arsenic	SW-846 6010B	1	111125708004	04/28/2011 02:46	Tara L Snyder	1
06946	Barium	SW-846 6010B	1	111125708004	04/28/2011 02:46	Tara L Snyder	1
06947	Beryllium	SW-846 6010B	1	111125708004	04/28/2011 02:46	Tara L Snyder	1
06949	Cadmium	SW-846 6010B	1	111125708004	04/28/2011 02:46	Tara L Snyder	1
01650	Calcium	SW-846 6010B	1	111125708004	04/28/2011 10:08	Joanne M Gates	5
06951	Chromium	SW-846 6010B	1	111125708004	04/28/2011 10:05	Joanne M Gates	1
06952	Cobalt	SW-846 6010B	1	111125708004	04/28/2011 02:46	Tara L Snyder	1
06953	Copper	SW-846 6010B	1	111125708004	04/28/2011 02:46	Tara L Snyder	1
01654	Iron	SW-846 6010B	1	111125708004	04/28/2011 02:46	Tara L Snyder	1
06955	Lead	SW-846 6010B	1	111125708004	04/28/2011 10:08	Joanne M Gates	5
01657	Magnesium	SW-846 6010B	1	111125708004	04/28/2011 02:46	Tara L Snyder	1
06958	Manganese	SW-846 6010B	1	111125708004	04/28/2011 02:46	Tara L Snyder	1
06961	Nickel	SW-846 6010B	1	111125708004	04/28/2011 02:46	Tara L Snyder	1
01662	Potassium	SW-846 6010B	1	111125708004	04/28/2011 02:46	Tara L Snyder	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-51_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-51_0-2'

LLI Sample # SW 6262290
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 10:20 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

51-02

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06936	Selenium	SW-846 6010B	1	111125708004	04/28/2011 10:05	Joanne M Gates	1
06966	Silver	SW-846 6010B	1	111125708004	04/28/2011 02:46	Tara L Snyder	1
01667	Sodium	SW-846 6010B	1	111125708004	04/28/2011 02:46	Tara L Snyder	1
06925	Thallium	SW-846 6010B	1	111125708004	04/28/2011 02:46	Tara L Snyder	1
06971	Vanadium	SW-846 6010B	1	111125708004	04/28/2011 02:46	Tara L Snyder	1
06972	Zinc	SW-846 6010B	1	111125708004	04/28/2011 02:46	Tara L Snyder	1
00159	Mercury	SW-846 7471A	1	111125711004	04/25/2011 11:34	Damary Valentin	5
05708	SW SW846 ICP Digest	SW-846 3050B	1	111125708004	04/23/2011 10:17	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111125711004	04/23/2011 12:05	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820001B	04/22/2011 18:08	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-52_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-52_0-2'

LLI Sample # SW 6262291
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 11:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

52-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	84		6	18	0.78
10950	Benzene	71-43-2	8		0.5	5	0.78
10950	Bromodichloromethane	75-27-4	N.D.		0.9	5	0.78
10950	Bromoform	75-25-2	N.D.		0.9	5	0.78
10950	Bromomethane	74-83-9	N.D.		2	5	0.78
10950	2-Butanone	78-93-3	8	J	4	9	0.78
10950	Carbon Disulfide	75-15-0	2	J	0.9	5	0.78
10950	Carbon Tetrachloride	56-23-5	N.D.		0.9	5	0.78
10950	Chlorobenzene	108-90-7	N.D.		0.9	5	0.78
10950	Chloroethane	75-00-3	N.D.		2	5	0.78
10950	Chloroform	67-66-3	N.D.		0.9	5	0.78
10950	Chloromethane	74-87-3	N.D.		2	5	0.78
10950	Cyclohexane	110-82-7	N.D.		0.9	5	0.78
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		2	5	0.78
10950	Dibromochloromethane	124-48-1	N.D.		0.9	5	0.78
10950	1,2-Dibromoethane	106-93-4	N.D.		0.9	5	0.78
10950	1,2-Dichlorobenzene	95-50-1	N.D.		0.9	5	0.78
10950	1,3-Dichlorobenzene	541-73-1	N.D.		0.9	5	0.78
10950	1,4-Dichlorobenzene	106-46-7	N.D.		0.9	5	0.78
10950	Dichlorodifluoromethane	75-71-8	N.D.		2	5	0.78
10950	1,1-Dichloroethane	75-34-3	N.D.		0.9	5	0.78
10950	1,2-Dichloroethane	107-06-2	N.D.		0.9	5	0.78
10950	1,1-Dichloroethene	75-35-4	N.D.		0.9	5	0.78
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		0.9	5	0.78
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		0.9	5	0.78
10950	1,2-Dichloropropane	78-87-5	N.D.		0.9	5	0.78
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		0.9	5	0.78
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		0.9	5	0.78
10950	Ethylbenzene	100-41-4	N.D.		0.9	5	0.78
10950	Freon 113	76-13-1	N.D.		2	9	0.78
10950	2-Hexanone	591-78-6	N.D.		3	9	0.78
10950	Isopropylbenzene	98-82-8	N.D.		0.9	5	0.78
10950	Methyl Acetate	79-20-9	N.D.		2	5	0.78
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.5	5	0.78
10950	4-Methyl-2-pentanone	108-10-1	N.D.		3	9	0.78
10950	Methylcyclohexane	108-87-2	N.D.		0.9	5	0.78
10950	Methylene Chloride	75-09-2	N.D.		2	5	0.78
10950	Styrene	100-42-5	N.D.		0.9	5	0.78
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		0.9	5	0.78
10950	Tetrachloroethene	127-18-4	N.D.		0.9	5	0.78
10950	Toluene	108-88-3	3	J	0.9	5	0.78
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		0.9	5	0.78
10950	1,1,1-Trichloroethane	71-55-6	N.D.		0.9	5	0.78
10950	1,1,2-Trichloroethane	79-00-5	N.D.		0.9	5	0.78
10950	Trichloroethene	79-01-6	N.D.		0.9	5	0.78
10950	Trichlorofluoromethane	75-69-4	N.D.		2	5	0.78
10950	Vinyl Chloride	75-01-4	N.D.		0.9	5	0.78
10950	Xylene (Total)	1330-20-7	1	J	0.9	5	0.78

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-52_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-52_0-2'

LLI Sample # SW 6262291
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 11:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

52-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**		**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	N.D.		190	970	5
10727	Acenaphthylene	208-96-8	N.D.		190	970	5
10727	Acetophenone	98-86-2	N.D.		390	970	5
10727	Anthracene	120-12-7	310	J	190	970	5
10727	Atrazine	1912-24-9	N.D.		190	970	5
10727	Benzaldehyde	100-52-7	N.D.		390	970	5
10727	Benzo(a)anthracene	56-55-3	610	J	190	970	5
10727	Benzo(a)pyrene	50-32-8	590	J	190	970	5
10727	Benzo(b)fluoranthene	205-99-2	680	J	190	970	5
10727	Benzo(g,h,i)perylene	191-24-2	440	J	190	970	5
10727	Benzo(k)fluoranthene	207-08-9	350	J	190	970	5
10727	1,1'-Biphenyl	92-52-4	N.D.		190	970	5
10727	4-Bromophenyl-phenylether	101-55-3	N.D.		190	970	5
10727	Butylbenzylphthalate	85-68-7	N.D.		390	970	5
10727	Di-n-butylphthalate	84-74-2	N.D.		390	970	5
10727	Caprolactam	105-60-2	N.D.		190	970	5
10727	Carbazole	86-74-8	N.D.		190	970	5
10727	4-Chloro-3-methylphenol	59-50-7	N.D.		390	970	5
10727	4-Chloroaniline	106-47-8	N.D.		390	970	5
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.		190	970	5
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.		190	970	5
10727	2-Chloronaphthalene	91-58-7	N.D.		190	970	5
10727	2-Chlorophenol	95-57-8	N.D.		190	970	5
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.		190	970	5
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.		190	970	5
10727	Chrysene	218-01-9	650	J	190	970	5
10727	Dibenz(a,h)anthracene	53-70-3	N.D.		190	970	5
10727	Dibenzofuran	132-64-9	N.D.		190	970	5
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.		580	1,900	5
10727	2,4-Dichlorophenol	120-83-2	N.D.		190	970	5
10727	Diethylphthalate	84-66-2	N.D.		390	970	5
10727	2,4-Dimethylphenol	105-67-9	N.D.		390	970	5
10727	Dimethylphthalate	131-11-3	N.D.		390	970	5
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.		970	2,900	5
10727	2,4-Dinitrophenol	51-28-5	N.D.		1,900	5,800	5
10727	2,4-Dinitrotoluene	121-14-2	N.D.		390	970	5
10727	2,6-Dinitrotoluene	606-20-2	N.D.		190	970	5
10727	bis(2-Ethylhexyl)phthalate	117-81-7	N.D.		390	1,900	5
10727	Fluoranthene	206-44-0	1,100		190	970	5
10727	Fluorene	86-73-7	N.D.		190	970	5
10727	Hexachlorobenzene	118-74-1	N.D.		190	970	5
10727	Hexachlorobutadiene	87-68-3	N.D.		390	970	5
10727	Hexachlorocyclopentadiene	77-47-4	N.D.		970	2,900	5
10727	Hexachloroethane	67-72-1	N.D.		190	970	5
10727	Indeno(1,2,3-cd)pyrene	193-39-5	350	J	190	970	5
10727	Isophorone	78-59-1	N.D.		190	970	5
10727	2-Methylnaphthalene	91-57-6	N.D.		190	970	5
10727	2-Methylphenol	95-48-7	N.D.		390	970	5
10727	4-Methylphenol	106-44-5	N.D.		390	970	5

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-52_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-52_0-2'

LLI Sample # SW 6262291
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 11:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

52-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	N.D.		190	970	5
10727	2-Nitroaniline	88-74-4	N.D.		190	970	5
10727	3-Nitroaniline	99-09-2	N.D.		390	970	5
10727	4-Nitroaniline	100-01-6	N.D.		390	970	5
10727	Nitrobenzene	98-95-3	N.D.		190	970	5
10727	2-Nitrophenol	88-75-5	N.D.		190	970	5
10727	4-Nitrophenol	100-02-7	N.D.		970	2,900	5
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		190	970	5
10727	N-Nitrosodiphenylamine	86-30-6	N.D.		190	970	5
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		390	970	5
10727	Pentachlorophenol	87-86-5	N.D.		970	2,900	5
10727	Phenanthrene	85-01-8	1,100		190	970	5
10727	Phenol	108-95-2	N.D.		190	970	5
10727	Pyrene	129-00-0	980		190	970	5
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		390	970	5
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		190	970	5
	Reporting limits were raised due to interference from the sample matrix.						
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	12,600		5.79	23.0	1
06944	Antimony	7440-36-0	N.D.		1.15	2.30	1
06935	Arsenic	7440-38-2	12.2		1.09	2.30	1
06946	Barium	7440-39-3	174		0.0461	0.576	1
06947	Beryllium	7440-41-7	0.649		0.0783	0.576	1
06949	Cadmium	7440-43-9	0.238	J	0.161	0.576	1
01650	Calcium	7440-70-2	9,200		7.06	23.0	1
06951	Chromium	7440-47-3	52.0		0.680	1.73	1
06952	Cobalt	7440-48-4	7.07		0.219	0.576	1
06953	Copper	7440-50-8	79.3		0.253	1.15	1
01654	Iron	7439-89-6	19,800		5.43	23.0	1
06955	Lead	7439-92-1	1,480		3.46	8.64	5
01657	Magnesium	7439-95-4	4,510		2.93	11.5	1
06958	Manganese	7439-96-5	276		0.0899	0.576	1
06961	Nickel	7440-02-0	24.9		0.219	1.15	1
01662	Potassium	7440-09-7	1,520		20.7	57.6	1
06936	Selenium	7782-49-2	N.D.		1.13	2.30	1
06966	Silver	7440-22-4	N.D.		0.207	0.576	1
01667	Sodium	7440-23-5	107	J	43.0	115	1
06925	Thallium	7440-28-0	N.D.		1.67	3.46	1
06971	Vanadium	7440-62-2	51.6		0.219	0.576	1
06972	Zinc	7440-66-6	177		0.760	2.30	1
	SW-846 7471A		**mg/kg**		**mg/kg**	**mg/kg**	

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-52_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-52_0-2'

LLI Sample # SW 6262291
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 11:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

52-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.715	0.0034	0.117	1
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	14.9	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	X111151AA	04/25/2011 21:55	Sara E Johnson	0.78
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/14/2011 11:15	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/14/2011 11:15	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/14/2011 11:15	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11111SLA026	04/25/2011 09:25	Brian K Graham	5
10809	BNA Soil Microwave	SW-846 3546	1	11111SLA026	04/22/2011 09:00	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111125708004	04/28/2011 02:50	Tara L Snyder	1
06944	Antimony	SW-846 6010B	1	111125708004	04/28/2011 02:50	Tara L Snyder	1
06935	Arsenic	SW-846 6010B	1	111125708004	04/28/2011 02:50	Tara L Snyder	1
06946	Barium	SW-846 6010B	1	111125708004	04/28/2011 02:50	Tara L Snyder	1
06947	Beryllium	SW-846 6010B	1	111125708004	04/28/2011 02:50	Tara L Snyder	1
06949	Cadmium	SW-846 6010B	1	111125708004	04/28/2011 02:50	Tara L Snyder	1
01650	Calcium	SW-846 6010B	1	111125708004	04/28/2011 02:50	Tara L Snyder	1
06951	Chromium	SW-846 6010B	1	111125708004	04/28/2011 02:50	Tara L Snyder	1
06952	Cobalt	SW-846 6010B	1	111125708004	04/28/2011 02:50	Tara L Snyder	1
06953	Copper	SW-846 6010B	1	111125708004	04/28/2011 02:50	Tara L Snyder	1
01654	Iron	SW-846 6010B	1	111125708004	04/28/2011 02:50	Tara L Snyder	1
06955	Lead	SW-846 6010B	1	111125708004	04/28/2011 10:15	Joanne M Gates	5
01657	Magnesium	SW-846 6010B	1	111125708004	04/28/2011 02:50	Tara L Snyder	1
06958	Manganese	SW-846 6010B	1	111125708004	04/28/2011 02:50	Tara L Snyder	1
06961	Nickel	SW-846 6010B	1	111125708004	04/28/2011 02:50	Tara L Snyder	1
01662	Potassium	SW-846 6010B	1	111125708004	04/28/2011 02:50	Tara L Snyder	1
06936	Selenium	SW-846 6010B	1	111125708004	04/28/2011 10:12	Joanne M Gates	1
06966	Silver	SW-846 6010B	1	111125708004	04/28/2011 02:50	Tara L Snyder	1
01667	Sodium	SW-846 6010B	1	111125708004	04/28/2011 02:50	Tara L Snyder	1
06925	Thallium	SW-846 6010B	1	111125708004	04/28/2011 02:50	Tara L Snyder	1

*=This limit was used in the evaluation of the final result

Sample Description: **BH-10-52_0-2' Grab Soil**
Philadelphia Refinery AOI-10
COC: 259438 BH-10-52_0-2'

LLI Sample # SW 6262291
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 11:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

52-02

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06971	Vanadium	SW-846 6010B	1	111125708004	04/28/2011 02:50	Tara L Snyder	1
06972	Zinc	SW-846 6010B	1	111125708004	04/28/2011 02:50	Tara L Snyder	1
00159	Mercury	SW-846 7471A	1	111125711004	04/25/2011 10:25	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111125708004	04/23/2011 10:17	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111125711004	04/23/2011 12:05	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820001B	04/22/2011 18:08	Scott W Freisher	1

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-68_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-68_0-2'

LLI Sample # SW 6262292
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 13:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

68-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	87		6	18	0.74
10950	Benzene	71-43-2	3	J	0.4	4	0.74
10950	Bromodichloromethane	75-27-4	N.D.		0.9	4	0.74
10950	Bromoform	75-25-2	N.D.		0.9	4	0.74
10950	Bromomethane	74-83-9	N.D.		2	4	0.74
10950	2-Butanone	78-93-3	9		4	9	0.74
10950	Carbon Disulfide	75-15-0	4	J	0.9	4	0.74
10950	Carbon Tetrachloride	56-23-5	N.D.		0.9	4	0.74
10950	Chlorobenzene	108-90-7	N.D.		0.9	4	0.74
10950	Chloroethane	75-00-3	N.D.		2	4	0.74
10950	Chloroform	67-66-3	N.D.		0.9	4	0.74
10950	Chloromethane	74-87-3	N.D.		2	4	0.74
10950	Cyclohexane	110-82-7	N.D.		0.9	4	0.74
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		2	4	0.74
10950	Dibromochloromethane	124-48-1	N.D.		0.9	4	0.74
10950	1,2-Dibromoethane	106-93-4	N.D.		0.9	4	0.74
10950	1,2-Dichlorobenzene	95-50-1	N.D.		0.9	4	0.74
10950	1,3-Dichlorobenzene	541-73-1	N.D.		0.9	4	0.74
10950	1,4-Dichlorobenzene	106-46-7	N.D.		0.9	4	0.74
10950	Dichlorodifluoromethane	75-71-8	N.D.		2	4	0.74
10950	1,1-Dichloroethane	75-34-3	N.D.		0.9	4	0.74
10950	1,2-Dichloroethane	107-06-2	N.D.		0.9	4	0.74
10950	1,1-Dichloroethene	75-35-4	N.D.		0.9	4	0.74
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		0.9	4	0.74
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		0.9	4	0.74
10950	1,2-Dichloropropane	78-87-5	N.D.		0.9	4	0.74
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		0.9	4	0.74
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		0.9	4	0.74
10950	Ethylbenzene	100-41-4	N.D.		0.9	4	0.74
10950	Freon 113	76-13-1	N.D.		2	9	0.74
10950	2-Hexanone	591-78-6	N.D.		3	9	0.74
10950	Isopropylbenzene	98-82-8	N.D.		0.9	4	0.74
10950	Methyl Acetate	79-20-9	N.D.		2	4	0.74
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.4	4	0.74
10950	4-Methyl-2-pentanone	108-10-1	N.D.		3	9	0.74
10950	Methylcyclohexane	108-87-2	2	J	0.9	4	0.74
10950	Methylene Chloride	75-09-2	N.D.		2	4	0.74
10950	Styrene	100-42-5	N.D.		0.9	4	0.74
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		0.9	4	0.74
10950	Tetrachloroethene	127-18-4	N.D.		0.9	4	0.74
10950	Toluene	108-88-3	N.D.		0.9	4	0.74
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		0.9	4	0.74
10950	1,1,1-Trichloroethane	71-55-6	N.D.		0.9	4	0.74
10950	1,1,2-Trichloroethane	79-00-5	N.D.		0.9	4	0.74
10950	Trichloroethene	79-01-6	N.D.		0.9	4	0.74
10950	Trichlorofluoromethane	75-69-4	N.D.		2	4	0.74
10950	Vinyl Chloride	75-01-4	N.D.		0.9	4	0.74
10950	Xylene (Total)	1330-20-7	N.D.		0.9	4	0.74

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-68_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-68_0-2'

LLI Sample # SW 6262292
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 13:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

68-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**	**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	N.D.	200	980	5
10727	Acenaphthylene	208-96-8	N.D.	200	980	5
10727	Acetophenone	98-86-2	N.D.	390	980	5
10727	Anthracene	120-12-7	N.D.	200	980	5
10727	Atrazine	1912-24-9	N.D.	200	980	5
10727	Benzaldehyde	100-52-7	N.D.	390	980	5
10727	Benzo(a)anthracene	56-55-3	N.D.	200	980	5
10727	Benzo(a)pyrene	50-32-8	N.D.	200	980	5
10727	Benzo(b)fluoranthene	205-99-2	N.D.	200	980	5
10727	Benzo(g,h,i)perylene	191-24-2	N.D.	200	980	5
10727	Benzo(k)fluoranthene	207-08-9	N.D.	200	980	5
10727	1,1'-Biphenyl	92-52-4	N.D.	200	980	5
10727	4-Bromophenyl-phenylether	101-55-3	N.D.	200	980	5
10727	Butylbenzylphthalate	85-68-7	N.D.	390	980	5
10727	Di-n-butylphthalate	84-74-2	N.D.	390	980	5
10727	Caprolactam	105-60-2	N.D.	200	980	5
10727	Carbazole	86-74-8	N.D.	200	980	5
10727	4-Chloro-3-methylphenol	59-50-7	N.D.	390	980	5
10727	4-Chloroaniline	106-47-8	N.D.	390	980	5
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.	200	980	5
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.	200	980	5
10727	2-Chloronaphthalene	91-58-7	N.D.	200	980	5
10727	2-Chlorophenol	95-57-8	N.D.	200	980	5
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.	200	980	5
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.	200	980	5
10727	Chrysene	218-01-9	N.D.	200	980	5
10727	Dibenz(a,h)anthracene	53-70-3	N.D.	200	980	5
10727	Dibenzofuran	132-64-9	N.D.	200	980	5
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.	590	2,000	5
10727	2,4-Dichlorophenol	120-83-2	N.D.	200	980	5
10727	Diethylphthalate	84-66-2	N.D.	390	980	5
10727	2,4-Dimethylphenol	105-67-9	N.D.	390	980	5
10727	Dimethylphthalate	131-11-3	N.D.	390	980	5
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.	980	2,900	5
10727	2,4-Dinitrophenol	51-28-5	N.D.	2,000	5,900	5
10727	2,4-Dinitrotoluene	121-14-2	N.D.	390	980	5
10727	2,6-Dinitrotoluene	606-20-2	N.D.	200	980	5
10727	bis(2-Ethylhexyl)phthalate	117-81-7	N.D.	390	2,000	5
10727	Fluoranthene	206-44-0	N.D.	200	980	5
10727	Fluorene	86-73-7	N.D.	200	980	5
10727	Hexachlorobenzene	118-74-1	N.D.	200	980	5
10727	Hexachlorobutadiene	87-68-3	N.D.	390	980	5
10727	Hexachlorocyclopentadiene	77-47-4	N.D.	980	2,900	5
10727	Hexachloroethane	67-72-1	N.D.	200	980	5
10727	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.	200	980	5
10727	Isophorone	78-59-1	N.D.	200	980	5
10727	2-Methylnaphthalene	91-57-6	N.D.	200	980	5
10727	2-Methylphenol	95-48-7	N.D.	390	980	5
10727	4-Methylphenol	106-44-5	N.D.	390	980	5

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-68_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-68_0-2'

LLI Sample # SW 6262292
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 13:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

68-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	N.D.		200	980	5
10727	2-Nitroaniline	88-74-4	N.D.		200	980	5
10727	3-Nitroaniline	99-09-2	N.D.		390	980	5
10727	4-Nitroaniline	100-01-6	N.D.		390	980	5
10727	Nitrobenzene	98-95-3	N.D.		200	980	5
10727	2-Nitrophenol	88-75-5	N.D.		200	980	5
10727	4-Nitrophenol	100-02-7	N.D.		980	2,900	5
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		200	980	5
10727	N-Nitrosodiphenylamine	86-30-6	N.D.		200	980	5
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		390	980	5
10727	Pentachlorophenol	87-86-5	N.D.		980	2,900	5
10727	Phenanthrene	85-01-8	N.D.		200	980	5
10727	Phenol	108-95-2	1,300		200	980	5
10727	Pyrene	129-00-0	N.D.		200	980	5
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		390	980	5
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		200	980	5
	Reporting limits were raised due to interference from the sample matrix.						
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	22,600		5.70	22.7	1
06944	Antimony	7440-36-0	N.D.		1.13	2.27	1
06935	Arsenic	7440-38-2	7.99		1.08	2.27	1
06946	Barium	7440-39-3	135		0.0454	0.567	1
06947	Beryllium	7440-41-7	1.11		0.0771	0.567	1
06949	Cadmium	7440-43-9	N.D.		0.159	0.567	1
01650	Calcium	7440-70-2	25,900		6.95	22.7	1
06951	Chromium	7440-47-3	142		0.669	1.70	1
06952	Cobalt	7440-48-4	9.00		0.215	0.567	1
06953	Copper	7440-50-8	41.2		0.249	1.13	1
01654	Iron	7439-89-6	30,000		5.34	22.7	1
06955	Lead	7439-92-1	94.2		0.680	1.70	1
01657	Magnesium	7439-95-4	13,800		2.88	11.3	1
06958	Manganese	7439-96-5	777		0.0884	0.567	1
06961	Nickel	7440-02-0	30.2		0.215	1.13	1
01662	Potassium	7440-09-7	1,050		20.4	56.7	1
06936	Selenium	7782-49-2	N.D.		1.11	2.27	1
06966	Silver	7440-22-4	N.D.		0.204	0.567	1
01667	Sodium	7440-23-5	88.4	J	42.3	113	1
06925	Thallium	7440-28-0	N.D.		1.64	3.40	1
06971	Vanadium	7440-62-2	60.8		0.215	0.567	1
06972	Zinc	7440-66-6	115		0.748	2.27	1
	SW-846 7471A		**mg/kg**		**mg/kg**	**mg/kg**	

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-68_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-68_0-2'

LLI Sample # SW 6262292
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 13:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

68-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.335	0.0032	0.112	1
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	16.0	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	X111131AA	04/23/2011 05:10	Stephanie A Selis	0.74
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/14/2011 13:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/14/2011 13:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/14/2011 13:30	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11111SLA026	04/25/2011 09:50	Brian K Graham	5
10809	BNA Soil Microwave	SW-846 3546	1	11111SLA026	04/22/2011 09:00	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111125708004	04/28/2011 02:53	Tara L Snyder	1
06944	Antimony	SW-846 6010B	1	111125708004	04/28/2011 02:53	Tara L Snyder	1
06935	Arsenic	SW-846 6010B	1	111125708004	04/28/2011 02:53	Tara L Snyder	1
06946	Barium	SW-846 6010B	1	111125708004	04/28/2011 02:53	Tara L Snyder	1
06947	Beryllium	SW-846 6010B	1	111125708004	04/28/2011 02:53	Tara L Snyder	1
06949	Cadmium	SW-846 6010B	1	111125708004	04/28/2011 02:53	Tara L Snyder	1
01650	Calcium	SW-846 6010B	1	111125708004	04/28/2011 02:53	Tara L Snyder	1
06951	Chromium	SW-846 6010B	1	111125708004	04/28/2011 02:53	Tara L Snyder	1
06952	Cobalt	SW-846 6010B	1	111125708004	04/28/2011 02:53	Tara L Snyder	1
06953	Copper	SW-846 6010B	1	111125708004	04/28/2011 02:53	Tara L Snyder	1
01654	Iron	SW-846 6010B	1	111125708004	04/28/2011 02:53	Tara L Snyder	1
06955	Lead	SW-846 6010B	1	111125708004	04/28/2011 02:53	Tara L Snyder	1
01657	Magnesium	SW-846 6010B	1	111125708004	04/28/2011 02:53	Tara L Snyder	1
06958	Manganese	SW-846 6010B	1	111125708004	04/28/2011 02:53	Tara L Snyder	1
06961	Nickel	SW-846 6010B	1	111125708004	04/28/2011 02:53	Tara L Snyder	1
01662	Potassium	SW-846 6010B	1	111125708004	04/28/2011 02:53	Tara L Snyder	1
06936	Selenium	SW-846 6010B	1	111125708004	04/28/2011 10:18	Joanne M Gates	1
06966	Silver	SW-846 6010B	1	111125708004	04/28/2011 02:53	Tara L Snyder	1
01667	Sodium	SW-846 6010B	1	111125708004	04/28/2011 02:53	Tara L Snyder	1
06925	Thallium	SW-846 6010B	1	111125708004	04/28/2011 02:53	Tara L Snyder	1

*=This limit was used in the evaluation of the final result

Sample Description: **BH-10-68_0-2' Grab Soil**
Philadelphia Refinery AOI-10
COC: 259438 BH-10-68_0-2'

LLI Sample # SW 6262292
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 13:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

68-02

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06971	Vanadium	SW-846 6010B	1	111125708004	04/28/2011 02:53	Tara L Snyder	1
06972	Zinc	SW-846 6010B	1	111125708004	04/28/2011 02:53	Tara L Snyder	1
00159	Mercury	SW-846 7471A	1	111125711004	04/25/2011 10:26	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111125708004	04/23/2011 10:17	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111125711004	04/23/2011 12:05	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820001B	04/22/2011 18:08	Scott W Freisher	1

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-65_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-65_0-2

LLI Sample # SW 6262293
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 14:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

65-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	360		10	28	1
10950	Benzene	71-43-2	33		0.7	7	1
10950	Bromodichloromethane	75-27-4	N.D.		1	7	1
10950	Bromoform	75-25-2	N.D.		1	7	1
10950	Bromomethane	74-83-9	N.D.		3	7	1
10950	2-Butanone	78-93-3	48		6	14	1
10950	Carbon Disulfide	75-15-0	5	J	1	7	1
10950	Carbon Tetrachloride	56-23-5	N.D.		1	7	1
10950	Chlorobenzene	108-90-7	N.D.		1	7	1
10950	Chloroethane	75-00-3	N.D.		3	7	1
10950	Chloroform	67-66-3	N.D.		1	7	1
10950	Chloromethane	74-87-3	N.D.		3	7	1
10950	Cyclohexane	110-82-7	9		1	7	1
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		3	7	1
10950	Dibromochloromethane	124-48-1	N.D.		1	7	1
10950	1,2-Dibromoethane	106-93-4	N.D.		1	7	1
10950	1,2-Dichlorobenzene	95-50-1	N.D.		1	7	1
10950	1,3-Dichlorobenzene	541-73-1	N.D.		1	7	1
10950	1,4-Dichlorobenzene	106-46-7	N.D.		1	7	1
10950	Dichlorodifluoromethane	75-71-8	N.D.		3	7	1
10950	1,1-Dichloroethane	75-34-3	N.D.		1	7	1
10950	1,2-Dichloroethane	107-06-2	N.D.		1	7	1
10950	1,1-Dichloroethene	75-35-4	N.D.		1	7	1
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		1	7	1
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		1	7	1
10950	1,2-Dichloropropane	78-87-5	N.D.		1	7	1
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		1	7	1
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		1	7	1
10950	Ethylbenzene	100-41-4	2	J	1	7	1
10950	Freon 113	76-13-1	N.D.		3	14	1
10950	2-Hexanone	591-78-6	N.D.		4	14	1
10950	Isopropylbenzene	98-82-8	2	J	1	7	1
10950	Methyl Acetate	79-20-9	N.D.		3	7	1
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.7	7	1
10950	4-Methyl-2-pentanone	108-10-1	N.D.		4	14	1
10950	Methylcyclohexane	108-87-2	28		1	7	1
10950	Methylene Chloride	75-09-2	N.D.		3	7	1
10950	Styrene	100-42-5	N.D.		1	7	1
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		1	7	1
10950	Tetrachloroethene	127-18-4	N.D.		1	7	1
10950	Toluene	108-88-3	8		1	7	1
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		1	7	1
10950	1,1,1-Trichloroethane	71-55-6	N.D.		1	7	1
10950	1,1,2-Trichloroethane	79-00-5	N.D.		1	7	1
10950	Trichloroethene	79-01-6	N.D.		1	7	1
10950	Trichlorofluoromethane	75-69-4	N.D.		3	7	1
10950	Vinyl Chloride	75-01-4	N.D.		1	7	1
10950	Xylene (Total)	1330-20-7	12		1	7	1

The GC/MS volatile internal standard peak areas were outside the QC limits. A re-analysis was performed, and the matrix effect

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-65_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-65_0-2

LLI Sample # SW 6262293
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 14:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

65-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
was confirmed.							
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	N.D.		230	1,100	5
10727	Acenaphthylene	208-96-8	N.D.		230	1,100	5
10727	Acetophenone	98-86-2	N.D.		450	1,100	5
10727	Anthracene	120-12-7	N.D.		230	1,100	5
10727	Atrazine	1912-24-9	N.D.		230	1,100	5
10727	Benzaldehyde	100-52-7	N.D.		450	1,100	5
10727	Benzo(a)anthracene	56-55-3	N.D.		230	1,100	5
10727	Benzo(a)pyrene	50-32-8	N.D.		230	1,100	5
10727	Benzo(b)fluoranthene	205-99-2	N.D.		230	1,100	5
10727	Benzo(g,h,i)perylene	191-24-2	N.D.		230	1,100	5
10727	Benzo(k)fluoranthene	207-08-9	N.D.		230	1,100	5
10727	1,1'-Biphenyl	92-52-4	N.D.		230	1,100	5
10727	4-Bromophenyl-phenylether	101-55-3	N.D.		230	1,100	5
10727	Butylbenzylphthalate	85-68-7	N.D.		450	1,100	5
10727	Di-n-butylphthalate	84-74-2	N.D.		450	1,100	5
10727	Caprolactam	105-60-2	N.D.		230	1,100	5
10727	Carbazole	86-74-8	N.D.		230	1,100	5
10727	4-Chloro-3-methylphenol	59-50-7	N.D.		450	1,100	5
10727	4-Chloroaniline	106-47-8	N.D.		450	1,100	5
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.		230	1,100	5
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.		230	1,100	5
10727	2-Chloronaphthalene	91-58-7	N.D.		230	1,100	5
10727	2-Chlorophenol	95-57-8	N.D.		230	1,100	5
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.		230	1,100	5
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.		230	1,100	5
10727	Chrysene	218-01-9	N.D.		230	1,100	5
10727	Dibenz(a,h)anthracene	53-70-3	N.D.		230	1,100	5
10727	Dibenzofuran	132-64-9	N.D.		230	1,100	5
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.		680	2,300	5
10727	2,4-Dichlorophenol	120-83-2	N.D.		230	1,100	5
10727	Diethylphthalate	84-66-2	N.D.		450	1,100	5
10727	2,4-Dimethylphenol	105-67-9	N.D.		450	1,100	5
10727	Dimethylphthalate	131-11-3	N.D.		450	1,100	5
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.		1,100	3,400	5
10727	2,4-Dinitrophenol	51-28-5	N.D.		2,300	6,800	5
10727	2,4-Dinitrotoluene	121-14-2	N.D.		450	1,100	5
10727	2,6-Dinitrotoluene	606-20-2	N.D.		230	1,100	5
10727	bis(2-Ethylhexyl)phthalate	117-81-7	N.D.		450	2,300	5
10727	Fluoranthene	206-44-0	N.D.		230	1,100	5
10727	Fluorene	86-73-7	N.D.		230	1,100	5
10727	Hexachlorobenzene	118-74-1	N.D.		230	1,100	5
10727	Hexachlorobutadiene	87-68-3	N.D.		450	1,100	5
10727	Hexachlorocyclopentadiene	77-47-4	N.D.		1,100	3,400	5
10727	Hexachloroethane	67-72-1	N.D.		230	1,100	5
10727	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.		230	1,100	5
10727	Isophorone	78-59-1	N.D.		230	1,100	5
10727	2-Methylnaphthalene	91-57-6	410	J	230	1,100	5
10727	2-Methylphenol	95-48-7	N.D.		450	1,100	5
10727	4-Methylphenol	106-44-5	N.D.		450	1,100	5

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-65_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-65_0-2

LLI Sample # SW 6262293
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 14:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

65-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	N.D.		230	1,100	5
10727	2-Nitroaniline	88-74-4	N.D.		230	1,100	5
10727	3-Nitroaniline	99-09-2	N.D.		450	1,100	5
10727	4-Nitroaniline	100-01-6	N.D.		450	1,100	5
10727	Nitrobenzene	98-95-3	N.D.		230	1,100	5
10727	2-Nitrophenol	88-75-5	N.D.		230	1,100	5
10727	4-Nitrophenol	100-02-7	N.D.		1,100	3,400	5
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		230	1,100	5
10727	N-Nitrosodiphenylamine	86-30-6	N.D.		230	1,100	5
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		450	1,100	5
10727	Pentachlorophenol	87-86-5	N.D.		1,100	3,400	5
10727	Phenanthrene	85-01-8	N.D.		230	1,100	5
10727	Phenol	108-95-2	N.D.		230	1,100	5
10727	Pyrene	129-00-0	N.D.		230	1,100	5
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		450	1,100	5
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		230	1,100	5
	Reporting limits were raised due to interference from the sample matrix.						
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	13,100		6.92	27.5	1
06944	Antimony	7440-36-0	N.D.		1.38	2.75	1
06935	Arsenic	7440-38-2	8.71		1.31	2.75	1
06946	Barium	7440-39-3	170		0.0550	0.688	1
06947	Beryllium	7440-41-7	0.503	J	0.0935	0.688	1
06949	Cadmium	7440-43-9	0.403	J	0.193	0.688	1
01650	Calcium	7440-70-2	20,200		8.43	27.5	1
06951	Chromium	7440-47-3	27.0		0.812	2.06	1
06952	Cobalt	7440-48-4	5.34		0.261	0.688	1
06953	Copper	7440-50-8	86.7		0.303	1.38	1
01654	Iron	7439-89-6	14,900		6.48	27.5	1
06955	Lead	7439-92-1	307		0.825	2.06	1
01657	Magnesium	7439-95-4	11,200		3.49	13.8	1
06958	Manganese	7439-96-5	382		0.107	0.688	1
06961	Nickel	7440-02-0	24.1		0.261	1.38	1
01662	Potassium	7440-09-7	836		24.8	68.8	1
06936	Selenium	7782-49-2	N.D.		1.35	2.75	1
06966	Silver	7440-22-4	N.D.		0.248	0.688	1
01667	Sodium	7440-23-5	99.3	J	51.3	138	1
06925	Thallium	7440-28-0	N.D.		1.99	4.13	1
06971	Vanadium	7440-62-2	48.8		0.261	0.688	1
06972	Zinc	7440-66-6	181		0.908	2.75	1
	SW-846 7471A		**mg/kg**		**mg/kg**	**mg/kg**	

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-65_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-65_0-2

LLI Sample # SW 6262293
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 14:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

65-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.648	0.0038	0.133	1
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	27.3	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	X111131AA	04/23/2011 05:32	Stephanie A Selis	1
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/14/2011 14:15	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/14/2011 14:15	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/14/2011 14:15	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11111SLA026	04/25/2011 10:16	Brian K Graham	5
10809	BNA Soil Microwave	SW-846 3546	1	11111SLA026	04/22/2011 09:00	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111125708004	04/28/2011 02:57	Tara L Snyder	1
06944	Antimony	SW-846 6010B	1	111125708004	04/28/2011 02:57	Tara L Snyder	1
06935	Arsenic	SW-846 6010B	1	111125708004	04/28/2011 02:57	Tara L Snyder	1
06946	Barium	SW-846 6010B	1	111125708004	04/28/2011 02:57	Tara L Snyder	1
06947	Beryllium	SW-846 6010B	1	111125708004	04/28/2011 02:57	Tara L Snyder	1
06949	Cadmium	SW-846 6010B	1	111125708004	04/28/2011 02:57	Tara L Snyder	1
01650	Calcium	SW-846 6010B	1	111125708004	04/28/2011 02:57	Tara L Snyder	1
06951	Chromium	SW-846 6010B	1	111125708004	04/28/2011 02:57	Tara L Snyder	1
06952	Cobalt	SW-846 6010B	1	111125708004	04/28/2011 02:57	Tara L Snyder	1
06953	Copper	SW-846 6010B	1	111125708004	04/28/2011 02:57	Tara L Snyder	1
01654	Iron	SW-846 6010B	1	111125708004	04/28/2011 02:57	Tara L Snyder	1
06955	Lead	SW-846 6010B	1	111125708004	04/28/2011 02:57	Tara L Snyder	1
01657	Magnesium	SW-846 6010B	1	111125708004	04/28/2011 02:57	Tara L Snyder	1
06958	Manganese	SW-846 6010B	1	111125708004	04/28/2011 02:57	Tara L Snyder	1
06961	Nickel	SW-846 6010B	1	111125708004	04/28/2011 02:57	Tara L Snyder	1
01662	Potassium	SW-846 6010B	1	111125708004	04/28/2011 02:57	Tara L Snyder	1
06936	Selenium	SW-846 6010B	1	111125708004	04/28/2011 10:22	Joanne M Gates	1
06966	Silver	SW-846 6010B	1	111125708004	04/28/2011 02:57	Tara L Snyder	1
01667	Sodium	SW-846 6010B	1	111125708004	04/28/2011 02:57	Tara L Snyder	1
06925	Thallium	SW-846 6010B	1	111125708004	04/28/2011 02:57	Tara L Snyder	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: **BH-10-65_0-2' Grab Soil**
Philadelphia Refinery AOI-10
COC: 259438 BH-10-65_0-2

LLI Sample # SW 6262293
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 14:15 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

65-02

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06971	Vanadium	SW-846 6010B	1	111125708004	04/28/2011 02:57	Tara L Snyder	1
06972	Zinc	SW-846 6010B	1	111125708004	04/28/2011 02:57	Tara L Snyder	1
00159	Mercury	SW-846 7471A	1	111125711004	04/25/2011 10:28	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111125708004	04/23/2011 10:17	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111125711004	04/23/2011 12:05	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820001B	04/22/2011 18:08	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-58_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-58_0-2'

LLI Sample # SW 6262294
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 15:20 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

58-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	N.D.	1,400	4,000	91.09
10950	Benzene	71-43-2	N.D.	99	990	91.09
10950	Bromodichloromethane	75-27-4	N.D.	200	990	91.09
10950	Bromoform	75-25-2	N.D.	200	990	91.09
10950	Bromomethane	74-83-9	N.D.	400	990	91.09
10950	2-Butanone	78-93-3	N.D.	790	2,000	91.09
10950	Carbon Disulfide	75-15-0	N.D.	200	990	91.09
10950	Carbon Tetrachloride	56-23-5	N.D.	200	990	91.09
10950	Chlorobenzene	108-90-7	N.D.	200	990	91.09
10950	Chloroethane	75-00-3	N.D.	400	990	91.09
10950	Chloroform	67-66-3	N.D.	200	990	91.09
10950	Chloromethane	74-87-3	N.D.	400	990	91.09
10950	Cyclohexane	110-82-7	N.D.	200	990	91.09
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.	400	990	91.09
10950	Dibromochloromethane	124-48-1	N.D.	200	990	91.09
10950	1,2-Dibromoethane	106-93-4	N.D.	200	990	91.09
10950	1,2-Dichlorobenzene	95-50-1	N.D.	200	990	91.09
10950	1,3-Dichlorobenzene	541-73-1	N.D.	200	990	91.09
10950	1,4-Dichlorobenzene	106-46-7	N.D.	200	990	91.09
10950	Dichlorodifluoromethane	75-71-8	N.D.	400	990	91.09
10950	1,1-Dichloroethane	75-34-3	N.D.	200	990	91.09
10950	1,2-Dichloroethane	107-06-2	N.D.	200	990	91.09
10950	1,1-Dichloroethene	75-35-4	N.D.	200	990	91.09
10950	cis-1,2-Dichloroethene	156-59-2	N.D.	200	990	91.09
10950	trans-1,2-Dichloroethene	156-60-5	N.D.	200	990	91.09
10950	1,2-Dichloropropane	78-87-5	N.D.	200	990	91.09
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.	200	990	91.09
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.	200	990	91.09
10950	Ethylbenzene	100-41-4	N.D.	200	990	91.09
10950	Freon 113	76-13-1	N.D.	400	2,000	91.09
10950	2-Hexanone	591-78-6	N.D.	590	2,000	91.09
10950	Isopropylbenzene	98-82-8	N.D.	200	990	91.09
10950	Methyl Acetate	79-20-9	1,700	400	990	91.09
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.	99	990	91.09
10950	4-Methyl-2-pentanone	108-10-1	N.D.	590	2,000	91.09
10950	Methylcyclohexane	108-87-2	N.D.	200	990	91.09
10950	Methylene Chloride	75-09-2	N.D.	400	990	91.09
10950	Styrene	100-42-5	N.D.	200	990	91.09
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.	200	990	91.09
10950	Tetrachloroethene	127-18-4	N.D.	200	990	91.09
10950	Toluene	108-88-3	N.D.	200	990	91.09
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.	200	990	91.09
10950	1,1,1-Trichloroethane	71-55-6	N.D.	200	990	91.09
10950	1,1,2-Trichloroethane	79-00-5	N.D.	200	990	91.09
10950	Trichloroethene	79-01-6	N.D.	200	990	91.09
10950	Trichlorofluoromethane	75-69-4	N.D.	400	990	91.09
10950	Vinyl Chloride	75-01-4	N.D.	200	990	91.09
10950	Xylene (Total)	1330-20-7	N.D.	200	990	91.09

Reporting limits were raised due to interference from the sample matrix.

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-58_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-58_0-2'

LLI Sample # SW 6262294
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 15:20 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

58-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**		**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	N.D.		360	1,800	5
10727	Acenaphthylene	208-96-8	N.D.		360	1,800	5
10727	Acetophenone	98-86-2	N.D.		720	1,800	5
10727	Anthracene	120-12-7	N.D.		360	1,800	5
10727	Atrazine	1912-24-9	N.D.		360	1,800	5
10727	Benzaldehyde	100-52-7	N.D.		720	1,800	5
10727	Benzo(a)anthracene	56-55-3	N.D.		360	1,800	5
10727	Benzo(a)pyrene	50-32-8	N.D.		360	1,800	5
10727	Benzo(b)fluoranthene	205-99-2	N.D.		360	1,800	5
10727	Benzo(g,h,i)perylene	191-24-2	N.D.		360	1,800	5
10727	Benzo(k)fluoranthene	207-08-9	N.D.		360	1,800	5
10727	1,1'-Biphenyl	92-52-4	N.D.		360	1,800	5
10727	4-Bromophenyl-phenylether	101-55-3	N.D.		360	1,800	5
10727	Butylbenzylphthalate	85-68-7	N.D.		720	1,800	5
10727	Di-n-butylphthalate	84-74-2	N.D.		720	1,800	5
10727	Caprolactam	105-60-2	N.D.		360	1,800	5
10727	Carbazole	86-74-8	N.D.		360	1,800	5
10727	4-Chloro-3-methylphenol	59-50-7	N.D.		720	1,800	5
10727	4-Chloroaniline	106-47-8	N.D.		720	1,800	5
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.		360	1,800	5
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.		360	1,800	5
10727	2-Chloronaphthalene	91-58-7	N.D.		360	1,800	5
10727	2-Chlorophenol	95-57-8	N.D.		360	1,800	5
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.		360	1,800	5
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.		360	1,800	5
10727	Chrysene	218-01-9	N.D.		360	1,800	5
10727	Dibenz(a,h)anthracene	53-70-3	N.D.		360	1,800	5
10727	Dibenzofuran	132-64-9	N.D.		360	1,800	5
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.		1,100	3,600	5
10727	2,4-Dichlorophenol	120-83-2	N.D.		360	1,800	5
10727	Diethylphthalate	84-66-2	N.D.		720	1,800	5
10727	2,4-Dimethylphenol	105-67-9	N.D.		720	1,800	5
10727	Dimethylphthalate	131-11-3	N.D.		720	1,800	5
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.		1,800	5,400	5
10727	2,4-Dinitrophenol	51-28-5	N.D.		3,600	11,000	5
10727	2,4-Dinitrotoluene	121-14-2	N.D.		720	1,800	5
10727	2,6-Dinitrotoluene	606-20-2	N.D.		360	1,800	5
10727	bis(2-Ethylhexyl)phthalate	117-81-7	N.D.		720	3,600	5
10727	Fluoranthene	206-44-0	N.D.		360	1,800	5
10727	Fluorene	86-73-7	N.D.		360	1,800	5
10727	Hexachlorobenzene	118-74-1	N.D.		360	1,800	5
10727	Hexachlorobutadiene	87-68-3	N.D.		720	1,800	5
10727	Hexachlorocyclopentadiene	77-47-4	N.D.		1,800	5,400	5
10727	Hexachloroethane	67-72-1	N.D.		360	1,800	5
10727	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.		360	1,800	5
10727	Isophorone	78-59-1	N.D.		360	1,800	5
10727	2-Methylnaphthalene	91-57-6	820	J	360	1,800	5
10727	2-Methylphenol	95-48-7	N.D.		720	1,800	5
10727	4-Methylphenol	106-44-5	N.D.		720	1,800	5

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-58_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-58_0-2'

LLI Sample # SW 6262294
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 15:20 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

58-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	400	J	360	1,800	5
10727	2-Nitroaniline	88-74-4	N.D.		360	1,800	5
10727	3-Nitroaniline	99-09-2	N.D.		720	1,800	5
10727	4-Nitroaniline	100-01-6	N.D.		720	1,800	5
10727	Nitrobenzene	98-95-3	N.D.		360	1,800	5
10727	2-Nitrophenol	88-75-5	N.D.		360	1,800	5
10727	4-Nitrophenol	100-02-7	N.D.		1,800	5,400	5
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		360	1,800	5
10727	N-Nitrosodiphenylamine	86-30-6	N.D.		360	1,800	5
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		720	1,800	5
10727	Pentachlorophenol	87-86-5	N.D.		1,800	5,400	5
10727	Phenanthrene	85-01-8	N.D.		360	1,800	5
10727	Phenol	108-95-2	N.D.		360	1,800	5
10727	Pyrene	129-00-0	N.D.		360	1,800	5
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		720	1,800	5
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		360	1,800	5
	Reporting limits were raised due to interference from the sample matrix.						
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	24,900		10.9	43.5	1
06944	Antimony	7440-36-0	N.D.		2.17	4.35	1
06935	Arsenic	7440-38-2	18.6		2.07	4.35	1
06946	Barium	7440-39-3	735		0.0870	1.09	1
06947	Beryllium	7440-41-7	0.724	J	0.148	1.09	1
06949	Cadmium	7440-43-9	1.26		0.304	1.09	1
01650	Calcium	7440-70-2	48,000		13.3	43.5	1
06951	Chromium	7440-47-3	57.3		1.28	3.26	1
06952	Cobalt	7440-48-4	11.3		0.413	1.09	1
06953	Copper	7440-50-8	363		0.478	2.17	1
01654	Iron	7439-89-6	28,900		10.2	43.5	1
06955	Lead	7439-92-1	941		1.30	3.26	1
01657	Magnesium	7439-95-4	33,200		5.52	21.7	1
06958	Manganese	7439-96-5	730		0.170	1.09	1
06961	Nickel	7440-02-0	61.6		0.413	2.17	1
01662	Potassium	7440-09-7	990		39.1	109	1
06936	Selenium	7782-49-2	N.D.		2.13	4.35	1
06966	Silver	7440-22-4	0.580	J	0.391	1.09	1
01667	Sodium	7440-23-5	212	J	81.1	217	1
06925	Thallium	7440-28-0	N.D.		3.15	6.52	1
06971	Vanadium	7440-62-2	100		0.413	1.09	1
06972	Zinc	7440-66-6	431		1.43	4.35	1
	SW-846 7471A		**mg/kg**		**mg/kg**	**mg/kg**	

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-58_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-58_0-2'

LLI Sample # SW 6262294
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 15:20 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

58-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	4.82	0.0295	1.03	5
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	54.0	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	Q111161AA	04/26/2011 10:33	Stephanie A Selis	91.09
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/14/2011 15:20	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/14/2011 15:20	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/14/2011 15:20	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11111SLA026	04/25/2011 10:41	Brian K Graham	5
10809	BNA Soil Microwave	SW-846 3546	1	11111SLA026	04/22/2011 09:00	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111125708004	04/28/2011 03:00	Tara L Snyder	1
06944	Antimony	SW-846 6010B	1	111125708004	04/28/2011 03:00	Tara L Snyder	1
06935	Arsenic	SW-846 6010B	1	111125708004	04/28/2011 03:00	Tara L Snyder	1
06946	Barium	SW-846 6010B	1	111125708004	04/28/2011 03:00	Tara L Snyder	1
06947	Beryllium	SW-846 6010B	1	111125708004	04/28/2011 03:00	Tara L Snyder	1
06949	Cadmium	SW-846 6010B	1	111125708004	04/28/2011 03:00	Tara L Snyder	1
01650	Calcium	SW-846 6010B	1	111125708004	04/28/2011 03:00	Tara L Snyder	1
06951	Chromium	SW-846 6010B	1	111125708004	04/28/2011 03:00	Tara L Snyder	1
06952	Cobalt	SW-846 6010B	1	111125708004	04/28/2011 03:00	Tara L Snyder	1
06953	Copper	SW-846 6010B	1	111125708004	04/28/2011 03:00	Tara L Snyder	1
01654	Iron	SW-846 6010B	1	111125708004	04/28/2011 03:00	Tara L Snyder	1
06955	Lead	SW-846 6010B	1	111125708004	04/28/2011 03:00	Tara L Snyder	1
01657	Magnesium	SW-846 6010B	1	111125708004	04/28/2011 03:00	Tara L Snyder	1
06958	Manganese	SW-846 6010B	1	111125708004	04/28/2011 03:00	Tara L Snyder	1
06961	Nickel	SW-846 6010B	1	111125708004	04/28/2011 03:00	Tara L Snyder	1
01662	Potassium	SW-846 6010B	1	111125708004	04/28/2011 03:00	Tara L Snyder	1
06936	Selenium	SW-846 6010B	1	111125708004	04/28/2011 10:32	Joanne M Gates	1
06966	Silver	SW-846 6010B	1	111125708004	04/28/2011 03:00	Tara L Snyder	1
01667	Sodium	SW-846 6010B	1	111125708004	04/28/2011 03:00	Tara L Snyder	1
06925	Thallium	SW-846 6010B	1	111125708004	04/28/2011 03:00	Tara L Snyder	1

*=This limit was used in the evaluation of the final result

Sample Description: **BH-10-58_0-2' Grab Soil**
Philadelphia Refinery AOI-10
COC: 259438 BH-10-58_0-2'

LLI Sample # SW 6262294
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 15:20 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

58-02

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06971	Vanadium	SW-846 6010B	1	111125708004	04/28/2011 03:00	Tara L Snyder	1
06972	Zinc	SW-846 6010B	1	111125708004	04/28/2011 03:00	Tara L Snyder	1
00159	Mercury	SW-846 7471A	1	111125711004	04/25/2011 11:36	Damary Valentin	5
05708	SW SW846 ICP Digest	SW-846 3050B	1	111125708004	04/23/2011 10:17	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111125711004	04/23/2011 12:05	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820001B	04/22/2011 18:08	Scott W Freisher	1

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-65_6-8' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-65_6-8'

LLI Sample # SW 6262295
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 14:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

65-68

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	N.D.		1,300	3,700	126.65
10950	Benzene	71-43-2	35,000		92	920	126.65
10950	Bromodichloromethane	75-27-4	N.D.		180	920	126.65
10950	Bromoform	75-25-2	N.D.		180	920	126.65
10950	Bromomethane	74-83-9	N.D.		370	920	126.65
10950	2-Butanone	78-93-3	N.D.		730	1,800	126.65
10950	Carbon Disulfide	75-15-0	N.D.		180	920	126.65
10950	Carbon Tetrachloride	56-23-5	N.D.		180	920	126.65
10950	Chlorobenzene	108-90-7	N.D.		180	920	126.65
10950	Chloroethane	75-00-3	N.D.		370	920	126.65
10950	Chloroform	67-66-3	N.D.		180	920	126.65
10950	Chloromethane	74-87-3	N.D.		370	920	126.65
10950	Cyclohexane	110-82-7	6,700		180	920	126.65
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		370	920	126.65
10950	Dibromochloromethane	124-48-1	N.D.		180	920	126.65
10950	1,2-Dibromoethane	106-93-4	N.D.		180	920	126.65
10950	1,2-Dichlorobenzene	95-50-1	N.D.		180	920	126.65
10950	1,3-Dichlorobenzene	541-73-1	N.D.		180	920	126.65
10950	1,4-Dichlorobenzene	106-46-7	N.D.		180	920	126.65
10950	Dichlorodifluoromethane	75-71-8	N.D.		370	920	126.65
10950	1,1-Dichloroethane	75-34-3	N.D.		180	920	126.65
10950	1,2-Dichloroethane	107-06-2	N.D.		180	920	126.65
10950	1,1-Dichloroethene	75-35-4	N.D.		180	920	126.65
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		180	920	126.65
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		180	920	126.65
10950	1,2-Dichloropropane	78-87-5	N.D.		180	920	126.65
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		180	920	126.65
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		180	920	126.65
10950	Ethylbenzene	100-41-4	7,500		180	920	126.65
10950	Freon 113	76-13-1	N.D.		370	1,800	126.65
10950	2-Hexanone	591-78-6	N.D.		550	1,800	126.65
10950	Isopropylbenzene	98-82-8	5,100		180	920	126.65
10950	Methyl Acetate	79-20-9	910	J	370	920	126.65
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		92	920	126.65
10950	4-Methyl-2-pentanone	108-10-1	N.D.		550	1,800	126.65
10950	Methylcyclohexane	108-87-2	26,000		180	920	126.65
10950	Methylene Chloride	75-09-2	N.D.		370	920	126.65
10950	Styrene	100-42-5	N.D.		180	920	126.65
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		180	920	126.65
10950	Tetrachloroethene	127-18-4	N.D.		180	920	126.65
10950	Toluene	108-88-3	5,800		180	920	126.65
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		180	920	126.65
10950	1,1,1-Trichloroethane	71-55-6	N.D.		180	920	126.65
10950	1,1,2-Trichloroethane	79-00-5	N.D.		180	920	126.65
10950	Trichloroethene	79-01-6	N.D.		180	920	126.65
10950	Trichlorofluoromethane	75-69-4	N.D.		370	920	126.65
10950	Vinyl Chloride	75-01-4	N.D.		180	920	126.65
10950	Xylene (Total)	1330-20-7	57,000		180	920	126.65

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-65_6-8' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-65_6-8'

LLI Sample # SW 6262295
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 14:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

65-68

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	15,000		2,400	12,000	5
10727	Acenaphthylene	208-96-8	N.D.		2,400	12,000	5
10727	Acetophenone	98-86-2	N.D.		4,800	12,000	5
10727	Anthracene	120-12-7	7,800	J	2,400	12,000	5
10727	Atrazine	1912-24-9	N.D.		2,400	12,000	5
10727	Benzaldehyde	100-52-7	N.D.		4,800	12,000	5
10727	Benzo(a)anthracene	56-55-3	7,200	J	2,400	12,000	5
10727	Benzo(a)pyrene	50-32-8	5,700	J	2,400	12,000	5
10727	Benzo(b)fluoranthene	205-99-2	6,100	J	2,400	12,000	5
10727	Benzo(g,h,i)perylene	191-24-2	5,200	J	2,400	12,000	5
10727	Benzo(k)fluoranthene	207-08-9	2,600	J	2,400	12,000	5
10727	1,1'-Biphenyl	92-52-4	26,000		2,400	12,000	5
10727	4-Bromophenyl-phenylether	101-55-3	N.D.		2,400	12,000	5
10727	Butylbenzylphthalate	85-68-7	N.D.		4,800	12,000	5
10727	Di-n-butylphthalate	84-74-2	N.D.		4,800	12,000	5
10727	Caprolactam	105-60-2	N.D.		2,400	12,000	5
10727	Carbazole	86-74-8	N.D.		2,400	12,000	5
10727	4-Chloro-3-methylphenol	59-50-7	N.D.		4,800	12,000	5
10727	4-Chloroaniline	106-47-8	N.D.		4,800	12,000	5
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.		2,400	12,000	5
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.		2,400	12,000	5
10727	2-Chloronaphthalene	91-58-7	N.D.		2,400	12,000	5
10727	2-Chlorophenol	95-57-8	N.D.		2,400	12,000	5
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.		2,400	12,000	5
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.		2,400	12,000	5
10727	Chrysene	218-01-9	14,000		2,400	12,000	5
10727	Dibenz(a,h)anthracene	53-70-3	N.D.		2,400	12,000	5
10727	Dibenzofuran	132-64-9	14,000		2,400	12,000	5
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.		7,200	24,000	5
10727	2,4-Dichlorophenol	120-83-2	N.D.		2,400	12,000	5
10727	Diethylphthalate	84-66-2	N.D.		4,800	12,000	5
10727	2,4-Dimethylphenol	105-67-9	N.D.		4,800	12,000	5
10727	Dimethylphthalate	131-11-3	N.D.		4,800	12,000	5
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.		12,000	36,000	5
10727	2,4-Dinitrophenol	51-28-5	N.D.		24,000	72,000	5
10727	2,4-Dinitrotoluene	121-14-2	N.D.		4,800	12,000	5
10727	2,6-Dinitrotoluene	606-20-2	N.D.		2,400	12,000	5
10727	bis(2-Ethylhexyl)phthalate	117-81-7	N.D.		4,800	24,000	5
10727	Fluoranthene	206-44-0	10,000	J	2,400	12,000	5
10727	Fluorene	86-73-7	24,000		2,400	12,000	5
10727	Hexachlorobenzene	118-74-1	N.D.		2,400	12,000	5
10727	Hexachlorobutadiene	87-68-3	N.D.		4,800	12,000	5
10727	Hexachlorocyclopentadiene	77-47-4	N.D.		12,000	36,000	5
10727	Hexachloroethane	67-72-1	N.D.		2,400	12,000	5
10727	Indeno(1,2,3-cd)pyrene	193-39-5	3,400	J	2,400	12,000	5
10727	Isophorone	78-59-1	N.D.		2,400	12,000	5
10727	2-Methylnaphthalene	91-57-6	280,000		24,000	120,000	50
10727	2-Methylphenol	95-48-7	N.D.		4,800	12,000	5
10727	4-Methylphenol	106-44-5	N.D.		4,800	12,000	5

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-65_6-8' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-65_6-8'

LLI Sample # SW 6262295
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 14:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

65-68

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.					
10727	Naphthalene	91-20-3	110,000	2,400	12,000	5
10727	2-Nitroaniline	88-74-4	N.D.	2,400	12,000	5
10727	3-Nitroaniline	99-09-2	N.D.	4,800	12,000	5
10727	4-Nitroaniline	100-01-6	N.D.	4,800	12,000	5
10727	Nitrobenzene	98-95-3	N.D.	2,400	12,000	5
10727	2-Nitrophenol	88-75-5	N.D.	2,400	12,000	5
10727	4-Nitrophenol	100-02-7	N.D.	12,000	36,000	5
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.	2,400	12,000	5
10727	N-Nitrosodiphenylamine	86-30-6	N.D.	2,400	12,000	5
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.					
10727	Di-n-octylphthalate	117-84-0	N.D.	4,800	12,000	5
10727	Pentachlorophenol	87-86-5	N.D.	12,000	36,000	5
10727	Phenanthrene	85-01-8	55,000	2,400	12,000	5
10727	Phenol	108-95-2	N.D.	2,400	12,000	5
10727	Pyrene	129-00-0	17,000	2,400	12,000	5
10727	2,4,5-Trichlorophenol	95-95-4	N.D.	4,800	12,000	5
10727	2,4,6-Trichlorophenol	88-06-2	N.D.	2,400	12,000	5
	Reporting limits were raised due to interference from the sample matrix.					
Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	10,200	7.29	29.0	1
06944	Antimony	7440-36-0	4.55	1.45	2.90	1
06935	Arsenic	7440-38-2	28.3	1.38	2.90	1
06946	Barium	7440-39-3	508	0.0580	0.725	1
06947	Beryllium	7440-41-7	0.490 J	0.0986	0.725	1
06949	Cadmium	7440-43-9	1.05	0.203	0.725	1
01650	Calcium	7440-70-2	12,100	8.88	29.0	1
06951	Chromium	7440-47-3	163	0.855	2.17	1
06952	Cobalt	7440-48-4	27.7	0.275	0.725	1
06953	Copper	7440-50-8	684	0.319	1.45	1
01654	Iron	7439-89-6	77,000	68.3	290	10
06955	Lead	7439-92-1	1,500	4.35	10.9	5
01657	Magnesium	7439-95-4	55,100	3.68	14.5	1
06958	Manganese	7439-96-5	639	0.113	0.725	1
06961	Nickel	7440-02-0	332	0.275	1.45	1
01662	Potassium	7440-09-7	1,020	26.1	72.5	1
06936	Selenium	7782-49-2	N.D.	7.10	14.5	5
	Reporting limits were raised due to interference from the sample matrix.					
06966	Silver	7440-22-4	0.299 J	0.261	0.725	1
01667	Sodium	7440-23-5	328	54.1	145	1
06925	Thallium	7440-28-0	2.32 J	2.10	4.35	1
06971	Vanadium	7440-62-2	95.6	0.275	0.725	1
06972	Zinc	7440-66-6	2,550	4.78	14.5	5

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-65_6-8' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-65_6-8'

LLI Sample # SW 6262295
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 14:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

65-68

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	1.29	0.0199	0.695	5
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	31.0	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	Q111121AA	04/22/2011 13:57	Stephanie A Selis	126.65
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/14/2011 14:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/14/2011 14:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/14/2011 14:30	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11111SLA026	04/25/2011 11:06	Brian K Graham	5
10727	TCL 8270 (microwave)	SW-846 8270C	1	11111SLA026	04/26/2011 02:34	Brian K Graham	50
10809	BNA Soil Microwave	SW-846 3546	1	11111SLA026	04/22/2011 09:00	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111125708004	04/28/2011 03:04	Tara L Snyder	1
06944	Antimony	SW-846 6010B	1	111125708004	04/28/2011 03:04	Tara L Snyder	1
06935	Arsenic	SW-846 6010B	1	111125708004	04/28/2011 03:04	Tara L Snyder	1
06946	Barium	SW-846 6010B	1	111125708004	04/28/2011 03:04	Tara L Snyder	1
06947	Beryllium	SW-846 6010B	1	111125708004	04/28/2011 03:04	Tara L Snyder	1
06949	Cadmium	SW-846 6010B	1	111125708004	04/28/2011 03:04	Tara L Snyder	1
01650	Calcium	SW-846 6010B	1	111125708004	04/28/2011 03:04	Tara L Snyder	1
06951	Chromium	SW-846 6010B	1	111125708004	04/28/2011 03:04	Tara L Snyder	1
06952	Cobalt	SW-846 6010B	1	111125708004	04/28/2011 03:04	Tara L Snyder	1
06953	Copper	SW-846 6010B	1	111125708004	04/28/2011 03:04	Tara L Snyder	1
01654	Iron	SW-846 6010B	1	111125708004	04/29/2011 04:59	Tara L Snyder	10
06955	Lead	SW-846 6010B	1	111125708004	04/28/2011 10:39	Joanne M Gates	5
01657	Magnesium	SW-846 6010B	1	111125708004	04/28/2011 03:04	Tara L Snyder	1
06958	Manganese	SW-846 6010B	1	111125708004	04/28/2011 03:04	Tara L Snyder	1
06961	Nickel	SW-846 6010B	1	111125708004	04/28/2011 03:04	Tara L Snyder	1
01662	Potassium	SW-846 6010B	1	111125708004	04/28/2011 03:04	Tara L Snyder	1
06936	Selenium	SW-846 6010B	1	111125708004	04/28/2011 10:39	Joanne M Gates	5
06966	Silver	SW-846 6010B	1	111125708004	04/28/2011 03:04	Tara L Snyder	1
01667	Sodium	SW-846 6010B	1	111125708004	04/28/2011 03:04	Tara L Snyder	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-65_6-8' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-65_6-8'

LLI Sample # SW 6262295
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 14:30 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

65-68

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06925	Thallium	SW-846 6010B	1	111125708004	04/28/2011 03:04	Tara L Snyder	1
06971	Vanadium	SW-846 6010B	1	111125708004	04/28/2011 03:04	Tara L Snyder	1
06972	Zinc	SW-846 6010B	1	111125708004	04/28/2011 10:39	Joanne M Gates	5
00159	Mercury	SW-846 7471A	1	111125711004	04/25/2011 11:37	Damary Valentin	5
05708	SW SW846 ICP Digest	SW-846 3050B	1	111125708004	04/23/2011 10:17	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111125711004	04/23/2011 12:05	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820001B	04/22/2011 18:08	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-65_14-16' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-65_14-16'

LLI Sample # SW 6262296
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 15:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

65-14

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	160		11	31	1
10950	Benzene	71-43-2	2	J	0.8	8	1
10950	Bromodichloromethane	75-27-4	N.D.		2	8	1
10950	Bromoform	75-25-2	N.D.		2	8	1
10950	Bromomethane	74-83-9	N.D.		3	8	1
10950	2-Butanone	78-93-3	27		6	15	1
10950	Carbon Disulfide	75-15-0	N.D.		2	8	1
10950	Carbon Tetrachloride	56-23-5	N.D.		2	8	1
10950	Chlorobenzene	108-90-7	N.D.		2	8	1
10950	Chloroethane	75-00-3	N.D.		3	8	1
10950	Chloroform	67-66-3	N.D.		2	8	1
10950	Chloromethane	74-87-3	N.D.		3	8	1
10950	Cyclohexane	110-82-7	71		2	8	1
10950	1,2-Dibromo-3-chloropropane	96-12-8	N.D.		3	8	1
10950	Dibromochloromethane	124-48-1	N.D.		2	8	1
10950	1,2-Dibromoethane	106-93-4	N.D.		2	8	1
10950	1,2-Dichlorobenzene	95-50-1	N.D.		2	8	1
10950	1,3-Dichlorobenzene	541-73-1	N.D.		2	8	1
10950	1,4-Dichlorobenzene	106-46-7	N.D.		2	8	1
10950	Dichlorodifluoromethane	75-71-8	N.D.		3	8	1
10950	1,1-Dichloroethane	75-34-3	N.D.		2	8	1
10950	1,2-Dichloroethane	107-06-2	N.D.		2	8	1
10950	1,1-Dichloroethene	75-35-4	N.D.		2	8	1
10950	cis-1,2-Dichloroethene	156-59-2	N.D.		2	8	1
10950	trans-1,2-Dichloroethene	156-60-5	N.D.		2	8	1
10950	1,2-Dichloropropane	78-87-5	N.D.		2	8	1
10950	cis-1,3-Dichloropropene	10061-01-5	N.D.		2	8	1
10950	trans-1,3-Dichloropropene	10061-02-6	N.D.		2	8	1
10950	Ethylbenzene	100-41-4	2	J	2	8	1
10950	Freon 113	76-13-1	N.D.		3	15	1
10950	2-Hexanone	591-78-6	N.D.		5	15	1
10950	Isopropylbenzene	98-82-8	7	J	2	8	1
10950	Methyl Acetate	79-20-9	N.D.		3	8	1
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.8	8	1
10950	4-Methyl-2-pentanone	108-10-1	N.D.		5	15	1
10950	Methylcyclohexane	108-87-2	350		2	8	1
10950	Methylene Chloride	75-09-2	N.D.		3	8	1
10950	Styrene	100-42-5	N.D.		2	8	1
10950	1,1,2,2-Tetrachloroethane	79-34-5	N.D.		2	8	1
10950	Tetrachloroethene	127-18-4	N.D.		2	8	1
10950	Toluene	108-88-3	N.D.		2	8	1
10950	1,2,4-Trichlorobenzene	120-82-1	N.D.		2	8	1
10950	1,1,1-Trichloroethane	71-55-6	N.D.		2	8	1
10950	1,1,2-Trichloroethane	79-00-5	N.D.		2	8	1
10950	Trichloroethene	79-01-6	N.D.		2	8	1
10950	Trichlorofluoromethane	75-69-4	N.D.		3	8	1
10950	Vinyl Chloride	75-01-4	N.D.		2	8	1
10950	Xylene (Total)	1330-20-7	13		2	8	1

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-65_14-16' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-65_14-16'

LLI Sample # SW 6262296
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 15:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

65-14

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**		**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	N.D.		50	250	1
10727	Acenaphthylene	208-96-8	N.D.		50	250	1
10727	Acetophenone	98-86-2	N.D.		100	250	1
10727	Anthracene	120-12-7	N.D.		50	250	1
10727	Atrazine	1912-24-9	N.D.		50	250	1
10727	Benzaldehyde	100-52-7	N.D.		100	250	1
10727	Benzo(a)anthracene	56-55-3	N.D.		50	250	1
10727	Benzo(a)pyrene	50-32-8	N.D.		50	250	1
10727	Benzo(b)fluoranthene	205-99-2	N.D.		50	250	1
10727	Benzo(g,h,i)perylene	191-24-2	N.D.		50	250	1
10727	Benzo(k)fluoranthene	207-08-9	N.D.		50	250	1
10727	1,1'-Biphenyl	92-52-4	N.D.		50	250	1
10727	4-Bromophenyl-phenylether	101-55-3	N.D.		50	250	1
10727	Butylbenzylphthalate	85-68-7	N.D.		100	250	1
10727	Di-n-butylphthalate	84-74-2	N.D.		100	250	1
10727	Caprolactam	105-60-2	N.D.		50	250	1
10727	Carbazole	86-74-8	N.D.		50	250	1
10727	4-Chloro-3-methylphenol	59-50-7	N.D.		100	250	1
10727	4-Chloroaniline	106-47-8	N.D.		100	250	1
10727	bis(2-Chloroethoxy)methane	111-91-1	N.D.		50	250	1
10727	bis(2-Chloroethyl)ether	111-44-4	N.D.		50	250	1
10727	2-Chloronaphthalene	91-58-7	N.D.		50	250	1
10727	2-Chlorophenol	95-57-8	N.D.		50	250	1
10727	4-Chlorophenyl-phenylether	7005-72-3	N.D.		50	250	1
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	N.D.		50	250	1
10727	Chrysene	218-01-9	56	J	50	250	1
10727	Dibenz(a,h)anthracene	53-70-3	N.D.		50	250	1
10727	Dibenzofuran	132-64-9	N.D.		50	250	1
10727	3,3'-Dichlorobenzidine	91-94-1	N.D.		150	500	1
10727	2,4-Dichlorophenol	120-83-2	N.D.		50	250	1
10727	Diethylphthalate	84-66-2	N.D.		100	250	1
10727	2,4-Dimethylphenol	105-67-9	N.D.		100	250	1
10727	Dimethylphthalate	131-11-3	N.D.		100	250	1
10727	4,6-Dinitro-2-methylphenol	534-52-1	N.D.		250	760	1
10727	2,4-Dinitrophenol	51-28-5	N.D.		500	1,500	1
10727	2,4-Dinitrotoluene	121-14-2	N.D.		100	250	1
10727	2,6-Dinitrotoluene	606-20-2	N.D.		50	250	1
10727	bis(2-Ethylhexyl)phthalate	117-81-7	N.D.		100	500	1
10727	Fluoranthene	206-44-0	54	J	50	250	1
10727	Fluorene	86-73-7	N.D.		50	250	1
10727	Hexachlorobenzene	118-74-1	N.D.		50	250	1
10727	Hexachlorobutadiene	87-68-3	N.D.		100	250	1
10727	Hexachlorocyclopentadiene	77-47-4	N.D.		250	760	1
10727	Hexachloroethane	67-72-1	N.D.		50	250	1
10727	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.		50	250	1
10727	Isophorone	78-59-1	N.D.		50	250	1
10727	2-Methylnaphthalene	91-57-6	160	J	50	250	1
10727	2-Methylphenol	95-48-7	N.D.		100	250	1
10727	4-Methylphenol	106-44-5	N.D.		100	250	1

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-65_14-16' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-65_14-16'

LLI Sample # SW 6262296
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 15:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

65-14

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.						
10727	Naphthalene	91-20-3	63	J	50	250	1
10727	2-Nitroaniline	88-74-4	N.D.		50	250	1
10727	3-Nitroaniline	99-09-2	N.D.		100	250	1
10727	4-Nitroaniline	100-01-6	N.D.		100	250	1
10727	Nitrobenzene	98-95-3	N.D.		50	250	1
10727	2-Nitrophenol	88-75-5	N.D.		50	250	1
10727	4-Nitrophenol	100-02-7	N.D.		250	760	1
10727	N-Nitroso-di-n-propylamine	621-64-7	N.D.		50	250	1
10727	N-Nitrosodiphenylamine	86-30-6	N.D.		50	250	1
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.						
10727	Di-n-octylphthalate	117-84-0	N.D.		100	250	1
10727	Pentachlorophenol	87-86-5	N.D.		250	760	1
10727	Phenanthrene	85-01-8	130	J	50	250	1
10727	Phenol	108-95-2	N.D.		50	250	1
10727	Pyrene	129-00-0	83	J	50	250	1
10727	2,4,5-Trichlorophenol	95-95-4	N.D.		100	250	1
10727	2,4,6-Trichlorophenol	88-06-2	N.D.		50	250	1
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	25,000		7.56	30.1	1
06944	Antimony	7440-36-0	N.D.		1.50	3.01	1
06935	Arsenic	7440-38-2	6.82		1.43	3.01	1
06946	Barium	7440-39-3	324		0.0601	0.752	1
06947	Beryllium	7440-41-7	1.12		0.102	0.752	1
06949	Cadmium	7440-43-9	N.D.		0.211	0.752	1
01650	Calcium	7440-70-2	4,350		9.22	30.1	1
06951	Chromium	7440-47-3	51.9		0.887	2.26	1
06952	Cobalt	7440-48-4	12.0		0.286	0.752	1
06953	Copper	7440-50-8	13.1		0.331	1.50	1
01654	Iron	7439-89-6	29,100		7.08	30.1	1
06955	Lead	7439-92-1	291		0.902	2.26	1
01657	Magnesium	7439-95-4	7,020		3.82	15.0	1
06958	Manganese	7439-96-5	352		0.117	0.752	1
06961	Nickel	7440-02-0	29.7		0.286	1.50	1
01662	Potassium	7440-09-7	2,320		27.1	75.2	1
06936	Selenium	7782-49-2	N.D.		1.47	3.01	1
06966	Silver	7440-22-4	N.D.		0.271	0.752	1
01667	Sodium	7440-23-5	272		56.1	150	1
06925	Thallium	7440-28-0	N.D.		2.18	4.51	1
06971	Vanadium	7440-62-2	55.8		0.286	0.752	1
06972	Zinc	7440-66-6	91.9		0.992	3.01	1
	SW-846 7471A		**mg/kg**		**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.0844	J	0.0041	0.143	1

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-65_14-16' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-65_14-16'

LLI Sample # SW 6262296
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 15:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

65-14

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM20 2540 G**		%	%	%	
00111	Moisture	n.a.	34.8	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	X111131AA	04/23/2011 09:41	Stephanie A Selis	1
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201111024168	04/14/2011 15:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201111024168	04/14/2011 15:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201111024168	04/14/2011 15:00	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11111SLA026	04/26/2011 02:59	Brian K Graham	1
10809	BNA Soil Microwave	SW-846 3546	1	11111SLA026	04/22/2011 09:00	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111125708004	04/28/2011 03:07	Tara L Snyder	1
06944	Antimony	SW-846 6010B	1	111125708004	04/28/2011 03:07	Tara L Snyder	1
06935	Arsenic	SW-846 6010B	1	111125708004	04/28/2011 03:07	Tara L Snyder	1
06946	Barium	SW-846 6010B	1	111125708004	04/28/2011 03:07	Tara L Snyder	1
06947	Beryllium	SW-846 6010B	1	111125708004	04/28/2011 03:07	Tara L Snyder	1
06949	Cadmium	SW-846 6010B	1	111125708004	04/28/2011 03:07	Tara L Snyder	1
01650	Calcium	SW-846 6010B	1	111125708004	04/28/2011 03:07	Tara L Snyder	1
06951	Chromium	SW-846 6010B	1	111125708004	04/28/2011 03:07	Tara L Snyder	1
06952	Cobalt	SW-846 6010B	1	111125708004	04/28/2011 03:07	Tara L Snyder	1
06953	Copper	SW-846 6010B	1	111125708004	04/28/2011 03:07	Tara L Snyder	1
01654	Iron	SW-846 6010B	1	111125708004	04/28/2011 03:07	Tara L Snyder	1
06955	Lead	SW-846 6010B	1	111125708004	04/28/2011 03:07	Tara L Snyder	1
01657	Magnesium	SW-846 6010B	1	111125708004	04/28/2011 03:07	Tara L Snyder	1
06958	Manganese	SW-846 6010B	1	111125708004	04/28/2011 03:07	Tara L Snyder	1
06961	Nickel	SW-846 6010B	1	111125708004	04/28/2011 03:07	Tara L Snyder	1
01662	Potassium	SW-846 6010B	1	111125708004	04/28/2011 03:07	Tara L Snyder	1
06936	Selenium	SW-846 6010B	1	111125708004	04/28/2011 12:42	Joanne M Gates	1
06966	Silver	SW-846 6010B	1	111125708004	04/28/2011 03:07	Tara L Snyder	1
01667	Sodium	SW-846 6010B	1	111125708004	04/28/2011 03:07	Tara L Snyder	1
06925	Thallium	SW-846 6010B	1	111125708004	04/28/2011 03:07	Tara L Snyder	1
06971	Vanadium	SW-846 6010B	1	111125708004	04/28/2011 03:07	Tara L Snyder	1
06972	Zinc	SW-846 6010B	1	111125708004	04/28/2011 03:07	Tara L Snyder	1
00159	Mercury	SW-846 7471A	1	111125711004	04/25/2011 10:32	Damary Valentin	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-65_14-16' Grab Soil
Philadelphia Refinery AOI-10
COC: 259438 BH-10-65_14-16'

LLI Sample # SW 6262296
LLI Group # 1242848
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/14/2011 15:00 by SS

Submitted: 04/19/2011 14:50
Reported: 05/05/2011 14:47

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

65-14

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
05708	SW SW846 ICP Digest	SW-846 3050B	1	111125708004	04/23/2011 10:17	James L Mertz	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111125711004	04/23/2011 12:05	James L Mertz	1
00111	Moisture	SM20 2540 G	1	11112820001B	04/22/2011 18:08	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1242848
Reported: 05/05/11 at 02:47 PM

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Laboratory Compliance Quality Control

Analysis Name	Blank Result	Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: Q111121AA	Sample number(s): 6262261-6262262,6262264,6262266-6262268,6262270-6262271,6262273-6262274,6262276-6262277,6262279-6262280,6262282-6262283,6262295								
Acetone	N.D.	350.	1,000	ug/kg	136	129	32-209	5	30
Benzene	N.D.	25.	250	ug/kg	115	115	80-120	0	30
Bromodichloromethane	N.D.	50.	250	ug/kg	106	105	78-120	1	30
Bromoform	N.D.	50.	250	ug/kg	84	87	70-120	3	30
Bromomethane	N.D.	100.	250	ug/kg	120	118	32-162	2	30
2-Butanone	N.D.	200.	500	ug/kg	109	110	46-153	0	30
Carbon Disulfide	N.D.	50.	250	ug/kg	117	115	67-122	2	30
Carbon Tetrachloride	N.D.	50.	250	ug/kg	107	110	69-122	2	30
Chlorobenzene	N.D.	50.	250	ug/kg	98	99	80-120	1	30
Chloroethane	N.D.	100.	250	ug/kg	126	166*	37-154	27	30
Chloroform	N.D.	50.	250	ug/kg	109	109	80-120	1	30
Chloromethane	N.D.	100.	250	ug/kg	102	100	54-132	1	30
Cyclohexane	N.D.	50.	250	ug/kg	101	102	62-121	0	30
1,2-Dibromo-3-chloropropane	N.D.	100.	250	ug/kg	65	69	58-120	6	30
Dibromochloromethane	N.D.	50.	250	ug/kg	94	95	77-120	1	30
1,2-Dibromoethane	N.D.	50.	250	ug/kg	94	98	80-120	4	30
1,2-Dichlorobenzene	N.D.	50.	250	ug/kg	93	91	79-120	1	30
1,3-Dichlorobenzene	N.D.	50.	250	ug/kg	95	94	78-120	1	30
1,4-Dichlorobenzene	N.D.	50.	250	ug/kg	94	92	79-120	1	30
Dichlorodifluoromethane	N.D.	100.	250	ug/kg	65	68	20-120	4	30
1,1-Dichloroethane	N.D.	50.	250	ug/kg	113	111	80-120	2	30
1,2-Dichloroethane	N.D.	50.	250	ug/kg	106	108	71-129	2	30
1,1-Dichloroethene	N.D.	50.	250	ug/kg	118	119	73-123	1	30
cis-1,2-Dichloroethene	N.D.	50.	250	ug/kg	112	112	80-120	0	30
trans-1,2-Dichloroethene	N.D.	50.	250	ug/kg	115	116	79-120	1	30
1,2-Dichloropropane	N.D.	50.	250	ug/kg	110	110	80-120	1	30
cis-1,3-Dichloropropene	N.D.	50.	250	ug/kg	107	108	80-120	0	30
trans-1,3-Dichloropropene	N.D.	50.	250	ug/kg	91	92	77-120	2	30
Ethylbenzene	N.D.	50.	250	ug/kg	98	99	80-120	1	30
Freon 113	N.D.	100.	500	ug/kg	104	102	61-126	2	30
2-Hexanone	N.D.	150.	500	ug/kg	73	76	45-155	3	30
Isopropylbenzene	N.D.	50.	250	ug/kg	98	99	76-120	0	30
Methyl Acetate	N.D.	100.	250	ug/kg	106	109	61-152	3	30
Methyl Tertiary Butyl Ether	N.D.	25.	250	ug/kg	109	110	74-121	1	30
4-Methyl-2-pentanone	N.D.	150.	500	ug/kg	93	94	61-134	2	30
Methylcyclohexane	N.D.	50.	250	ug/kg	114	114	57-138	0	30
Methylene Chloride	N.D.	100.	250	ug/kg	113	114	76-124	1	30
Styrene	N.D.	50.	250	ug/kg	95	97	76-120	2	30
1,1,2,2-Tetrachloroethane	N.D.	50.	250	ug/kg	82	84	71-123	2	30
Tetrachloroethene	N.D.	50.	250	ug/kg	98	99	77-120	1	30
Toluene	N.D.	50.	250	ug/kg	99	101	80-120	2	30
1,2,4-Trichlorobenzene	N.D.	50.	250	ug/kg	76	76	68-120	1	30
1,1,1-Trichloroethane	N.D.	50.	250	ug/kg	111	114	71-125	2	30
1,1,2-Trichloroethane	N.D.	50.	250	ug/kg	94	95	80-120	1	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1242848
Reported: 05/05/11 at 02:47 PM

Analysis Name	Blank Result	Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Trichloroethene	N.D.	50.	250	ug/kg	112	113	80-120	0	30
Trichlorofluoromethane	N.D.	100.	250	ug/kg	101	103	58-133	2	30
Vinyl Chloride	N.D.	50.	250	ug/kg	101	100	53-120	1	30
Xylene (Total)	N.D.	50.	250	ug/kg	99	100	80-120	1	30
Batch number: Q111161AA	Sample number(s): 6262287,6262294								
Acetone	N.D.	350.	1,000	ug/kg	70	76	32-209	7	30
Benzene	N.D.	25.	250	ug/kg	110	111	80-120	1	30
Bromodichloromethane	N.D.	50.	250	ug/kg	107	106	78-120	1	30
Bromoform	N.D.	50.	250	ug/kg	86	87	70-120	1	30
Bromomethane	N.D.	100.	250	ug/kg	100	102	32-162	1	30
2-Butanone	N.D.	200.	500	ug/kg	78	82	46-153	6	30
Carbon Disulfide	N.D.	50.	250	ug/kg	119	119	67-122	1	30
Carbon Tetrachloride	N.D.	50.	250	ug/kg	108	109	69-122	1	30
Chlorobenzene	N.D.	50.	250	ug/kg	91	92	80-120	1	30
Chloroethane	N.D.	100.	250	ug/kg	96	98	37-154	3	30
Chloroform	N.D.	50.	250	ug/kg	108	108	80-120	0	30
Chloromethane	N.D.	100.	250	ug/kg	98	97	54-132	1	30
Cyclohexane	N.D.	50.	250	ug/kg	118	119	62-121	1	30
1,2-Dibromo-3-chloropropane	N.D.	100.	250	ug/kg	73	75	58-120	3	30
Dibromochloromethane	N.D.	50.	250	ug/kg	90	91	77-120	1	30
1,2-Dibromoethane	N.D.	50.	250	ug/kg	91	91	80-120	0	30
1,2-Dichlorobenzene	N.D.	50.	250	ug/kg	84	85	79-120	1	30
1,3-Dichlorobenzene	N.D.	50.	250	ug/kg	85	85	78-120	0	30
1,4-Dichlorobenzene	N.D.	50.	250	ug/kg	84	86	79-120	2	30
Dichlorodifluoromethane	N.D.	100.	250	ug/kg	60	57	20-120	6	30
1,1-Dichloroethane	N.D.	50.	250	ug/kg	110	109	80-120	0	30
1,2-Dichloroethane	N.D.	50.	250	ug/kg	106	108	71-129	2	30
1,1-Dichloroethene	N.D.	50.	250	ug/kg	115	117	73-123	1	30
cis-1,2-Dichloroethene	N.D.	50.	250	ug/kg	111	112	80-120	1	30
trans-1,2-Dichloroethene	N.D.	50.	250	ug/kg	113	112	79-120	1	30
1,2-Dichloropropane	N.D.	50.	250	ug/kg	106	107	80-120	1	30
cis-1,3-Dichloropropene	N.D.	50.	250	ug/kg	110	109	80-120	1	30
trans-1,3-Dichloropropene	N.D.	50.	250	ug/kg	89	89	77-120	0	30
Ethylbenzene	N.D.	50.	250	ug/kg	90	91	80-120	1	30
Freon 113	N.D.	100.	500	ug/kg	136*	136*	61-126	0	30
2-Hexanone	N.D.	150.	500	ug/kg	65	68	45-155	4	30
Isopropylbenzene	N.D.	50.	250	ug/kg	93	94	76-120	1	30
Methyl Acetate	N.D.	100.	250	ug/kg	115	116	61-152	1	30
Methyl Tertiary Butyl Ether	N.D.	25.	250	ug/kg	146*	145*	74-121	0	30
4-Methyl-2-pentanone	N.D.	150.	500	ug/kg	98	98	61-134	0	30
Methylcyclohexane	N.D.	50.	250	ug/kg	118	117	57-138	0	30
Methylene Chloride	N.D.	100.	250	ug/kg	113	112	76-124	1	30
Styrene	N.D.	50.	250	ug/kg	91	91	76-120	0	30
1,1,2,2-Tetrachloroethane	N.D.	50.	250	ug/kg	80	80	71-123	1	30
Tetrachloroethene	N.D.	50.	250	ug/kg	88	89	77-120	2	30
Toluene	N.D.	50.	250	ug/kg	91	90	80-120	1	30
1,2,4-Trichlorobenzene	N.D.	50.	250	ug/kg	78	79	68-120	0	30
1,1,1-Trichloroethane	N.D.	50.	250	ug/kg	115	116	71-125	1	30
1,1,2-Trichloroethane	N.D.	50.	250	ug/kg	90	90	80-120	0	30
Trichloroethene	N.D.	50.	250	ug/kg	103	105	80-120	2	30
Trichlorofluoromethane	N.D.	100.	250	ug/kg	93	96	58-133	3	30
Vinyl Chloride	N.D.	50.	250	ug/kg	93	93	53-120	0	30
Xylene (Total)	N.D.	50.	250	ug/kg	93	93	80-120	0	30
Batch number: Q111162AA	Sample number(s): 6262285								
Acetone	N.D.	350.	1,000	ug/kg	62	70	32-209	13	30
Benzene	N.D.	25.	250	ug/kg	115	116	80-120	0	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1242848
Reported: 05/05/11 at 02:47 PM

Analysis Name	Blank Result	Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Bromodichloromethane	N.D.	50.	250	ug/kg	108	108	78-120	0	30
Bromoform	N.D.	50.	250	ug/kg	84	85	70-120	2	30
Bromomethane	N.D.	100.	250	ug/kg	92	93	32-162	1	30
2-Butanone	N.D.	200.	500	ug/kg	77	78	46-153	2	30
Carbon Disulfide	N.D.	50.	250	ug/kg	123*	124*	67-122	1	30
Carbon Tetrachloride	N.D.	50.	250	ug/kg	114	113	69-122	1	30
Chlorobenzene	N.D.	50.	250	ug/kg	93	94	80-120	1	30
Chloroethane	N.D.	100.	250	ug/kg	88	93	37-154	6	30
Chloroform	N.D.	50.	250	ug/kg	112	112	80-120	0	30
Chloromethane	N.D.	100.	250	ug/kg	105	99	54-132	5	30
Cyclohexane	N.D.	50.	250	ug/kg	125*	118	62-121	6	30
1,2-Dibromo-3-chloropropane	N.D.	100.	250	ug/kg	73	72	58-120	2	30
Dibromochloromethane	N.D.	50.	250	ug/kg	90	90	77-120	0	30
1,2-Dibromoethane	N.D.	50.	250	ug/kg	90	90	80-120	0	30
1,2-Dichlorobenzene	N.D.	50.	250	ug/kg	84	86	79-120	2	30
1,3-Dichlorobenzene	N.D.	50.	250	ug/kg	84	86	78-120	2	30
1,4-Dichlorobenzene	N.D.	50.	250	ug/kg	84	85	79-120	2	30
Dichlorodifluoromethane	N.D.	100.	250	ug/kg	68	56	20-120	20	30
1,1-Dichloroethane	N.D.	50.	250	ug/kg	110	112	80-120	1	30
1,2-Dichloroethane	N.D.	50.	250	ug/kg	109	109	71-129	0	30
1,1-Dichloroethene	N.D.	50.	250	ug/kg	123	121	73-123	1	30
cis-1,2-Dichloroethene	N.D.	50.	250	ug/kg	113	117	80-120	3	30
trans-1,2-Dichloroethene	N.D.	50.	250	ug/kg	115	116	79-120	1	30
1,2-Dichloropropane	N.D.	50.	250	ug/kg	109	109	80-120	0	30
cis-1,3-Dichloropropene	N.D.	50.	250	ug/kg	109	110	80-120	0	30
trans-1,3-Dichloropropene	N.D.	50.	250	ug/kg	88	88	77-120	0	30
Ethylbenzene	N.D.	50.	250	ug/kg	91	92	80-120	1	30
Freon 113	N.D.	100.	500	ug/kg	144*	136*	61-126	5	30
2-Hexanone	N.D.	150.	500	ug/kg	62	63	45-155	1	30
Isopropylbenzene	N.D.	50.	250	ug/kg	94	95	76-120	2	30
Methyl Acetate	N.D.	100.	250	ug/kg	118	117	61-152	1	30
Methyl Tertiary Butyl Ether	N.D.	25.	250	ug/kg	149*	146*	74-121	2	30
4-Methyl-2-pentanone	N.D.	150.	500	ug/kg	98	99	61-134	1	30
Methylcyclohexane	N.D.	50.	250	ug/kg	120	115	57-138	4	30
Methylene Chloride	N.D.	100.	250	ug/kg	114	113	76-124	1	30
Styrene	N.D.	50.	250	ug/kg	92	92	76-120	1	30
1,1,2,2-Tetrachloroethane	N.D.	50.	250	ug/kg	79	80	71-123	0	30
Tetrachloroethene	N.D.	50.	250	ug/kg	90	91	77-120	2	30
Toluene	N.D.	50.	250	ug/kg	92	93	80-120	1	30
1,2,4-Trichlorobenzene	N.D.	50.	250	ug/kg	74	77	68-120	4	30
1,1,1-Trichloroethane	N.D.	50.	250	ug/kg	120	121	71-125	0	30
1,1,2-Trichloroethane	N.D.	50.	250	ug/kg	89	89	80-120	0	30
Trichloroethene	N.D.	50.	250	ug/kg	108	109	80-120	0	30
Trichlorofluoromethane	N.D.	100.	250	ug/kg	100	98	58-133	3	30
Vinyl Chloride	N.D.	50.	250	ug/kg	100	99	53-120	1	30
Xylene (Total)	N.D.	50.	250	ug/kg	93	94	80-120	1	30
Batch number: X111131AA	Sample number(s): 6262260,6262269,6262272,6262275,6262281,6262284,6262286,6262289-6262290,6262292-6262293,6262296								
Acetone	N.D.	7.	20	ug/kg	106	117	32-209	9	30
Benzene	N.D.	0.5	5	ug/kg	94	91	80-120	4	30
Bromodichloromethane	N.D.	1.	5	ug/kg	88	85	78-120	4	30
Bromoform	N.D.	1.	5	ug/kg	85	84	70-120	1	30
Bromomethane	N.D.	2.	5	ug/kg	74	68	32-162	8	30
2-Butanone	N.D.	4.	10	ug/kg	100	106	46-153	5	30
Carbon Disulfide	N.D.	1.	5	ug/kg	78	75	67-122	4	30
Carbon Tetrachloride	N.D.	1.	5	ug/kg	91	86	69-122	5	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1242848
Reported: 05/05/11 at 02:47 PM

Analysis Name	Blank Result	Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Chlorobenzene	N.D.	1.	5	ug/kg	97	93	80-120	4	30
Chloroethane	N.D.	2.	5	ug/kg	70	65	37-154	6	30
Chloroform	N.D.	1.	5	ug/kg	95	92	80-120	4	30
Chloromethane	N.D.	2.	5	ug/kg	81	76	54-132	5	30
Cyclohexane	N.D.	1.	5	ug/kg	77	73	62-121	5	30
1,2-Dibromo-3-chloropropane	N.D.	2.	5	ug/kg	78	88	58-120	13	30
Dibromochloromethane	N.D.	1.	5	ug/kg	89	88	77-120	0	30
1,2-Dibromoethane	N.D.	1.	5	ug/kg	96	97	80-120	1	30
1,2-Dichlorobenzene	N.D.	1.	5	ug/kg	92	89	79-120	3	30
1,3-Dichlorobenzene	N.D.	1.	5	ug/kg	90	86	78-120	4	30
1,4-Dichlorobenzene	N.D.	1.	5	ug/kg	95	92	79-120	3	30
Dichlorodifluoromethane	N.D.	2.	5	ug/kg	62	59	20-120	5	30
1,1-Dichloroethane	N.D.	1.	5	ug/kg	92	90	80-120	2	30
1,2-Dichloroethane	N.D.	1.	5	ug/kg	98	95	71-129	2	30
1,1-Dichloroethene	N.D.	1.	5	ug/kg	94	90	73-123	5	30
cis-1,2-Dichloroethene	N.D.	1.	5	ug/kg	97	92	80-120	5	30
trans-1,2-Dichloroethene	N.D.	1.	5	ug/kg	95	93	79-120	2	30
1,2-Dichloropropane	N.D.	1.	5	ug/kg	91	87	80-120	5	30
cis-1,3-Dichloropropene	N.D.	1.	5	ug/kg	83	80	80-120	3	30
trans-1,3-Dichloropropene	N.D.	1.	5	ug/kg	77	79	77-120	2	30
Ethylbenzene	N.D.	1.	5	ug/kg	93	90	80-120	3	30
Freon 113	N.D.	2.	10	ug/kg	81	78	61-126	4	30
2-Hexanone	N.D.	3.	10	ug/kg	88	96	45-155	9	30
Isopropylbenzene	N.D.	1.	5	ug/kg	95	92	76-120	3	30
Methyl Acetate	N.D.	2.	5	ug/kg	99	130	61-152	28	30
Methyl Tertiary Butyl Ether	N.D.	0.5	5	ug/kg	88	87	74-121	1	30
4-Methyl-2-pentanone	N.D.	3.	10	ug/kg	93	97	61-134	5	30
Methylcyclohexane	N.D.	1.	5	ug/kg	77	74	57-138	4	30
Methylene Chloride	N.D.	2.	5	ug/kg	92	89	76-124	3	30
Styrene	N.D.	1.	5	ug/kg	90	83	76-120	8	30
1,1,2,2-Tetrachloroethane	N.D.	1.	5	ug/kg	88	89	71-123	2	30
Tetrachloroethene	N.D.	1.	5	ug/kg	101	101	77-120	0	30
Toluene	N.D.	1.	5	ug/kg	94	91	80-120	2	30
1,2,4-Trichlorobenzene	N.D.	1.	5	ug/kg	88	83	68-120	5	30
1,1,1-Trichloroethane	N.D.	1.	5	ug/kg	90	87	71-125	3	30
1,1,2-Trichloroethane	N.D.	1.	5	ug/kg	89	91	80-120	2	30
Trichloroethene	N.D.	1.	5	ug/kg	96	91	80-120	5	30
Trichlorofluoromethane	N.D.	2.	5	ug/kg	81	76	58-133	7	30
Vinyl Chloride	N.D.	1.	5	ug/kg	79	76	53-120	4	30
Xylene (Total)	N.D.	1.	5	ug/kg	96	94	80-120	3	30
Batch number: X111151AA	Sample number(s): 6262263,6262265,6262278,6262288,6262291								
Acetone	N.D.	7.	20	ug/kg	103	100	32-209	4	30
Benzene	N.D.	0.5	5	ug/kg	94	95	80-120	1	30
Bromodichloromethane	N.D.	1.	5	ug/kg	91	91	78-120	0	30
Bromoform	N.D.	1.	5	ug/kg	90	89	70-120	1	30
Bromomethane	N.D.	2.	5	ug/kg	75	77	32-162	2	30
2-Butanone	N.D.	4.	10	ug/kg	106	105	46-153	1	30
Carbon Disulfide	N.D.	1.	5	ug/kg	81	81	67-122	0	30
Carbon Tetrachloride	N.D.	1.	5	ug/kg	92	92	69-122	0	30
Chlorobenzene	N.D.	1.	5	ug/kg	94	97	80-120	3	30
Chloroethane	N.D.	2.	5	ug/kg	77	78	37-154	1	30
Chloroform	N.D.	1.	5	ug/kg	95	95	80-120	0	30
Chloromethane	N.D.	2.	5	ug/kg	84	84	54-132	1	30
Cyclohexane	N.D.	1.	5	ug/kg	83	84	62-121	2	30
1,2-Dibromo-3-chloropropane	N.D.	2.	5	ug/kg	104	102	58-120	2	30
Dibromochloromethane	N.D.	1.	5	ug/kg	94	94	77-120	1	30
1,2-Dibromoethane	N.D.	1.	5	ug/kg	99	99	80-120	1	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1242848
Reported: 05/05/11 at 02:47 PM

Analysis Name	Blank Result	Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
1,2-Dichlorobenzene	N.D.	1.	5	ug/kg	94	97	79-120	4	30
1,3-Dichlorobenzene	N.D.	1.	5	ug/kg	90	92	78-120	2	30
1,4-Dichlorobenzene	N.D.	1.	5	ug/kg	96	96	79-120	0	30
Dichlorodifluoromethane	N.D.	2.	5	ug/kg	64	64	20-120	1	30
1,1-Dichloroethane	N.D.	1.	5	ug/kg	94	92	80-120	3	30
1,2-Dichloroethane	N.D.	1.	5	ug/kg	97	97	71-129	0	30
1,1-Dichloroethene	N.D.	1.	5	ug/kg	91	91	73-123	0	30
cis-1,2-Dichloroethene	N.D.	1.	5	ug/kg	95	95	80-120	1	30
trans-1,2-Dichloroethene	N.D.	1.	5	ug/kg	93	92	79-120	1	30
1,2-Dichloropropane	N.D.	1.	5	ug/kg	94	93	80-120	1	30
cis-1,3-Dichloropropene	N.D.	1.	5	ug/kg	87	90	80-120	3	30
trans-1,3-Dichloropropene	N.D.	1.	5	ug/kg	91	90	77-120	1	30
Ethylbenzene	N.D.	1.	5	ug/kg	96	97	80-120	2	30
Freon 113	N.D.	2.	10	ug/kg	85	86	61-126	0	30
2-Hexanone	N.D.	3.	10	ug/kg	106	105	45-155	1	30
Isopropylbenzene	N.D.	1.	5	ug/kg	99	100	76-120	1	30
Methyl Acetate	N.D.	2.	5	ug/kg	122	107	61-152	14	30
Methyl Tertiary Butyl Ether	N.D.	0.5	5	ug/kg	89	89	74-121	0	30
4-Methyl-2-pentanone	N.D.	3.	10	ug/kg	108	101	61-134	7	30
Methylcyclohexane	N.D.	1.	5	ug/kg	84	86	57-138	2	30
Methylene Chloride	N.D.	2.	5	ug/kg	92	92	76-124	0	30
Styrene	N.D.	1.	5	ug/kg	94	90	76-120	4	30
1,1,2,2-Tetrachloroethane	N.D.	1.	5	ug/kg	98	98	71-123	0	30
Tetrachloroethene	N.D.	1.	5	ug/kg	94	94	77-120	0	30
Toluene	N.D.	1.	5	ug/kg	93	95	80-120	2	30
1,2,4-Trichlorobenzene	N.D.	1.	5	ug/kg	86	89	68-120	3	30
1,1,1-Trichloroethane	N.D.	1.	5	ug/kg	83	83	71-125	0	30
1,1,2-Trichloroethane	N.D.	1.	5	ug/kg	95	93	80-120	1	30
Trichloroethene	N.D.	1.	5	ug/kg	95	92	80-120	3	30
Trichlorofluoromethane	N.D.	2.	5	ug/kg	86	85	58-133	1	30
Vinyl Chloride	N.D.	1.	5	ug/kg	87	86	53-120	1	30
Xylene (Total)	N.D.	1.	5	ug/kg	97	99	80-120	2	30
Batch number: 11110SLA026	Sample number(s): 6262260-6262269								
Acenaphthene	N.D.	33.	170	ug/kg	97		83-111		
Acenaphthylene	N.D.	33.	170	ug/kg	103		68-120		
Acetophenone	N.D.	67.	170	ug/kg	96		70-106		
Anthracene	N.D.	33.	170	ug/kg	101		83-111		
Atrazine	N.D.	33.	170	ug/kg	101		69-122		
Benzaldehyde	N.D.	67.	170	ug/kg	25		10-74		
Benzo(a)anthracene	N.D.	33.	170	ug/kg	100		82-111		
Benzo(a)pyrene	N.D.	33.	170	ug/kg	93		63-138		
Benzo(b)fluoranthene	N.D.	33.	170	ug/kg	98		61-133		
Benzo(g,h,i)perylene	N.D.	33.	170	ug/kg	87		63-130		
Benzo(k)fluoranthene	N.D.	33.	170	ug/kg	93		71-135		
1,1'-Biphenyl	N.D.	33.	170	ug/kg	99		82-106		
4-Bromophenyl-phenylether	N.D.	33.	170	ug/kg	102		79-117		
Butylbenzylphthalate	N.D.	67.	170	ug/kg	106		83-122		
Di-n-butylphthalate	N.D.	67.	170	ug/kg	101		79-112		
Caprolactam	N.D.	33.	170	ug/kg	89		65-113		
Carbazole	N.D.	33.	170	ug/kg	100		83-111		
4-Chloro-3-methylphenol	N.D.	67.	170	ug/kg	100		74-119		
4-Chloroaniline	N.D.	67.	170	ug/kg	53		10-97		
bis(2-Chloroethoxy)methane	N.D.	33.	170	ug/kg	103		82-113		
bis(2-Chloroethyl)ether	N.D.	33.	170	ug/kg	101		77-115		
2-Chloronaphthalene	N.D.	33.	170	ug/kg	85		59-139		
2-Chlorophenol	N.D.	33.	170	ug/kg	102		83-119		
4-Chlorophenyl-phenylether	N.D.	33.	170	ug/kg	95		79-110		

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1242848
Reported: 05/05/11 at 02:47 PM

Analysis Name	Blank Result	Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
2,2'-oxybis(1-Chloropropane)	N.D.	33.	170	ug/kg	99		67-130		
Chrysene	N.D.	33.	170	ug/kg	98		81-111		
Dibenz(a,h)anthracene	N.D.	33.	170	ug/kg	88		67-129		
Dibenzofuran	N.D.	33.	170	ug/kg	100		85-110		
3,3'-Dichlorobenzidine	N.D.	100.	330	ug/kg	53		35-94		
2,4-Dichlorophenol	N.D.	33.	170	ug/kg	103		87-117		
Diethylphthalate	N.D.	67.	170	ug/kg	96		82-113		
2,4-Dimethylphenol	N.D.	67.	170	ug/kg	105		83-120		
Dimethylphthalate	N.D.	67.	170	ug/kg	96		85-111		
4,6-Dinitro-2-methylphenol	N.D.	170.	500	ug/kg	94		60-113		
2,4-Dinitrophenol	N.D.	330.	1,000	ug/kg	81		51-124		
2,4-Dinitrotoluene	N.D.	67.	170	ug/kg	97		80-116		
2,6-Dinitrotoluene	N.D.	33.	170	ug/kg	94		79-115		
bis(2-Ethylhexyl)phthalate	120 J	67.	330	ug/kg	103		80-119		
Fluoranthene	N.D.	33.	170	ug/kg	101		80-113		
Fluorene	N.D.	33.	170	ug/kg	96		81-117		
Hexachlorobenzene	N.D.	33.	170	ug/kg	99		79-115		
Hexachlorobutadiene	N.D.	67.	170	ug/kg	100		70-112		
Hexachlorocyclopentadiene	N.D.	170.	500	ug/kg	105		64-127		
Hexachloroethane	N.D.	33.	170	ug/kg	96		76-109		
Indeno(1,2,3-cd)pyrene	N.D.	33.	170	ug/kg	85		64-128		
Isophorone	N.D.	33.	170	ug/kg	105		72-107		
2-Methylnaphthalene	N.D.	33.	170	ug/kg	93		79-110		
2-Methylphenol	N.D.	67.	170	ug/kg	98		80-119		
4-Methylphenol	N.D.	67.	170	ug/kg	97		74-116		
Naphthalene	N.D.	33.	170	ug/kg	99		83-112		
2-Nitroaniline	N.D.	33.	170	ug/kg	101		83-118		
3-Nitroaniline	N.D.	67.	170	ug/kg	96		66-114		
4-Nitroaniline	N.D.	67.	170	ug/kg	74		52-92		
Nitrobenzene	N.D.	33.	170	ug/kg	108		78-122		
2-Nitrophenol	N.D.	33.	170	ug/kg	101		81-114		
4-Nitrophenol	N.D.	170.	500	ug/kg	93		57-131		
N-Nitroso-di-n-propylamine	N.D.	33.	170	ug/kg	102		70-113		
N-Nitrosodiphenylamine	N.D.	33.	170	ug/kg	105		86-112		
Di-n-octylphthalate	N.D.	67.	170	ug/kg	107		65-141		
Pentachlorophenol	N.D.	170.	500	ug/kg	102		50-133		
Phenanthrene	N.D.	33.	170	ug/kg	99		83-109		
Phenol	N.D.	33.	170	ug/kg	94		74-115		
Pyrene	N.D.	33.	170	ug/kg	104		80-121		
2,4,5-Trichlorophenol	N.D.	67.	170	ug/kg	97		84-109		
2,4,6-Trichlorophenol	N.D.	33.	170	ug/kg	103		88-114		
Batch number: 11110SLD026	Sample number(s): 6262270-6262289								
Acenaphthene	N.D.	33.	170	ug/kg	100		83-111		
Acenaphthylene	N.D.	33.	170	ug/kg	101		68-120		
Acetophenone	N.D.	67.	170	ug/kg	94		70-106		
Anthracene	N.D.	33.	170	ug/kg	98		83-111		
Atrazine	N.D.	33.	170	ug/kg	90		69-122		
Benzaldehyde	N.D.	67.	170	ug/kg	21		10-74		
Benzo(a)anthracene	N.D.	33.	170	ug/kg	97		82-111		
Benzo(a)pyrene	N.D.	33.	170	ug/kg	110		63-138		
Benzo(b)fluoranthene	N.D.	33.	170	ug/kg	118		61-133		
Benzo(g,h,i)perylene	N.D.	33.	170	ug/kg	102		63-130		
Benzo(k)fluoranthene	N.D.	33.	170	ug/kg	107		71-135		
1,1'-Biphenyl	N.D.	33.	170	ug/kg	98		82-106		
4-Bromophenyl-phenylether	N.D.	33.	170	ug/kg	97		79-117		
Butylbenzylphthalate	N.D.	67.	170	ug/kg	95		83-122		

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1242848
Reported: 05/05/11 at 02:47 PM

Analysis Name	Blank Result	Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Di-n-butylphthalate	N.D.	67.	170	ug/kg	94		79-112		
Caprolactam	N.D.	33.	170	ug/kg	92		65-113		
Carbazole	N.D.	33.	170	ug/kg	96		83-111		
4-Chloro-3-methylphenol	N.D.	67.	170	ug/kg	97		74-119		
4-Chloroaniline	N.D.	67.	170	ug/kg	77		10-97		
bis(2-Chloroethoxy)methane	N.D.	33.	170	ug/kg	99		82-113		
bis(2-Chloroethyl)ether	N.D.	33.	170	ug/kg	98		77-115		
2-Chloronaphthalene	N.D.	33.	170	ug/kg	72		59-139		
2-Chlorophenol	N.D.	33.	170	ug/kg	103		83-119		
4-Chlorophenyl-phenylether	N.D.	33.	170	ug/kg	97		79-110		
2,2'-oxybis(1-Chloropropane)	N.D.	33.	170	ug/kg	96		67-130		
Chrysene	N.D.	33.	170	ug/kg	100		81-111		
Dibenz(a,h)anthracene	N.D.	33.	170	ug/kg	104		67-129		
Dibenzofuran	N.D.	33.	170	ug/kg	101		85-110		
3,3'-Dichlorobenzidine	N.D.	100.	330	ug/kg	78		35-94		
2,4-Dichlorophenol	N.D.	33.	170	ug/kg	100		87-117		
Diethylphthalate	N.D.	67.	170	ug/kg	97		82-113		
2,4-Dimethylphenol	N.D.	67.	170	ug/kg	100		83-120		
Dimethylphthalate	N.D.	67.	170	ug/kg	98		85-111		
4,6-Dinitro-2-methylphenol	N.D.	170.	500	ug/kg	100		60-113		
2,4-Dinitrophenol	N.D.	330.	1,000	ug/kg	98		51-124		
2,4-Dinitrotoluene	N.D.	67.	170	ug/kg	105		80-116		
2,6-Dinitrotoluene	N.D.	33.	170	ug/kg	103		79-115		
bis(2-Ethylhexyl)phthalate	N.D.	67.	330	ug/kg	93		80-119		
Fluoranthene	N.D.	33.	170	ug/kg	96		80-113		
Fluorene	N.D.	33.	170	ug/kg	100		81-117		
Hexachlorobenzene	N.D.	33.	170	ug/kg	99		79-115		
Hexachlorobutadiene	N.D.	67.	170	ug/kg	94		70-112		
Hexachlorocyclopentadiene	N.D.	170.	500	ug/kg	98		64-127		
Hexachloroethane	N.D.	33.	170	ug/kg	91		76-109		
Indeno(1,2,3-cd)pyrene	N.D.	33.	170	ug/kg	104		64-128		
Isophorone	N.D.	33.	170	ug/kg	96		72-107		
2-Methylnaphthalene	N.D.	33.	170	ug/kg	92		79-110		
2-Methylphenol	N.D.	67.	170	ug/kg	100		80-119		
4-Methylphenol	N.D.	67.	170	ug/kg	100		74-116		
Naphthalene	N.D.	33.	170	ug/kg	95		83-112		
2-Nitroaniline	N.D.	33.	170	ug/kg	100		83-118		
3-Nitroaniline	N.D.	67.	170	ug/kg	101		66-114		
4-Nitroaniline	N.D.	67.	170	ug/kg	84		52-92		
Nitrobenzene	N.D.	33.	170	ug/kg	98		78-122		
2-Nitrophenol	N.D.	33.	170	ug/kg	94		81-114		
4-Nitrophenol	N.D.	170.	500	ug/kg	87		57-131		
N-Nitroso-di-n-propylamine	N.D.	33.	170	ug/kg	95		70-113		
N-Nitrosodiphenylamine	N.D.	33.	170	ug/kg	101		86-112		
Di-n-octylphthalate	N.D.	67.	170	ug/kg	111		65-141		
Pentachlorophenol	N.D.	170.	500	ug/kg	98		50-133		
Phenanthrene	N.D.	33.	170	ug/kg	97		83-109		
Phenol	N.D.	33.	170	ug/kg	102		74-115		
Pyrene	N.D.	33.	170	ug/kg	102		80-121		
2,4,5-Trichlorophenol	N.D.	67.	170	ug/kg	98		84-109		
2,4,6-Trichlorophenol	N.D.	33.	170	ug/kg	100		88-114		
Batch number: 11111SLA026	Sample number(s): 6262290-6262296								
Acenaphthene	N.D.	33.	170	ug/kg	95		83-111		
Acenaphthylene	N.D.	33.	170	ug/kg	100		68-120		
Acetophenone	N.D.	67.	170	ug/kg	93		70-106		
Anthracene	N.D.	33.	170	ug/kg	96		83-111		
Atrazine	N.D.	33.	170	ug/kg	94		69-122		

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1242848
Reported: 05/05/11 at 02:47 PM

Analysis Name	Blank Result	Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Benzaldehyde	N.D.	67.	170	ug/kg	58		10-74		
Benzo(a)anthracene	N.D.	33.	170	ug/kg	96		82-111		
Benzo(a)pyrene	N.D.	33.	170	ug/kg	101		63-138		
Benzo(b)fluoranthene	N.D.	33.	170	ug/kg	94		61-133		
Benzo(g,h,i)perylene	N.D.	33.	170	ug/kg	101		63-130		
Benzo(k)fluoranthene	N.D.	33.	170	ug/kg	112		71-135		
1,1'-Biphenyl	N.D.	33.	170	ug/kg	95		82-106		
4-Bromophenyl-phenylether	N.D.	33.	170	ug/kg	97		79-117		
Butylbenzylphthalate	N.D.	67.	170	ug/kg	102		83-122		
Di-n-butylphthalate	N.D.	67.	170	ug/kg	93		79-112		
Caprolactam	N.D.	33.	170	ug/kg	89		65-113		
Carbazole	N.D.	33.	170	ug/kg	93		83-111		
4-Chloro-3-methylphenol	N.D.	67.	170	ug/kg	97		74-119		
4-Chloroaniline	N.D.	67.	170	ug/kg	68		10-97		
bis(2-Chloroethoxy)methane	N.D.	33.	170	ug/kg	98		82-113		
bis(2-Chloroethyl)ether	N.D.	33.	170	ug/kg	95		77-115		
2-Chloronaphthalene	N.D.	33.	170	ug/kg	66		59-139		
2-Chlorophenol	N.D.	33.	170	ug/kg	98		83-119		
4-Chlorophenyl-phenylether	N.D.	33.	170	ug/kg	94		79-110		
2,2'-oxybis(1-Chloropropane)	N.D.	33.	170	ug/kg	94		67-130		
Chrysene	N.D.	33.	170	ug/kg	94		81-111		
Dibenz(a,h)anthracene	N.D.	33.	170	ug/kg	100		67-129		
Dibenzofuran	N.D.	33.	170	ug/kg	95		85-110		
3,3'-Dichlorobenzidine	N.D.	100.	330	ug/kg	75		35-94		
2,4-Dichlorophenol	N.D.	33.	170	ug/kg	96		87-117		
Diethylphthalate	N.D.	67.	170	ug/kg	91		82-113		
2,4-Dimethylphenol	N.D.	67.	170	ug/kg	99		83-120		
Dimethylphthalate	N.D.	67.	170	ug/kg	93		85-111		
4,6-Dinitro-2-methylphenol	N.D.	170.	500	ug/kg	90		60-113		
2,4-Dinitrophenol	N.D.	330.	1,000	ug/kg	81		51-124		
2,4-Dinitrotoluene	N.D.	67.	170	ug/kg	94		80-116		
2,6-Dinitrotoluene	N.D.	33.	170	ug/kg	91		79-115		
bis(2-Ethylhexyl)phthalate	N.D.	67.	330	ug/kg	99		80-119		
Fluoranthene	N.D.	33.	170	ug/kg	93		80-113		
Fluorene	N.D.	33.	170	ug/kg	94		81-117		
Hexachlorobenzene	N.D.	33.	170	ug/kg	97		79-115		
Hexachlorobutadiene	N.D.	67.	170	ug/kg	90		70-112		
Hexachlorocyclopentadiene	N.D.	170.	500	ug/kg	95		64-127		
Hexachloroethane	N.D.	33.	170	ug/kg	88		76-109		
Indeno(1,2,3-cd)pyrene	N.D.	33.	170	ug/kg	98		64-128		
Isophorone	N.D.	33.	170	ug/kg	99		72-107		
2-Methylnaphthalene	N.D.	33.	170	ug/kg	89		79-110		
2-Methylphenol	N.D.	67.	170	ug/kg	96		80-119		
4-Methylphenol	N.D.	67.	170	ug/kg	92		74-116		
Naphthalene	N.D.	33.	170	ug/kg	91		83-112		
2-Nitroaniline	N.D.	33.	170	ug/kg	98		83-118		
3-Nitroaniline	N.D.	67.	170	ug/kg	95		66-114		
4-Nitroaniline	N.D.	67.	170	ug/kg	74		52-92		
Nitrobenzene	N.D.	33.	170	ug/kg	99		78-122		
2-Nitrophenol	N.D.	33.	170	ug/kg	93		81-114		
4-Nitrophenol	N.D.	170.	500	ug/kg	88		57-131		
N-Nitroso-di-n-propylamine	N.D.	33.	170	ug/kg	99		70-113		
N-Nitrosodiphenylamine	N.D.	33.	170	ug/kg	101		86-112		
Di-n-octylphthalate	N.D.	67.	170	ug/kg	113		65-141		
Pentachlorophenol	N.D.	170.	500	ug/kg	93		50-133		
Phenanthrene	N.D.	33.	170	ug/kg	94		83-109		
Phenol	N.D.	33.	170	ug/kg	91		74-115		
Pyrene	N.D.	33.	170	ug/kg	105		80-121		

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1242848
Reported: 05/05/11 at 02:47 PM

Analysis Name	Blank Result	Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
2,4,5-Trichlorophenol	N.D.	67.	170	ug/kg	94		84-109		
2,4,6-Trichlorophenol	N.D.	33.	170	ug/kg	102		88-114		
Batch number: 111115708001	Sample number(s): 6262260-6262269								
Aluminum	N.D.	4.79	19.0	mg/kg	88		61-110		
Antimony	N.D.	0.952	1.90	mg/kg	56		38-150		
Arsenic	N.D.	0.905	1.90	mg/kg	97		90-110		
Barium	N.D.	0.0381	0.476	mg/kg	103		90-117		
Beryllium	N.D.	0.0648	0.476	mg/kg	98		87-110		
Cadmium	N.D.	0.133	0.476	mg/kg	97		90-114		
Calcium	N.D.	5.84	19.0	mg/kg	97		88-110		
Chromium	N.D.	0.562	1.43	mg/kg	92		85-110		
Cobalt	N.D.	0.181	0.476	mg/kg	99		90-114		
Copper	N.D.	0.210	0.952	mg/kg	97		83-112		
Iron	N.D.	4.49	19.0	mg/kg	85		61-110		
Lead	N.D.	0.571	1.43	mg/kg	97		80-120		
Magnesium	N.D.	2.42	9.52	mg/kg	93		82-110		
Manganese	N.D.	0.0743	0.476	mg/kg	102		89-112		
Nickel	N.D.	0.181	0.952	mg/kg	98		90-114		
Potassium	N.D.	17.1	47.6	mg/kg	93		78-110		
Selenium	N.D.	0.933	1.90	mg/kg	97		57-110		
Silver	N.D.	0.171	0.476	mg/kg	99		86-111		
Sodium	N.D.	35.5	95.2	mg/kg	90		87-110		
Thallium	N.D.	1.38	2.86	mg/kg	101		90-116		
Vanadium	N.D.	0.181	0.476	mg/kg	93		79-110		
Zinc	N.D.	0.629	1.90	mg/kg	93		90-110		
Batch number: 111115711001	Sample number(s): 6262260-6262269								
Mercury	N.D.	0.0029	0.100	mg/kg	96		88-123		
Batch number: 111125708002	Sample number(s): 6262270-6262274								
Aluminum	N.D.	5.03	20.0	mg/kg	92		61-110		
Antimony	N.D.	1.00	2.00	mg/kg	94		38-150		
Arsenic	N.D.	0.950	2.00	mg/kg	97		90-110		
Barium	N.D.	0.0400	0.500	mg/kg	101		90-117		
Beryllium	N.D.	0.0680	0.500	mg/kg	97		87-110		
Cadmium	N.D.	0.140	0.500	mg/kg	97		90-114		
Calcium	N.D.	6.13	20.0	mg/kg	100		88-110		
Chromium	N.D.	0.590	1.50	mg/kg	97		85-110		
Cobalt	N.D.	0.190	0.500	mg/kg	100		90-114		
Copper	N.D.	0.220	1.00	mg/kg	99		83-112		
Iron	N.D.	4.71	20.0	mg/kg	99		61-110		
Lead	N.D.	0.600	1.50	mg/kg	100		80-120		
Magnesium	N.D.	2.54	10.0	mg/kg	98		82-110		
Manganese	0.0810 J	0.0780	0.500	mg/kg	101		89-112		
Nickel	N.D.	0.190	1.00	mg/kg	99		90-114		
Potassium	N.D.	18.0	50.0	mg/kg	95		78-110		
Selenium	N.D.	0.980	2.00	mg/kg	96		57-110		
Silver	N.D.	0.180	0.500	mg/kg	101		86-111		
Sodium	N.D.	37.3	100	mg/kg	94		87-110		
Thallium	N.D.	1.45	3.00	mg/kg	103		90-116		
Vanadium	N.D.	0.190	0.500	mg/kg	97		79-110		
Zinc	N.D.	0.660	2.00	mg/kg	95		90-110		
Batch number: 111125708004	Sample number(s): 6262277-6262296								
Aluminum	N.D.	5.03	20.0	mg/kg	93		61-110		
Antimony	N.D.	1.00	2.00	mg/kg	55		38-150		
Arsenic	N.D.	0.950	2.00	mg/kg	100		90-110		

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1242848
Reported: 05/05/11 at 02:47 PM

Analysis Name	Blank Result	Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Barium	N.D.	0.0400	0.500	mg/kg	106		90-117		
Beryllium	N.D.	0.0680	0.500	mg/kg	99		87-110		
Cadmium	N.D.	0.140	0.500	mg/kg	99		90-114		
Calcium	N.D.	6.13	20.0	mg/kg	101		88-110		
Chromium	N.D.	0.590	1.50	mg/kg	94		85-110		
Cobalt	N.D.	0.190	0.500	mg/kg	102		90-114		
Copper	N.D.	0.220	1.00	mg/kg	100		83-112		
Iron	N.D.	4.71	20.0	mg/kg	90		61-110		
Lead	N.D.	0.600	1.50	mg/kg	100		80-120		
Magnesium	N.D.	2.54	10.0	mg/kg	100		82-110		
Manganese	N.D.	0.0780	0.500	mg/kg	103		89-112		
Nickel	N.D.	0.190	1.00	mg/kg	101		90-114		
Potassium	N.D.	18.0	50.0	mg/kg	98		78-110		
Selenium	N.D.	0.980	2.00	mg/kg	94		57-110		
Silver	N.D.	0.180	0.500	mg/kg	101		86-111		
Sodium	N.D.	37.3	100	mg/kg	97		87-110		
Thallium	N.D.	1.45	3.00	mg/kg	102		90-116		
Vanadium	N.D.	0.190	0.500	mg/kg	95		79-110		
Zinc	N.D.	0.660	2.00	mg/kg	98		90-110		
Batch number: 111125708006	Sample number(s): 6262275-6262276								
Aluminum	N.D.	5.03	20.0	mg/kg	101		61-110		
Antimony	N.D.	1.00	2.00	mg/kg	52		38-150		
Arsenic	N.D.	0.950	2.00	mg/kg	99		90-110		
Barium	N.D.	0.0400	0.500	mg/kg	99		90-117		
Beryllium	N.D.	0.0680	0.500	mg/kg	95		87-110		
Cadmium	N.D.	0.140	0.500	mg/kg	100		90-114		
Calcium	8.47 J	6.13	20.0	mg/kg	97		88-110		
Chromium	N.D.	0.590	1.50	mg/kg	96		85-110		
Cobalt	N.D.	0.190	0.500	mg/kg	101		90-114		
Copper	N.D.	0.220	1.00	mg/kg	99		83-112		
Iron	N.D.	4.71	20.0	mg/kg	91		61-110		
Lead	N.D.	0.600	1.50	mg/kg	97		80-120		
Magnesium	N.D.	2.54	10.0	mg/kg	100		82-110		
Manganese	N.D.	0.0780	0.500	mg/kg	100		89-112		
Nickel	N.D.	0.190	1.00	mg/kg	100		90-114		
Potassium	N.D.	18.0	50.0	mg/kg	99		78-110		
Selenium	N.D.	0.980	2.00	mg/kg	97		57-110		
Silver	N.D.	0.180	0.500	mg/kg	101		86-111		
Sodium	N.D.	37.3	100	mg/kg	94		87-110		
Thallium	N.D.	1.45	3.00	mg/kg	105		90-116		
Vanadium	N.D.	0.190	0.500	mg/kg	95		79-110		
Zinc	N.D.	0.660	2.00	mg/kg	98		90-110		
Batch number: 111125711004	Sample number(s): 6262277-6262296								
Mercury	N.D.	0.0028	0.0983	mg/kg	97		88-123		
Batch number: 111125711006	Sample number(s): 6262275-6262276								
Mercury	N.D.	0.0028	0.0963	mg/kg	99		88-123		
Batch number: 111155711002	Sample number(s): 6262270-6262274								
Mercury	N.D.	0.0027	0.0954	mg/kg	95		88-123		
Batch number: 11112820001A	Sample number(s): 6262280-6262285								
Moisture					100		99-101		
Batch number: 11112820001B	Sample number(s): 6262286-6262296								
Moisture					100		99-101		

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1242848
Reported: 05/05/11 at 02:47 PM

Analysis Name	Blank Result	Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 11112820002A	Sample number(s): 6262260-6262269								
Moisture					100		99-101		
Batch number: 11112820002B	Sample number(s): 6262270-6262279								
Moisture					100		99-101		

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: 11110SLA026	Sample number(s): 6262260-6262269 UNSPK: 6262260								
Acenaphthene	97	97	51-135	1	30				
Acenaphthylene	102	103	47-137	1	30				
Acetophenone	99	99	38-136	1	30				
Anthracene	96	98	40-147	2	30				
Atrazine	98	97	52-124	0	30				
Benzaldehyde	35	37	10-85	4	30				
Benzo(a)anthracene	97	100	32-150	3	30				
Benzo(a)pyrene	86	88	57-129	3	30				
Benzo(b)fluoranthene	87	90	53-131	4	30				
Benzo(g,h,i)perylene	86	89	60-123	3	30				
Benzo(k)fluoranthene	86	87	61-131	1	30				
1,1'-Biphenyl	97	100	51-127	3	30				
4-Bromophenyl-phenylether	97	99	58-136	2	30				
Butylbenzylphthalate	107	111	42-155	4	30				
Di-n-butylphthalate	98	99	55-131	1	30				
Caprolactam	64	90	36-137	34*	30				
Carbazole	96	96	36-148	0	30				
4-Chloro-3-methylphenol	101	101	33-144	0	30				
4-Chloroaniline	86	89	11-114	3	30				
bis(2-Chloroethoxy)methane	101	104	60-118	3	30				
bis(2-Chloroethyl)ether	103	103	45-139	0	30				
2-Chloronaphthalene	69	73	43-149	5	30				
2-Chlorophenol	104	105	53-141	1	30				
4-Chlorophenyl-phenylether	96	96	57-127	0	30				
2,2'-oxybis(1-Chloropropane)	98	99	51-124	0	30				
Chrysene	96	97	76-114	2	30				
Dibenz(a,h)anthracene	86	90	37-151	4	30				
Dibenzofuran	98	98	38-148	0	30				
3,3'-Dichlorobenzidine	92	91	10-143	2	30				
2,4-Dichlorophenol	103	103	48-141	0	30				
Diethylphthalate	95	95	52-130	0	30				
2,4-Dimethylphenol	93	93	27-143	0	30				
Dimethylphthalate	96	97	49-134	1	30				
4,6-Dinitro-2-methylphenol	66	102	10-148	42*	30				
2,4-Dinitrophenol	40	98	20-143	85*	30				
2,4-Dinitrotoluene	97	96	27-147	1	30				
2,6-Dinitrotoluene	96	97	44-140	1	30				
bis(2-Ethylhexyl)phthalate	108	110	38-151	2	30				
Fluoranthene	97	96	48-122	1	30				

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1242848
Reported: 05/05/11 at 02:47 PM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Fluorene	97	97	46-137	0	30				
Hexachlorobenzene	92	97	53-137	5	30				
Hexachlorobutadiene	91	94	52-124	3	30				
Hexachlorocyclopentadiene	83	86	10-153	3	30				
Hexachloroethane	89	90	71-104	1	30				
Indeno(1,2,3-cd)pyrene	86	89	61-123	3	30				
Isophorone	102	104	54-122	3	30				
2-Methylnaphthalene	95	93	34-139	3	30				
2-Methylphenol	98	97	30-145	2	30				
4-Methylphenol	103	99	36-149	3	30				
Naphthalene	96	97	52-132	0	30				
2-Nitroaniline	99	102	46-146	3	30				
3-Nitroaniline	98	96	34-134	2	30				
4-Nitroaniline	86	86	26-124	0	30				
Nitrobenzene	104	107	37-139	3	30				
2-Nitrophenol	101	99	25-151	2	30				
4-Nitrophenol	97	100	15-149	3	30				
N-Nitroso-di-n-propylamine	105	103	46-128	1	30				
N-Nitrosodiphenylamine	103	104	33-148	1	30				
Di-n-octylphthalate	100	102	43-149	2	30				
Pentachlorophenol	92	99	23-145	8	30				
Phenanthrene	97	98	34-147	1	30				
Phenol	97	97	39-151	1	30				
Pyrene	106	109	76-124	3	30				
2,4,5-Trichlorophenol	98	97	25-143	1	30				
2,4,6-Trichlorophenol	99	100	41-142	1	30				
Batch number: 11110SLD026	Sample number(s): 6262270-6262289 UNSPK: 6262270								
Acenaphthene	-96*	-6*	51-135	40*	30				
Acenaphthylene	0*	109	47-137	200*	30				
Acetophenone	0*	225*	38-136	200*	30				
Anthracene	0*	-1*	40-147	200*	30				
Atrazine	0*	0*	52-124	0	30				
Benzaldehyde	0*	0*	10-85	0	30				
Benzo(a)anthracene	-29*	-15*	32-150	10	30				
Benzo(a)pyrene	0*	110	57-129	200*	30				
Benzo(b)fluoranthene	0*	116	53-131	200*	30				
Benzo(g,h,i)perylene	0*	128*	60-123	200*	30				
Benzo(k)fluoranthene	0*	0*	61-131	0	30				
1,1'-Biphenyl	-117*	-50*	51-127	29	30				
4-Bromophenyl-phenylether	0*	0*	58-136	0	30				
Butylbenzylphthalate	0*	0*	42-155	0	30				
Di-n-butylphthalate	0*	0*	55-131	0	30				
Caprolactam	987*	1176*	36-137	17	30				
Carbazole	0*	0*	36-148	0	30				
4-Chloro-3-methylphenol	0*	0*	33-144	0	30				
4-Chloroaniline	0*	0*	11-114	0	30				
bis(2-Chloroethoxy)methane	0*	0*	60-118	0	30				
bis(2-Chloroethyl)ether	0*	0*	45-139	0	30				
2-Chloronaphthalene	0*	0*	43-149	0	30				
2-Chlorophenol	0*	0*	53-141	0	30				
4-Chlorophenyl-phenylether	0*	0*	57-127	0	30				
2,2'-oxybis(1-Chloropropane)	0*	113	51-124	200*	30				

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1242848
Reported: 05/05/11 at 02:47 PM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Chrysene	-320 (2)	-196 (2)	76-114	27	30				
Dibenz(a,h)anthracene	0*	0*	37-151	0	30				
Dibenzofuran	163*	185*	38-148	13	30				
3,3'-Dichlorobenzidine	0*	0*	10-143	0	30				
2,4-Dichlorophenol	147*	166*	48-141	12	30				
Diethylphthalate	0*	0*	52-130	0	30				
2,4-Dimethylphenol	0*	0*	27-143	0	30				
Dimethylphthalate	0*	0*	49-134	0	30				
4,6-Dinitro-2-methylphenol	0*	0*	10-148	0	30				
2,4-Dinitrophenol	0 (2)	0 (2)	20-143	0	30				
2,4-Dinitrotoluene	0*	306*	27-147	200*	30				
2,6-Dinitrotoluene	0*	0*	44-140	0	30				
bis(2-Ethylhexyl)phthalate	0*	203*	38-151	200*	30				
Fluoranthene	135*	179*	48-122	28	30				
Fluorene	-160 (2)	-90 (2)	46-137	24	30				
Hexachlorobenzene	0*	0*	53-137	0	30				
Hexachlorobutadiene	0*	0*	52-124	0	30				
Hexachlorocyclopentadiene	0*	0*	10-153	0	30				
Hexachloroethane	634*	850*	71-104	29	30				
Indeno(1,2,3-cd)pyrene	0*	0*	61-123	0	30				
Isophorone	105	0*	54-122	200*	30				
2-Methylnaphthalene	-2614 (2)	-1871 (2)	34-139	23	30				
2-Methylphenol	0*	0*	30-145	0	30				
4-Methylphenol	0*	0*	36-149	0	30				
Naphthalene	-567 (2)	-397 (2)	52-132	20	30				
2-Nitroaniline	0*	0*	46-146	0	30				
3-Nitroaniline	0*	0*	34-134	0	30				
4-Nitroaniline	0*	0*	26-124	0	30				
Nitrobenzene	0*	110	37-139	200*	30				
2-Nitrophenol	0*	103	25-151	200*	30				
4-Nitrophenol	0*	0*	15-149	0	30				
N-Nitroso-di-n-propylamine	0*	0*	46-128	0	30				
N-Nitrosodiphenylamine	-336 (2)	-231 (2)	33-148	23	30				
Di-n-octylphthalate	0*	0*	43-149	0	30				
Pentachlorophenol	0*	0*	23-145	0	30				
Phenanthrene	-544 (2)	-359 (2)	34-147	27	30				
Phenol	0*	0*	39-151	0	30				
Pyrene	-80*	-40*	76-124	23	30				
2,4,5-Trichlorophenol	0*	0*	25-143	0	30				
2,4,6-Trichlorophenol	0*	0*	41-142	0	30				
Batch number: 11111SLA026	Sample number(s): 6262290-6262296 UNSPK: 6262290								
Acenaphthene	48*	70	51-135	39*	30				
Acenaphthylene	55	73	47-137	30	30				
Acetophenone	58	71	38-136	22	30				
Anthracene	55	75	40-147	33*	30				
Atrazine	67	74	52-124	10	30				

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1242848
Reported: 05/05/11 at 02:47 PM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Benzaldehyde	34	47	10-85	32*	30				
Benzo(a)anthracene	69	76	32-150	11	30				
Benzo(a)pyrene	62	74	57-129	14	30				
Benzo(b)fluoranthene	60	66	53-131	9	30				
Benzo(g,h,i)perylene	48*	64	60-123	21	30				
Benzo(k)fluoranthene	52*	70	61-131	31*	30				
1,1'-Biphenyl	51	71	51-127	34*	30				
4-Bromophenyl-phenylether	51*	79	58-136	44*	30				
Butylbenzylphthalate	64	83	42-155	26	30				
Di-n-butylphthalate	60	72	55-131	19	30				
Caprolactam	30*	70	36-137	80*	30				
Carbazole	63	75	36-148	19	30				
4-Chloro-3-methylphenol	56	70	33-144	23	30				
4-Chloroaniline	53	61	11-114	16	30				
bis(2-Chloroethoxy)methane	63	73	60-118	16	30				
bis(2-Chloroethyl)ether	59	70	45-139	19	30				
2-Chloronaphthalene	43	60	43-149	35*	30				
2-Chlorophenol	25*	35*	53-141	33*	30				
4-Chlorophenyl-phenylether	48*	69	57-127	37*	30				
2,2'-oxybis(1-Chloropropane)	54	75	51-124	34*	30				
Chrysene	53*	62*	76-114	11	30				
Dibenz(a,h)anthracene	60	74	37-151	22	30				
Dibenzofuran	52	71	38-148	31*	30				
3,3'-Dichlorobenzidine	46	67	10-143	38*	30				
2,4-Dichlorophenol	33*	41*	48-141	22	30				
Diethylphthalate	56	66	52-130	16	30				
2,4-Dimethylphenol	63	72	27-143	14	30				
Dimethylphthalate	54	66	49-134	20	30				
4,6-Dinitro-2-methylphenol	56	0*	10-148	200*	30				
2,4-Dinitrophenol	0*	0*	20-143	0	30				
2,4-Dinitrotoluene	49	63	27-147	25	30				
2,6-Dinitrotoluene	58	73	44-140	24	30				
bis(2-Ethylhexyl)phthalate	57	83	38-151	37*	30				
Fluoranthene	70	80	48-122	15	30				
Fluorene	49	69	46-137	36*	30				
Hexachlorobenzene	33*	62	53-137	62*	30				
Hexachlorobutadiene	42*	66	52-124	45*	30				
Hexachlorocyclopentadiene	0*	0*	10-153	0	30				
Hexachloroethane	13*	36*	71-104	96*	30				
Indeno(1,2,3-cd)pyrene	54*	75	61-123	35*	30				
Isophorone	59	72	54-122	21	30				
2-Methylnaphthalene	27*	57	34-139	36*	30				
2-Methylphenol	56	68	30-145	20	30				
4-Methylphenol	56	62	36-149	13	30				
Naphthalene	45*	67	52-132	33*	30				
2-Nitroaniline	72	82	46-146	14	30				
3-Nitroaniline	63	82	34-134	28	30				
4-Nitroaniline	75	82	26-124	9	30				
Nitrobenzene	65	73	37-139	12	30				
2-Nitrophenol	23*	28	25-151	21	30				
4-Nitrophenol	0*	0*	15-149	0	30				
N-Nitroso-di-n-propylamine	61	76	46-128	22	30				
N-Nitrosodiphenylamine	92	129	33-148	35*	30				

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1242848
Reported: 05/05/11 at 02:47 PM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Di-n-octylphthalate	52	81	43-149	44*	30				
Pentachlorophenol	0*	0*	23-145	0	30				
Phenanthrene	53	67	34-147	17	30				
Phenol	52	61	39-151	17	30				
Pyrene	51*	65*	76-124	17	30				
2,4,5-Trichlorophenol	41	48	25-143	15	30				
2,4,6-Trichlorophenol	38*	38*	41-142	2	30				
Batch number: 111115708001	Sample number(s): 6262260-6262269 UNSPK: 6262260 BKG: 6262260								
Aluminum	3274 (2)	2057 (2)	90-110	12	20	14,400	13,800	4	20
Antimony	49*	52*	75-125	8	20	N.D.	N.D.	0 (1)	20
Arsenic	92	87	75-125	2	20	6.71	5.55	19 (1)	20
Barium	100	96	75-125	2	20	68.6	66.1	4	20
Beryllium	97	93	83-111	2	20	1.36	1.51	10 (1)	20
Cadmium	80	82	75-125	4	20	N.D.	N.D.	0 (1)	20
Calcium	-1850 (2)	462 (2)	75-125	31*	20	31,600	35,000	10	20
Chromium	105	104	75-125	1	20	17.7	15.7	12	20
Cobalt	88	85	78-113	1	20	9.24	8.45	9	20
Copper	105	89	75-125	8	20	21.5	23.1	7	20
Iron	851 (2)	-2415 (2)	75-125	13	20	24,900	22,300	11	20
Lead	77	59*	75-125	9	20	18.0	15.8	13	20
Magnesium	-2244 (2)	277 (2)	75-125	27*	20	20,200	22,200	10	20
Manganese	321 (2)	-53 (2)	75-125	24*	20	683	731	7	20
Nickel	93	88	75-125	3	20	15.0	14.5	3	20
Potassium	183*	167*	75-125	5	20	1,020	955	7	20
Selenium	83	80	75-125	2	20	1.65 J	N.D.	200* (1)	20
Silver	87	89	75-125	4	20	N.D.	N.D.	0 (1)	20
Sodium	94	94	75-125	2	20	60.0 J	56.5 J	6 (1)	20
Thallium	82	83	75-125	3	20	N.D.	N.D.	0 (1)	20
Vanadium	102	98	75-125	2	20	28.1	26.9	4	20
Zinc	100	81	75-125	8	20	61.2	56.9	7	20
Batch number: 111115711001	Sample number(s): 6262260-6262269 UNSPK: P261012 BKG: P261012								
Mercury	98	97	80-120	2	20	0.0269 J	0.0331 J	21* (1)	20
Batch number: 111125708002	Sample number(s): 6262270-6262274 UNSPK: P260289 BKG: P260289								
Aluminum	4212 (2)	4154 (2)	90-110	1	20	14,100	13,700	3	20
Antimony	64*	65*	75-125	1	20	N.D.	N.D.	0 (1)	20
Arsenic	105	106	75-125	1	20	9.53	9.43	1 (1)	20
Barium	142*	139*	75-125	1	20	258	245	5	20
Beryllium	104	105	83-111	1	20	0.681	0.655	4 (1)	20
Cadmium	92	93	75-125	0	20	N.D.	N.D.	0 (1)	20
Calcium	-133 (2)	-126 (2)	75-125	0	20	22,100	21,200	4	20
Chromium	147*	150*	75-125	1	20	21.5	21.1	2	20
Cobalt	92	93	78-113	1	20	7.09	6.90	3	20
Copper	104	108	75-125	2	20	17.9	17.7	1	20
Iron	843 (2)	1143	75-125	1	20	18,700	18,200	3	20

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1242848
Reported: 05/05/11 at 02:47 PM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
		(2)							
Lead	90	90	75-125	0	20	12.2	11.9	3	20
Magnesium	341 (2)	390 (2)	75-125	1	20	8,400	8,160	3	20
Manganese	84 (2)	84 (2)	75-125	0	20	271	263	3	20
Nickel	93	94	75-125	1	20	22.3	22.0	2	20
Potassium	320*	316*	75-125	1	20	2,430	2,390	2	20
Selenium	90	90	75-125	0	20	2.65	2.16	20 (1)	20
Silver	114	116	75-125	1	20	N.D.	N.D.	0 (1)	20
Sodium	91	97	75-125	1	20	3,270	3,160	4	20
Thallium	115	115	75-125	1	20	2.89 J	2.75 J	5 (1)	20
Vanadium	160*	159*	75-125	0	20	47.3	46.3	2	20
Zinc	98	102	75-125	1	20	69.7	68.6	2	20
Batch number: 111125708004	Sample number(s): 6262277-6262296 UNSPK: 6262277 BKG: 6262277								
Aluminum	2996 (2)	3506 (2)	90-110	6	20	10,300	11,000	7	20
Antimony	55*	54*	75-125	3	20	N.D.	1.08 J	200* (1)	20
Arsenic	107	110	75-125	2	20	11.9	12.8	7	20
Barium	107	106	75-125	1	20	163	166	2	20
Beryllium	105	104	83-111	1	20	1.07	1.16	8 (1)	20
Cadmium	98	99	75-125	1	20	1.10	1.31	17 (1)	20
Calcium	-35 (2)	52 (2)	75-125	11	20	2,920	2,240	26*	20
Chromium	124	133*	75-125	3	20	33.4	37.1	10	20
Cobalt	98	98	78-113	0	20	13.1	13.9	6	20
Copper	123	132*	75-125	2	20	72.2	78.6	8	20
Iron	949 (2)	1907 (2)	75-125	6	20	15,500	16,600	7	20
Lead	151 (2)	333 (2)	75-125	11	20	210	229	9	20
Magnesium	167 (2)	277 (2)	75-125	8	20	2,380	2,260	5	20
Manganese	124 (2)	136 (2)	75-125	2	20	281	295	5	20
Nickel	102	104	75-125	1	20	23.6	25.2	6	20
Potassium	193*	205*	75-125	4	20	1,140	1,170	2	20
Selenium	96	96	75-125	0	20	2.37	2.00	17 (1)	20
Silver	96	97	75-125	1	20	0.345 J	0.473 J	31* (1)	20
Sodium	105	104	75-125	1	20	436	426	2 (1)	20
Thallium	93	93	75-125	0	20	N.D.	N.D.	0 (1)	20
Vanadium	113	114	75-125	1	20	20.6	21.1	2	20
Zinc	131 (2)	183 (2)	75-125	7	20	304	341	12	20
Batch number: 111125708006	Sample number(s): 6262275-6262276 UNSPK: P261350 BKG: P261350								
Aluminum	1183 (2)	1925 (2)	90-110	10	20	10,600	10,600	0	20
Antimony	79	74*	75-125	7	20	N.D.	1.19 J	200* (1)	20
Arsenic	104	106	75-125	1	20	2.53	2.61	3 (1)	20
Barium	111	112	75-125	0	20	32.5	35.6	9	20
Beryllium	110	110	83-111	1	20	0.229 J	0.234 J	2 (1)	20
Cadmium	103	102	75-125	2	20	N.D.	N.D.	0 (1)	20
Calcium	134*	139*	75-125	2	20	155	152	2	20
Chromium	122	121	75-125	1	20	28.3	32.5	14	20
Cobalt	106	106	78-113	1	20	1.27	1.40	9 (1)	20
Copper	113	122	75-125	5	20	12.1	13.6	12	20
Iron	738 (2)	846 (2)	75-125	1	20	8,450	9,140	8	20
Lead	202*	221*	75-125	3	20	57.8	97.1	51*	20

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1242848
Reported: 05/05/11 at 02:47 PM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc		DUP Conc		DUP RPD	Dup RPD Max
Magnesium	180 (2)	211 (2)	75-125	5	20	799		891		11	20
Manganese	110	116	75-125	3	20	27.4		29.9		9	20
Nickel	108	114	75-125	3	20	7.06		7.37		4	20
Potassium	151*	162*	75-125	4	20	857		900		5	20
Selenium	93	94	75-125	0	20	1.47	J	N.D.		200* (1)	20
Silver	118	119	75-125	0	20	N.D.		N.D.		0 (1)	20
Sodium	108	110	75-125	1	20	N.D.		N.D.		0 (1)	20
Thallium	122	123	75-125	1	20	1.49	J	1.52	J	2 (1)	20
Vanadium	114	116	75-125	0	20	17.2		18.3		7	20
Zinc	107	108	75-125	1	20	13.0		13.9		6	20
Batch number: 111125711004	Sample number(s): 6262277-6262296 UNSPK: 6262279 BKG: 6262279										
Mercury	-5841 (2)	-6808 (2)	80-120	35*	20	15.0		16.7		11 (1)	20
Batch number: 111125711006	Sample number(s): 6262275-6262276 UNSPK: P261350 BKG: P261350										
Mercury	-31*	-29*	80-120	1	20	0.369		0.351		5 (1)	20
Batch number: 111155711002	Sample number(s): 6262270-6262274 UNSPK: 6262272 BKG: 6262272										
Mercury	-194 (2)	331 (2)	80-120	44*	20	1.81		1.18		42* (1)	20
Batch number: 11112820001A	Sample number(s): 6262280-6262285 BKG: P258672										
Moisture						12.4		14.2		13	15
Batch number: 11112820001B	Sample number(s): 6262286-6262296 BKG: 6262286										
Moisture						41.8		42.2		1	15
Batch number: 11112820002A	Sample number(s): 6262260-6262269 BKG: 6262268										
Moisture						32.3		33.7		4	15
Batch number: 11112820002B	Sample number(s): 6262270-6262279 BKG: 6262271										
Moisture						31.3		33.0		5	15

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: TCL(4.3)by 8260(soil)
Batch number: Q111121AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6262261	84	75	67*	69*
6262262	75	73	64*	63*
6262264	79	82	63*	73
6262266	90	94	81	81
6262267	60*	65*	45*	48*
6262268	74	73	65*	66*
6262270	83	85	68*	74

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1242848
Reported: 05/05/11 at 02:47 PM

Surrogate Quality Control

6262271	69*	71	49*	53*
6262273	82	87	73	75
6262274	81	75	73	75
6262276	86	90	69*	70
6262277	77	72	66*	72
6262279	65*	55*	42*	33*
6262280	74	75	56*	66*
6262282	81	80	63*	60*
6262283	84	85	75	82
6262295	90	90	72	74
Blank	90	94	83	80
LCS	89	92	80	78
LCSD	92	93	82	84
Limits:	71-114	70-109	70-123	70-111

Analysis Name: TCL(4.3)by 8260(soil)
Batch number: Q111161AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6262287	105	106	83	85
6262294	74	76	56*	52*
Blank	92	96	78	76
LCS	106	110*	88	85
LCSD	103	106	87	84
Limits:	71-114	70-109	70-123	70-111

Analysis Name: TCL(4.3)by 8260(soil)
Batch number: Q111162AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6262285	94	96	83	93
Blank	94	96	77	75
LCS	109	108	89	85
LCSD	107	106	88	85
Limits:	71-114	70-109	70-123	70-111

Analysis Name: TCL(4.3)by 8260(soil)
Batch number: X111131AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6262260	98	109	92	96
6262269	108	113*	107	73
6262272	100	110*	97	87
6262275	104	106	99	80
6262281	106	108	92	95
6262284	109	113*	115	65*
6262286	105	110*	95	85
6262289	99	104	101	89
6262290	106	112*	110	85
6262292	99	105	91	96
6262293	110	110*	120	79
6262296	106	110*	105	105
Blank	106	108	91	96
LCS	105	107	101	97

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1242848
Reported: 05/05/11 at 02:47 PM

Surrogate Quality Control

LCSD	106	107	101	98
Limits:	71-114	70-109	70-123	70-111

Analysis Name: TCL(4.3)by 8260(soil)
Batch number: X111151AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6262263	100	104	93	102
6262265	101	100	102	103
6262278	102	107	95	96
6262288	97	103	91	99
6262291	100	105	93	95
Blank	103	106	94	100
LCS	105	106	102	100
LCSD	104	100	103	100
Limits:	71-114	70-109	70-123	70-111

Analysis Name: TCL 8270 (microwave)
Batch number: 11110SLA026

	Phenol-d6	2-Fluorophenol	2,4,6-Tribromophenol	Nitrobenzene-d5	2-Fluorobiphenyl	Terphenyl-d14
6262260	104	109	85	102	91	90
6262261	37*	42	36	64	46*	47
6262262	96	98	84	110	104	89
6262263	84	87	76	96	90	82
6262264	78	83	77	112	86	83
6262265	81	40	30	96	94	82
6262266	92	97	79	102	97	78
6262267	99	83	57	219*	109	92
6262268	89	90	85	99	94	85
6262269	81	85	76	88	82	78
Blank	90	95	91	95	91	78
LCS	102	107	95	105	98	91
MS	101	106	86	101	94	89
MSD	103	106	88	102	95	93
Limits:	42-130	39-136	28-139	55-121	56-121	43-124

Analysis Name: TCL 8270 (microwave)
Batch number: 11110SLD026

	Phenol-d6	2-Fluorophenol	2,4,6-Tribromophenol	Nitrobenzene-d5	2-Fluorobiphenyl	Terphenyl-d14
6262270	72	69	65	128*	84	82
6262271	80	73	72	106	85	68
6262272	83	81	81	84	87	75
6262273	68	67	46	77	66	58
6262274	78	78	77	83	80	69
6262275	78	78	73	76	83	72
6262276	95	83	53	102	96	86
6262277	73	73	70	74	77	64
6262278	75	74	65	67	70	58
6262279	47	47	43	50*	48*	44
6262280	95	97	85	157*	112	97
6262281	94	94	91	91	95	80
6262282	86	83	81	111	84	76

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1242848
Reported: 05/05/11 at 02:47 PM

Surrogate Quality Control

6262283	80	81	90	105	88	72
6262284	74	77	72	80	76	77
6262285	73	72	76	116	78	69
6262286	64	65	74	63	66	58
6262287	35*	36*	45	41*	42*	36*
6262288	79	82	77	82	86	70
6262289	85	86	82	87	90	43
Blank	103	101	95	93	94	83
LCS	103	103	98	92	94	88
MS	42	36*	33	89	42*	48
MSD	55	53	39	81	58	56
Limits:	42-130	39-136	28-139	55-121	56-121	43-124

Analysis Name: TCL 8270 (microwave)
Batch number: 11111SLA026

	Phenol-d6	2-Fluorophenol	2,4,6-Tribromophenol	Nitrobenzene-d5	2-Fluorobiphenyl	Terphenyl-d14
6262290	59	32*	35	70	64	59
6262291	71	73	55	74	70	65
6262292	73	75	59	74	73	65
6262293	58	57	48	60	59	52
6262294	58	58	50	63	59	53
6262295	109	101	90	240*	123*	107
6262296	86	88	75	85	82	78
Blank	96	98	100	99	96	97
LCS	99	100	93	97	94	92
MS	59	36*	37	60	51*	46
MSD	65	41	38	74	69	62
Limits:	42-130	39-136	28-139	55-121	56-121	43-124

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1242848 Sample # 62662260-96 **COC #** 259438

Please print. Instructions on reverse side correspond with circled numbers. 0.8-2.1°C

(1) Client: SUN-AQUATERRA Acct. #:

Project Name/#: PHILA REF AOI-10 PWSID #:

Project Manager: T. DOERR P.O.#:

Sampler: S. SYKES Quote #:

Name of state where samples were collected: PA

For Lab Use Only
FSC:
SCR#:

Preservation Codes
H=HCl T=Thiosulfate
N=HNO_3 B=NaOH
S=H_2SO_4 O=Other

(2) Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water (Potable / NPDES)	Other	Total # of Containers	(5) Analyses Requested / Preservation Codes: TCL VOCs 8260	TCL SVOCs 8270	TAL metals 6010	Remarks	(6) Temperature of samples upon receipt (if requested)
BH-10-69-WC_0-2'	4/12/11	815	X		X			4	X	X	X		
BH-10-69-WC_5-8'		830	X		X			4	X	X	X		
BH-10-69-WC_15.5-16'		900	X		X			4	X	X	X		
BH-10-46-WC_0-2'		915	X		X			4	X	X	X		
BH-10-46-WC_5-8'		930	X		X			4	X	X	X		
BH-10-46-WC_17-18'		1000	X		X			4	X	X	X		
BH-10-44-WC_0-2'		1020	X		X			4	X	X	X		
BH-10-44-WC_10-12'		1040	X		X			4	X	X	X		
BH-10-44-WC_24-26'		1100	X		X			4	X	X	X		

(7) **Turnaround Time Requested** (TAT) (please circle): (Normal) Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax (E-mail)
Phone #: Fax #:
E-mail address:

(8) **Data Package Options** (please circle if required)
Type I (validation/NJ Reg)
Type II (Tier II)
Type III (Reduced NJ)
Type IV (CLP SOW)
Type VI (Raw Data Only)
TX TRRP-13
MA MCP CT RCP
SDG Complete? (Yes) No
Site-specific QC (MS/MSD/Dup)? Yes (No)
(If yes, indicate QC sample and submit triplicate volume.)
Internal COC Required? Yes / (No)

Relinquished by:	Date	Time	Received by:	Date	Time
[signature] AQT	4/19/11	0600	Sample Fridge	4/19/11	0600
[signature]	4/19/11	0925	[signature]	4/19/11	0925
[signature]	4/19/11	1450			
			[signature]	4/19/11	1450

(9)

Lancaster Laboratories, Inc., 2425 New Holland Pike, Lancaster, PA 17601 (717) 656-2300 Fax: (717) 656-6766
Copies: White and yellow should accompany samples to Lancaster Laboratories. The pink copy should be retained by the client.

Issued by Dept. 6042 Management
2102.05

Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1242848 Sample # 62622260-96

COC # 260329

Please print. Instructions on reverse side correspond with circled numbers. 0.8-2.1°c

(1) Client: SUN-AQUATERRA Acct. #:

Project Name/#: PHILA REF AOI-10 PWSID #:

Project Manager: T. DOERR P.O.#:

Sampler: S. SYKES Quote #:

Name of state where samples were collected: PA

For Lab Use Only
FSC:
SCR#:

Preservation Codes
H=HCl T=Thiosulfate
N=HNO_3 B=NaOH
S=H_2SO_4 O=Other

(2) Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water (Potable / NPDES)	Other	Total # of Containers	(5) Analyses Requested / Preservation Codes: TCL VOCs 8260	TCL SVOCs 8270	TAL metals 6010	Remarks
BH-10-45-WC_0-2'	4/12/11	1215	X		X			4	X	X	X	
BH-10-45-WC_5-8'		1230	X		X			4	X	X	X	
BH-10-45-WC_18-20'		1300	X		X			4	X	X	X	
BH-10-55-WC_0-2'		1430	X		X			4	X	X	X	
BH-10-55-WC_5-8'		1445	X		X			4	X	X	X	
BH-10-55-WC_20-22'		1500	X		X			4	X	X	X	
BH-10-56-WC_0-2'		1600	X		X			4	X	X	X	
BH-10-56-WC_10-12'		1630	X		X			4	X	X	X	
BH-10-56-WC_22-24'		1700	X		X			4	X	X	X	

(6) Temperature of samples upon receipt (if requested)

(7) **Turnaround Time Requested** (TAT) (please circle): (Normal) Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax (E-mail)
Phone #: Fax #:
E-mail address:

(8) **Data Package Options** (please circle if required)
Type I (validation/NJ Reg)
Type II (Tier II)
Type III (Reduced NJ)
Type IV (CLP SOW)
Type VI (Raw Data Only)
TX TRRP-13
MA MCP CT RCP
SDG Complete? (Yes) No
Site-specific QC (MS/MSD/Dup)? Yes (No)
(If yes, indicate QC sample and submit triplicate volume.)
Internal COC Required? Yes / (No)

(9)

Relinquished by:	Date	Time	Received by:	Date	Time
[signature] AGT	4/19/11	0600	Sample Fridge	4/19/11	0600
[signature]	4/19/11	0925	[signature]	4/19/11	0925
[signature]	4/19/11	1450			
			[signature]	4/19/11	1450

Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1242848 Sample # 62622260-96

COC # 260330

Please print. Instructions on reverse side correspond with circled numbers. 0.8-2.1°c

For Lab Use Only
FSC: _____
SCR#: _____

(1)
Client: SUN-AQUATERRA Acct. #: _____
Project Name/#: PHILA REF AOI-10 PWSID #: _____
Project Manager: T. DOERR P.O.#: _____
Sampler: S. SYKES Quote #: _____
Name of state where samples were collected: PA

Preservation Codes
H=HCl T=Thiosulfate
N=HNO_3 B=NaOH
S=H_2SO_4 O=Other

(6) Temperature of samples upon receipt (if requested)

(2) Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water (Potable ☐ NPDES ☐ Check if Applicable)	Other	Total # of Containers	(5) Analyses Requested: TCL VOCs 8260D	TCL SVOCs 8270C	TAL metals 6020	Remarks
BH-10-77-WC_0-2'	4/13/11	1000	X		X			4	X	X	X	
BH-10-77-WC_10-12'		1030	X		X			4	X	X	X	
BH-10-77-WC_20-22'		1100	X		X			4	X	X	X	
BH-10-63-WC_0-2'		1415	X		X			4	X	X	X	
BH-10-63-WC_12-14'		1430	X		X			4	X	X	X	
BH-10-63-WC_21-23'		1500	X		X			4	X	X	X	
BH-10-64-WC_0-2'		1520	X		X			4	X	X	X	
BH-10-64-WC_11-13'		1540	X		X			4	X	X	X	
BH-10-64-WC_24-26'		1600	X		X			4	X	X	X	
BH-10-77-WC_6.5-7'		1045	X		X			4	X	X	X	

(7) **Turnaround Time Requested** (TAT) (please circle): ~~Normal~~ Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharge.)
Date results are needed: _____
Rush results requested by (please circle): Phone Fax ~~E-mail~~
Phone #: _____ Fax #: _____
E-mail address: _____

(8) **Data Package Options** (please circle if required)
Type I (validation/NJ Reg)
Type II (Tier II)
Type III (Reduced NJ)
Type IV (CLP SOW)
Type VI (Raw Data Only)
TX TRRP-13
MA MCP CT RCP
SDG Complete? ~~Yes~~ No
Site-specific QC (MS/MSD/Dup)? Yes ~~No~~
(If yes, indicate QC sample and submit triplicate volume.)
Internal COC Required? Yes / ~~No~~

Relinquished by:	Date	Time	Received by:	Date	Time
[signature] / AQT	4/19/11	0600	Sample Fridge	4/19/11	0600
[signature]	4/19/11	0925	D Rydzy	4/19/11	0925
D Rydzy	4/19/11	1450			
			[signature]	4/19/11	1450

(9)

Lancaster Laboratories, Inc., 2425 New Holland Pike, Lancaster, PA 17601 (717) 656-2300 Fax: (717) 656-6766
Copies: White and yellow should accompany samples to Lancaster Laboratories. The pink copy should be retained by the client.

Issued by Dept. 6042 Management
2102.05

Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1242848 Sample # 6262260-96

COC # 259435

Please print. Instructions on reverse side correspond with circled numbers. 0.8-2.1°c

(1) Client: SUN-AQUATERRA Acct. #:

Project Name/#: PHILA REF AOI-10 PWSID #:

Project Manager: T. DOERR P.O.#:

Sampler: S. STKES Quote #:

Name of state where samples were collected: PA

For Lab Use Only

FSC:

SCR#:

Preservation Codes

H=HCl T=Thiosulfate

N=HNO_3 B=NaOH

S=H_2SO_4 O=Other

(6) Temperature of samples upon receipt (if requested)

(2) Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water (Potable ☐ NPDES ☐)	Other	Total # of Containers	(5) Analyses Requested: TCL VOCs 8260B	TCL SVOCs 8270C	TAL metals 6010	Remarks
BH-10-43_0-2'	4/14/11	900	X		X			4	X	X	X	
BH-10-48_0-2'		945	X		X			4	X	X	X	
BH-10-51_0-2'		1020	X		X			4	X	X	X	
BH-10-52_0-2'		1115	X		X			4	X	X	X	
BH-10-68_0-2'		1330	X		X			4	X	X	X	
BH-10-65_0-2'		1415	X		X			4	X	X	X	
BH-10-58_0-2'		1520	X		X			4	X	X	X	
BH-10-65_6-8'		1430	X		X			4	X	X	X	
BH-10-65_14-16'		1500	X		X			4	X	X	X	

(7) **Turnaround Time Requested** (TAT) (please circle): Normal Rush

(Rush TAT is subject to Lancaster Laboratories approval and surcharge.)

Date results are needed:

Rush results requested by (please circle): Phone Fax E-mail

Phone #: Fax #:

E-mail address:

(8) **Data Package Options** (please circle if required)

Type I (validation/NJ Reg)
Type II (Tier II)
Type III (Reduced NJ)
Type IV (CLP SOW)
Type VI (Raw Data Only)

TX TRRP-13
MA MCP CT RCP

SDG Complete? Yes No

Site-specific QC (MS/MSD/Dup)? Yes No

(If yes, indicate QC sample and submit triplicate volume.)

Internal COC Required? Yes / No

(9)

Relinquished by:	Date	Time	Received by:	Date	Time
[signature] / AGT	4/15/11	0600	Sample Fridge	4/15/11	0600
[signature]	4/19/11	0925	[signature]	4/19/11	0925
[signature]	4/19/11	1450			
			[signature]	4/19/11	1450

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
ug	microgram(s)	**mg**	milligram(s)
ml	milliliter(s)	**l**	liter(s)
m3	cubic meter(s)	**ul**	microliter(s)

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

J estimated value – The result is ≥ the Method Detection Limit (MDL) and < the Limit of Quantitation (LOQ).

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

U.S. EPA CLP Data Qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
N	Presumptive evidence of a compound (TICs only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Analytical test results meet all requirements of NELAC unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL LANCASTER LABORATORIES BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF LANCASTER LABORATORIES AND (B) WHETHER LANCASTER LABORATORIES HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Lancaster Laboratories which includes any conditions that vary from the Standard Terms and Conditions, and Lancaster hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

ANALYTICAL RESULTS

Prepared by:

Lancaster Laboratories
2425 New Holland Pike
Lancaster, PA 17605-2425

Prepared for:

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

April 21, 2011

Project: SUN: Philadelphia Refinery AOI-10

Submittal Date: 04/12/2011
Group Number: 1241810
PO Number: PHILADELPHIA
State of Sample Origin: PA

Client Sample Description	Lancaster Labs (LLI) #
BH-10-70-WC@0'-2' Grab Soil	6256388
BH-10-70-WC@5'-8' Grab Soil	6256389
BH-10-70-WC@15.5-16' Grab Soil	6256390

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

ELECTRONIC COPY TO	Langan	Attn: Dennis Webster
ELECTRONIC COPY TO	SUN: Aquaterra Tech.	Attn: Tiffani Doerr
ELECTRONIC COPY TO	LLI	Attn: EDD Group
ELECTRONIC COPY TO	Langan	Attn: Kristen Ward
ELECTRONIC COPY TO	Aquaterra Tech	Attn: Loretta Belfiglio

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Questions? Contact your Client Services Representative
Jessica A Oknefski at (717) 656-2300 Ext. 1815

Respectfully Submitted,



Chad A. Moline
Group Leader

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-70-WC@0'-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 260713 BH-10-70-WC@0'-2'

LLI Sample # SW 6256388
LLI Group # 1241810
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/11/2011 15:00 by TD

Submitted: 04/12/2011 17:00
Reported: 04/21/2011 17:55

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

B7010

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		ug/kg	ug/kg	ug/kg	
10950	Acetone	67-64-1	57	19	7	0.81
10950	Benzene	71-43-2	< 5	5	0.5	0.81
10950	Bromodichloromethane	75-27-4	< 5	5	0.9	0.81
10950	Bromoform	75-25-2	< 5	5	0.9	0.81
10950	Bromomethane	74-83-9	< 5	5	2	0.81
10950	2-Butanone	78-93-3	< 9	9	4	0.81
10950	Carbon Disulfide	75-15-0	< 5	5	0.9	0.81
10950	Carbon Tetrachloride	56-23-5	< 5	5	0.9	0.81
10950	Chlorobenzene	108-90-7	< 5	5	0.9	0.81
10950	Chloroethane	75-00-3	< 5	5	2	0.81
10950	Chloroform	67-66-3	< 5	5	0.9	0.81
10950	Chloromethane	74-87-3	< 5	5	2	0.81
10950	Cyclohexane	110-82-7	< 5	5	0.9	0.81
10950	1,2-Dibromo-3-chloropropane	96-12-8	< 5	5	2	0.81
10950	Dibromochloromethane	124-48-1	< 5	5	0.9	0.81
10950	1,2-Dibromoethane	106-93-4	< 5	5	0.9	0.81
10950	1,2-Dichlorobenzene	95-50-1	< 5	5	0.9	0.81
10950	1,3-Dichlorobenzene	541-73-1	< 5	5	0.9	0.81
10950	1,4-Dichlorobenzene	106-46-7	< 5	5	0.9	0.81
10950	Dichlorodifluoromethane	75-71-8	< 5	5	2	0.81
10950	1,1-Dichloroethane	75-34-3	< 5	5	0.9	0.81
10950	1,2-Dichloroethane	107-06-2	< 5	5	0.9	0.81
10950	1,1-Dichloroethene	75-35-4	< 5	5	0.9	0.81
10950	cis-1,2-Dichloroethene	156-59-2	< 5	5	0.9	0.81
10950	trans-1,2-Dichloroethene	156-60-5	< 5	5	0.9	0.81
10950	1,2-Dichloropropane	78-87-5	< 5	5	0.9	0.81
10950	cis-1,3-Dichloropropene	10061-01-5	< 5	5	0.9	0.81
10950	trans-1,3-Dichloropropene	10061-02-6	< 5	5	0.9	0.81
10950	Ethylbenzene	100-41-4	< 5	5	0.9	0.81
10950	Freon 113	76-13-1	< 9	9	2	0.81
10950	2-Hexanone	591-78-6	< 9	9	3	0.81
10950	Isopropylbenzene	98-82-8	< 5	5	0.9	0.81
10950	Methyl Acetate	79-20-9	< 5	5	2	0.81
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 5	5	0.5	0.81
10950	4-Methyl-2-pentanone	108-10-1	< 9	9	3	0.81
10950	Methylcyclohexane	108-87-2	< 5	5	0.9	0.81
10950	Methylene Chloride	75-09-2	< 5	5	2	0.81
10950	Styrene	100-42-5	< 5	5	0.9	0.81
10950	1,1,2,2-Tetrachloroethane	79-34-5	< 5	5	0.9	0.81
10950	Tetrachloroethene	127-18-4	< 5	5	0.9	0.81
10950	Toluene	108-88-3	< 5	5	0.9	0.81
10950	1,2,4-Trichlorobenzene	120-82-1	< 5	5	0.9	0.81
10950	1,1,1-Trichloroethane	71-55-6	< 5	5	0.9	0.81
10950	1,1,2-Trichloroethane	79-00-5	< 5	5	0.9	0.81
10950	Trichloroethene	79-01-6	< 5	5	0.9	0.81
10950	Trichlorofluoromethane	75-69-4	< 5	5	2	0.81
10950	Vinyl Chloride	75-01-4	< 5	5	0.9	0.81
10950	Xylene (Total)	1330-20-7	< 5	5	0.9	0.81

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-70-WC@0'-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 260713 BH-10-70-WC@0'-2'

LLI Sample # SW 6256388
LLI Group # 1241810
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/11/2011 15:00 by TD

Submitted: 04/12/2011 17:00
Reported: 04/21/2011 17:55

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

B7010

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**	**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	< 190	190	39	1
10727	Acenaphthylene	208-96-8	< 190	190	39	1
10727	Acetophenone	98-86-2	< 190	190	77	1
10727	Anthracene	120-12-7	< 190	190	39	1
10727	Atrazine	1912-24-9	< 190	190	39	1
10727	Benzaldehyde	100-52-7	< 190	190	77	1
10727	Benzo(a)anthracene	56-55-3	< 190	190	39	1
10727	Benzo(a)pyrene	50-32-8	< 190	190	39	1
10727	Benzo(b)fluoranthene	205-99-2	< 190	190	39	1
10727	Benzo(g,h,i)perylene	191-24-2	< 190	190	39	1
10727	Benzo(k)fluoranthene	207-08-9	< 190	190	39	1
10727	1,1'-Biphenyl	92-52-4	< 190	190	39	1
10727	4-Bromophenyl-phenylether	101-55-3	< 190	190	39	1
10727	Butylbenzylphthalate	85-68-7	< 190	190	77	1
10727	Di-n-butylphthalate	84-74-2	< 190	190	77	1
10727	Caprolactam	105-60-2	< 190	190	39	1
10727	Carbazole	86-74-8	< 190	190	39	1
10727	4-Chloro-3-methylphenol	59-50-7	< 190	190	77	1
10727	4-Chloroaniline	106-47-8	< 190	190	77	1
10727	bis(2-Chloroethoxy)methane	111-91-1	< 190	190	39	1
10727	bis(2-Chloroethyl)ether	111-44-4	< 190	190	39	1
10727	2-Chloronaphthalene	91-58-7	< 190	190	39	1
10727	2-Chlorophenol	95-57-8	< 190	190	39	1
10727	4-Chlorophenyl-phenylether	7005-72-3	< 190	190	39	1
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	< 190	190	39	1
10727	Chrysene	218-01-9	< 190	190	39	1
10727	Dibenz(a,h)anthracene	53-70-3	< 190	190	39	1
10727	Dibenzofuran	132-64-9	< 190	190	39	1
10727	3,3'-Dichlorobenzidine	91-94-1	< 390	390	120	1
10727	2,4-Dichlorophenol	120-83-2	< 190	190	39	1
10727	Diethylphthalate	84-66-2	< 190	190	77	1
10727	2,4-Dimethylphenol	105-67-9	< 190	190	77	1
10727	Dimethylphthalate	131-11-3	< 190	190	77	1
10727	4,6-Dinitro-2-methylphenol	534-52-1	< 580	580	190	1
10727	2,4-Dinitrophenol	51-28-5	< 1,200	1,200	390	1
10727	2,4-Dinitrotoluene	121-14-2	< 190	190	77	1
10727	2,6-Dinitrotoluene	606-20-2	< 190	190	39	1
10727	bis(2-Ethylhexyl)phthalate	117-81-7	< 390	390	77	1
10727	Fluoranthene	206-44-0	< 190	190	39	1
10727	Fluorene	86-73-7	< 190	190	39	1
10727	Hexachlorobenzene	118-74-1	< 190	190	39	1
10727	Hexachlorobutadiene	87-68-3	< 190	190	77	1
10727	Hexachlorocyclopentadiene	77-47-4	< 580	580	190	1
10727	Hexachloroethane	67-72-1	< 190	190	39	1
10727	Indeno(1,2,3-cd)pyrene	193-39-5	< 190	190	39	1
10727	Isophorone	78-59-1	< 190	190	39	1
10727	2-Methylnaphthalene	91-57-6	< 190	190	39	1
10727	2-Methylphenol	95-48-7	< 190	190	77	1
10727	4-Methylphenol	106-44-5	< 190	190	77	1

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-70-WC@0'-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 260713 BH-10-70-WC@0'-2'

LLI Sample # SW 6256388
LLI Group # 1241810
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/11/2011 15:00 by TD

Submitted: 04/12/2011 17:00
Reported: 04/21/2011 17:55

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

B7010

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.					
10727	Naphthalene	91-20-3	< 190	190	39	1
10727	2-Nitroaniline	88-74-4	< 190	190	39	1
10727	3-Nitroaniline	99-09-2	< 190	190	77	1
10727	4-Nitroaniline	100-01-6	< 190	190	77	1
10727	Nitrobenzene	98-95-3	< 190	190	39	1
10727	2-Nitrophenol	88-75-5	< 190	190	39	1
10727	4-Nitrophenol	100-02-7	< 580	580	190	1
10727	N-Nitroso-di-n-propylamine	621-64-7	< 190	190	39	1
10727	N-Nitrosodiphenylamine	86-30-6	< 190	190	39	1
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.					
10727	Di-n-octylphthalate	117-84-0	< 190	190	77	1
10727	Pentachlorophenol	87-86-5	< 580	580	190	1
10727	Phenanthrene	85-01-8	< 190	190	39	1
10727	Phenol	108-95-2	< 190	190	39	1
10727	Pyrene	129-00-0	< 190	190	39	1
10727	2,4,5-Trichlorophenol	95-95-4	< 190	190	77	1
10727	2,4,6-Trichlorophenol	88-06-2	< 190	190	39	1
Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	102,000	117	29.3	5
06944	Antimony	7440-36-0	< 11.7	11.7	5.83	5
06935	Arsenic	7440-38-2	< 11.7	11.7	5.54	5
06946	Barium	7440-39-3	154	0.583	0.0466	1
06947	Beryllium	7440-41-7	2.06	0.583	0.0793	1
06949	Cadmium	7440-43-9	< 2.91	2.91	0.816	5
01650	Calcium	7440-70-2	988	23.3	7.14	1
06951	Chromium	7440-47-3	298	8.74	3.44	5
06952	Cobalt	7440-48-4	46.6	2.91	1.11	5
06953	Copper	7440-50-8	88.9	5.83	1.28	5
01654	Iron	7439-89-6	69,100	117	27.4	5
06955	Lead	7439-92-1	20.8	8.74	3.50	5
01657	Magnesium	7439-95-4	2,100	11.7	2.96	1
06958	Manganese	7439-96-5	798	0.583	0.0909	1
06961	Nickel	7440-02-0	132	5.83	1.11	5
01662	Potassium	7440-09-7	1,010	291	105	5
06936	Selenium	7782-49-2	< 11.7	11.7	5.71	5
06966	Silver	7440-22-4	< 2.91	2.91	1.05	5
01667	Sodium	7440-23-5	147	117	43.5	1
06925	Thallium	7440-28-0	< 17.5	17.5	8.45	5
	Reporting limits for ICP metals were raised due to interference from the sample matrix.					
06971	Vanadium	7440-62-2	141	2.91	1.11	5
06972	Zinc	7440-66-6	66.4	11.7	3.85	5

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-70-WC@0'-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 260713 BH-10-70-WC@0'-2'

LLI Sample # SW 6256388
LLI Group # 1241810
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/11/2011 15:00 by TD

Submitted: 04/12/2011 17:00
Reported: 04/21/2011 17:55

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

B7010

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	< 0.116	0.116	0.0033	1
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	14.2	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	X111061AA	04/16/2011 15:35	Chelsea B Eastep	0.81
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201110324087	04/11/2011 15:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201110324087	04/11/2011 15:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201110324087	04/11/2011 15:00	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11104SLA026	04/16/2011 05:15	Linda M Hartenstine	1
10809	BNA Soil Microwave	SW-846 3546	1	11104SLA026	04/14/2011 14:10	Wanda F Oswald	1
01643	Aluminum	SW-846 6010B	1	111035708001	04/14/2011 08:29	Tara L Snyder	5
06944	Antimony	SW-846 6010B	1	111035708001	04/14/2011 08:29	Tara L Snyder	5
06935	Arsenic	SW-846 6010B	1	111035708001	04/14/2011 08:29	Tara L Snyder	5
06946	Barium	SW-846 6010B	1	111035708001	04/14/2011 07:17	Tara L Snyder	1
06947	Beryllium	SW-846 6010B	1	111035708001	04/14/2011 07:17	Tara L Snyder	1
06949	Cadmium	SW-846 6010B	1	111035708001	04/14/2011 08:29	Tara L Snyder	5
01650	Calcium	SW-846 6010B	1	111035708001	04/14/2011 07:17	Tara L Snyder	1
06951	Chromium	SW-846 6010B	1	111035708001	04/14/2011 08:29	Tara L Snyder	5
06952	Cobalt	SW-846 6010B	1	111035708001	04/14/2011 08:29	Tara L Snyder	5
06953	Copper	SW-846 6010B	1	111035708001	04/14/2011 08:29	Tara L Snyder	5
01654	Iron	SW-846 6010B	1	111035708001	04/14/2011 08:29	Tara L Snyder	5
06955	Lead	SW-846 6010B	1	111035708001	04/15/2011 09:02	Joanne M Gates	5
01657	Magnesium	SW-846 6010B	1	111035708001	04/14/2011 07:17	Tara L Snyder	1
06958	Manganese	SW-846 6010B	1	111035708001	04/14/2011 07:17	Tara L Snyder	1
06961	Nickel	SW-846 6010B	1	111035708001	04/14/2011 08:29	Tara L Snyder	5
01662	Potassium	SW-846 6010B	1	111035708001	04/14/2011 08:29	Tara L Snyder	5
06936	Selenium	SW-846 6010B	1	111035708001	04/14/2011 08:29	Tara L Snyder	5
06966	Silver	SW-846 6010B	1	111035708001	04/14/2011 08:29	Tara L Snyder	5
01667	Sodium	SW-846 6010B	1	111035708001	04/14/2011 07:17	Tara L Snyder	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-70-WC@0'-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 260713 BH-10-70-WC@0'-2'

LLI Sample # SW 6256388
LLI Group # 1241810
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/11/2011 15:00 by TD

Submitted: 04/12/2011 17:00
Reported: 04/21/2011 17:55

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

B7010

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06925	Thallium	SW-846 6010B	1	111035708001	04/14/2011 08:29	Tara L Snyder	5
06971	Vanadium	SW-846 6010B	1	111035708001	04/14/2011 08:29	Tara L Snyder	5
06972	Zinc	SW-846 6010B	1	111035708001	04/14/2011 08:29	Tara L Snyder	5
00159	Mercury	SW-846 7471A	1	111035711001	04/14/2011 08:34	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111035708001	04/13/2011 20:09	Annamaria Stipkovits	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111035711001	04/13/2011 23:40	Annamaria Stipkovits	1
00111	Moisture	SM20 2540 G	1	11103820005B	04/13/2011 18:27	Scott W Freisher	1

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-70-WC@5'-8' Grab Soil
Philadelphia Refinery AOI-10
COC: 260713 BH-10-70-WC@5'-8'

LLI Sample # SW 6256389
LLI Group # 1241810
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/11/2011 16:00 by TD

Submitted: 04/12/2011 17:00
Reported: 04/21/2011 17:55

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

B7012

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		ug/kg	ug/kg	ug/kg	
10950	Acetone	67-64-1	88	55	19	1.9
10950	Benzene	71-43-2	24	14	1	1.9
10950	Bromodichloromethane	75-27-4	< 14	14	3	1.9
10950	Bromoform	75-25-2	< 14	14	3	1.9
10950	Bromomethane	74-83-9	< 14	14	5	1.9
10950	2-Butanone	78-93-3	27	27	11	1.9
10950	Carbon Disulfide	75-15-0	< 14	14	3	1.9
10950	Carbon Tetrachloride	56-23-5	< 14	14	3	1.9
10950	Chlorobenzene	108-90-7	< 14	14	3	1.9
10950	Chloroethane	75-00-3	< 14	14	5	1.9
10950	Chloroform	67-66-3	< 14	14	3	1.9
10950	Chloromethane	74-87-3	< 14	14	5	1.9
10950	Cyclohexane	110-82-7	62	14	3	1.9
10950	1,2-Dibromo-3-chloropropane	96-12-8	< 14	14	5	1.9
10950	Dibromochloromethane	124-48-1	< 14	14	3	1.9
10950	1,2-Dibromoethane	106-93-4	< 14	14	3	1.9
10950	1,2-Dichlorobenzene	95-50-1	< 14	14	3	1.9
10950	1,3-Dichlorobenzene	541-73-1	< 14	14	3	1.9
10950	1,4-Dichlorobenzene	106-46-7	< 14	14	3	1.9
10950	Dichlorodifluoromethane	75-71-8	< 14	14	5	1.9
10950	1,1-Dichloroethane	75-34-3	< 14	14	3	1.9
10950	1,2-Dichloroethane	107-06-2	< 14	14	3	1.9
10950	1,1-Dichloroethene	75-35-4	< 14	14	3	1.9
10950	cis-1,2-Dichloroethene	156-59-2	< 14	14	3	1.9
10950	trans-1,2-Dichloroethene	156-60-5	< 14	14	3	1.9
10950	1,2-Dichloropropane	78-87-5	< 14	14	3	1.9
10950	cis-1,3-Dichloropropene	10061-01-5	< 14	14	3	1.9
10950	trans-1,3-Dichloropropene	10061-02-6	< 14	14	3	1.9
10950	Ethylbenzene	100-41-4	< 14	14	3	1.9
10950	Freon 113	76-13-1	< 27	27	5	1.9
10950	2-Hexanone	591-78-6	< 27	27	8	1.9
10950	Isopropylbenzene	98-82-8	< 14	14	3	1.9
10950	Methyl Acetate	79-20-9	< 14	14	5	1.9
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 14	14	1	1.9
10950	4-Methyl-2-pentanone	108-10-1	< 27	27	8	1.9
10950	Methylcyclohexane	108-87-2	79	14	3	1.9
10950	Methylene Chloride	75-09-2	< 14	14	5	1.9
10950	Styrene	100-42-5	< 14	14	3	1.9
10950	1,1,2,2-Tetrachloroethane	79-34-5	< 14	14	3	1.9
10950	Tetrachloroethene	127-18-4	< 14	14	3	1.9
10950	Toluene	108-88-3	< 14	14	3	1.9
10950	1,2,4-Trichlorobenzene	120-82-1	< 14	14	3	1.9
10950	1,1,1-Trichloroethane	71-55-6	< 14	14	3	1.9
10950	1,1,2-Trichloroethane	79-00-5	< 14	14	3	1.9
10950	Trichloroethene	79-01-6	< 14	14	3	1.9
10950	Trichlorofluoromethane	75-69-4	< 14	14	5	1.9
10950	Vinyl Chloride	75-01-4	< 14	14	3	1.9
10950	Xylene (Total)	1330-20-7	17	14	3	1.9

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-70-WC@5'-8' Grab Soil
Philadelphia Refinery AOI-10
COC: 260713 BH-10-70-WC@5'-8'

LLI Sample # SW 6256389
LLI Group # 1241810
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/11/2011 16:00 by TD

Submitted: 04/12/2011 17:00
Reported: 04/21/2011 17:55

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

B7012

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**	**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	< 14,000	14,000	2,900	1
10727	Acenaphthylene	208-96-8	< 14,000	14,000	2,900	1
10727	Acetophenone	98-86-2	< 14,000	14,000	5,800	1
10727	Anthracene	120-12-7	< 14,000	14,000	2,900	1
10727	Atrazine	1912-24-9	< 14,000	14,000	2,900	1
10727	Benzaldehyde	100-52-7	< 14,000	14,000	5,800	1
10727	Benzo(a)anthracene	56-55-3	< 14,000	14,000	2,900	1
10727	Benzo(a)pyrene	50-32-8	< 14,000	14,000	2,900	1
10727	Benzo(b)fluoranthene	205-99-2	< 14,000	14,000	2,900	1
10727	Benzo(g,h,i)perylene	191-24-2	< 14,000	14,000	2,900	1
10727	Benzo(k)fluoranthene	207-08-9	< 14,000	14,000	2,900	1
10727	1,1'-Biphenyl	92-52-4	< 14,000	14,000	2,900	1
10727	4-Bromophenyl-phenylether	101-55-3	< 14,000	14,000	2,900	1
10727	Butylbenzylphthalate	85-68-7	< 14,000	14,000	5,800	1
10727	Di-n-butylphthalate	84-74-2	< 14,000	14,000	5,800	1
10727	Caprolactam	105-60-2	< 14,000	14,000	2,900	1
10727	Carbazole	86-74-8	< 14,000	14,000	2,900	1
10727	4-Chloro-3-methylphenol	59-50-7	< 14,000	14,000	5,800	1
10727	4-Chloroaniline	106-47-8	< 14,000	14,000	5,800	1
10727	bis(2-Chloroethoxy)methane	111-91-1	< 14,000	14,000	2,900	1
10727	bis(2-Chloroethyl)ether	111-44-4	< 14,000	14,000	2,900	1
10727	2-Chloronaphthalene	91-58-7	< 14,000	14,000	2,900	1
10727	2-Chlorophenol	95-57-8	< 14,000	14,000	2,900	1
10727	4-Chlorophenyl-phenylether	7005-72-3	< 14,000	14,000	2,900	1
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	< 14,000	14,000	2,900	1
10727	Chrysene	218-01-9	< 14,000	14,000	2,900	1
10727	Dibenz(a,h)anthracene	53-70-3	< 14,000	14,000	2,900	1
10727	Dibenzofuran	132-64-9	< 14,000	14,000	2,900	1
10727	3,3'-Dichlorobenzidine	91-94-1	< 29,000	29,000	8,700	1
10727	2,4-Dichlorophenol	120-83-2	< 14,000	14,000	2,900	1
10727	Diethylphthalate	84-66-2	< 14,000	14,000	5,800	1
10727	2,4-Dimethylphenol	105-67-9	< 14,000	14,000	5,800	1
10727	Dimethylphthalate	131-11-3	< 14,000	14,000	5,800	1
10727	4,6-Dinitro-2-methylphenol	534-52-1	< 43,000	43,000	14,000	1
10727	2,4-Dinitrophenol	51-28-5	< 87,000	87,000	29,000	1
10727	2,4-Dinitrotoluene	121-14-2	< 14,000	14,000	5,800	1
10727	2,6-Dinitrotoluene	606-20-2	< 14,000	14,000	2,900	1
10727	bis(2-Ethylhexyl)phthalate	117-81-7	< 29,000	29,000	5,800	1
10727	Fluoranthene	206-44-0	< 14,000	14,000	2,900	1
10727	Fluorene	86-73-7	< 14,000	14,000	2,900	1
10727	Hexachlorobenzene	118-74-1	< 14,000	14,000	2,900	1
10727	Hexachlorobutadiene	87-68-3	< 14,000	14,000	5,800	1
10727	Hexachlorocyclopentadiene	77-47-4	< 43,000	43,000	14,000	1
10727	Hexachloroethane	67-72-1	< 14,000	14,000	2,900	1
10727	Indeno(1,2,3-cd)pyrene	193-39-5	< 14,000	14,000	2,900	1
10727	Isophorone	78-59-1	< 14,000	14,000	2,900	1
10727	2-Methylnaphthalene	91-57-6	< 14,000	14,000	2,900	1
10727	2-Methylphenol	95-48-7	< 14,000	14,000	5,800	1
10727	4-Methylphenol	106-44-5	< 14,000	14,000	5,800	1

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-70-WC@5'-8' Grab Soil
Philadelphia Refinery AOI-10
COC: 260713 BH-10-70-WC@5'-8'

LLI Sample # SW 6256389
LLI Group # 1241810
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/11/2011 16:00 by TD

Submitted: 04/12/2011 17:00
Reported: 04/21/2011 17:55

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

B7012

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.					
10727	Naphthalene	91-20-3	< 14,000	14,000	2,900	1
10727	2-Nitroaniline	88-74-4	< 14,000	14,000	2,900	1
10727	3-Nitroaniline	99-09-2	< 14,000	14,000	5,800	1
10727	4-Nitroaniline	100-01-6	< 14,000	14,000	5,800	1
10727	Nitrobenzene	98-95-3	< 14,000	14,000	2,900	1
10727	2-Nitrophenol	88-75-5	< 14,000	14,000	2,900	1
10727	4-Nitrophenol	100-02-7	< 43,000	43,000	14,000	1
10727	N-Nitroso-di-n-propylamine	621-64-7	< 14,000	14,000	2,900	1
10727	N-Nitrosodiphenylamine	86-30-6	< 14,000	14,000	2,900	1
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.					
10727	Di-n-octylphthalate	117-84-0	< 14,000	14,000	5,800	1
10727	Pentachlorophenol	87-86-5	< 43,000	43,000	14,000	1
10727	Phenanthrene	85-01-8	< 14,000	14,000	2,900	1
10727	Phenol	108-95-2	< 14,000	14,000	2,900	1
10727	Pyrene	129-00-0	< 14,000	14,000	2,900	1
10727	2,4,5-Trichlorophenol	95-95-4	< 14,000	14,000	5,800	1
10727	2,4,6-Trichlorophenol	88-06-2	< 14,000	14,000	2,900	1
	Reporting limits were raised due to interference from the sample matrix.					
Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	153	28.6	7.19	1
06944	Antimony	7440-36-0	< 2.86	2.86	1.43	1
06935	Arsenic	7440-38-2	< 2.86	2.86	1.36	1
06946	Barium	7440-39-3	25.3	0.714	0.0571	1
06947	Beryllium	7440-41-7	< 0.714	0.714	0.0972	1
06949	Cadmium	7440-43-9	< 0.714	0.714	0.200	1
01650	Calcium	7440-70-2	115	28.6	8.76	1
06951	Chromium	7440-47-3	< 2.14	2.14	0.843	1
06952	Cobalt	7440-48-4	< 0.714	0.714	0.271	1
06953	Copper	7440-50-8	1.46	1.43	0.314	1
01654	Iron	7439-89-6	219	28.6	6.73	1
06955	Lead	7439-92-1	7.74	2.14	0.857	1
01657	Magnesium	7439-95-4	56.8	14.3	3.63	1
06958	Manganese	7439-96-5	2.23	0.714	0.111	1
06961	Nickel	7440-02-0	< 1.43	1.43	0.271	1
01662	Potassium	7440-09-7	< 71.4	71.4	25.7	1
06936	Selenium	7782-49-2	< 2.86	2.86	1.40	1
06966	Silver	7440-22-4	< 0.714	0.714	0.257	1
01667	Sodium	7440-23-5	< 143	143	53.3	1
06925	Thallium	7440-28-0	< 4.29	4.29	2.07	1
06971	Vanadium	7440-62-2	< 0.714	0.714	0.271	1
06972	Zinc	7440-66-6	< 2.86	2.86	0.943	1
	SW-846 7471A		**mg/kg**	**mg/kg**	**mg/kg**	

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-70-WC@5'-8' Grab Soil
Philadelphia Refinery AOI-10
COC: 260713 BH-10-70-WC@5'-8'

LLI Sample # SW 6256389
LLI Group # 1241810
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/11/2011 16:00 by TD

Submitted: 04/12/2011 17:00
Reported: 04/21/2011 17:55

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

B7012

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	< 0.136	0.136	0.0039	1
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	30.7	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	X111061AA	04/16/2011 14:05	Chelsea B Eastep	1.9
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201110324087	04/11/2011 16:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201110324087	04/11/2011 16:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201110324087	04/11/2011 16:00	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11104SLA026	04/16/2011 06:28	Linda M Hartenstine	1
10809	BNA Soil Microwave	SW-846 3546	1	11104SLA026	04/14/2011 14:10	Wanda F Oswald	1
01643	Aluminum	SW-846 6010B	1	111035708001	04/14/2011 07:21	Tara L Snyder	1
06944	Antimony	SW-846 6010B	1	111035708001	04/14/2011 07:21	Tara L Snyder	1
06935	Arsenic	SW-846 6010B	1	111035708001	04/14/2011 07:21	Tara L Snyder	1
06946	Barium	SW-846 6010B	1	111035708001	04/14/2011 07:21	Tara L Snyder	1
06947	Beryllium	SW-846 6010B	1	111035708001	04/14/2011 07:21	Tara L Snyder	1
06949	Cadmium	SW-846 6010B	1	111035708001	04/14/2011 07:21	Tara L Snyder	1
01650	Calcium	SW-846 6010B	1	111035708001	04/15/2011 07:54	Joanne M Gates	1
06951	Chromium	SW-846 6010B	1	111035708001	04/14/2011 07:21	Tara L Snyder	1
06952	Cobalt	SW-846 6010B	1	111035708001	04/14/2011 07:21	Tara L Snyder	1
06953	Copper	SW-846 6010B	1	111035708001	04/14/2011 07:21	Tara L Snyder	1
01654	Iron	SW-846 6010B	1	111035708001	04/14/2011 07:21	Tara L Snyder	1
06955	Lead	SW-846 6010B	1	111035708001	04/15/2011 07:54	Joanne M Gates	1
01657	Magnesium	SW-846 6010B	1	111035708001	04/14/2011 07:21	Tara L Snyder	1
06958	Manganese	SW-846 6010B	1	111035708001	04/14/2011 07:21	Tara L Snyder	1
06961	Nickel	SW-846 6010B	1	111035708001	04/14/2011 07:21	Tara L Snyder	1
01662	Potassium	SW-846 6010B	1	111035708001	04/14/2011 07:21	Tara L Snyder	1
06936	Selenium	SW-846 6010B	1	111035708001	04/14/2011 07:21	Tara L Snyder	1
06966	Silver	SW-846 6010B	1	111035708001	04/14/2011 07:21	Tara L Snyder	1
01667	Sodium	SW-846 6010B	1	111035708001	04/14/2011 07:21	Tara L Snyder	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-70-WC@5'-8' Grab Soil
Philadelphia Refinery AOI-10
COC: 260713 BH-10-70-WC@5'-8'

LLI Sample # SW 6256389
LLI Group # 1241810
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/11/2011 16:00 by TD

Submitted: 04/12/2011 17:00
Reported: 04/21/2011 17:55

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

B7012

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06925	Thallium	SW-846 6010B	1	111035708001	04/14/2011 07:21	Tara L Snyder	1
06971	Vanadium	SW-846 6010B	1	111035708001	04/14/2011 07:21	Tara L Snyder	1
06972	Zinc	SW-846 6010B	1	111035708001	04/14/2011 07:21	Tara L Snyder	1
00159	Mercury	SW-846 7471A	1	111035711001	04/14/2011 08:35	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111035708001	04/13/2011 20:09	Annamaria Stipkovits	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111035711001	04/13/2011 23:40	Annamaria Stipkovits	1
00111	Moisture	SM20 2540 G	1	11103820005B	04/13/2011 18:27	Scott W Freisher	1

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-70-WC@15.5-16' Grab Soil
Philadelphia Refinery AOI-10
COC: 260713 BH-10-70-WC@15.5-

LLI Sample # SW 6256390
LLI Group # 1241810
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/11/2011 16:20 by TD

Submitted: 04/12/2011 17:00
Reported: 04/21/2011 17:55

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

B7013

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Acetone	67-64-1	< 1,400	1,400	480	55.51
10950	Benzene	71-43-2	350	340	34	55.51
10950	Bromodichloromethane	75-27-4	< 340	340	69	55.51
10950	Bromoform	75-25-2	< 340	340	69	55.51
10950	Bromomethane	74-83-9	< 340	340	140	55.51
10950	2-Butanone	78-93-3	< 690	690	270	55.51
10950	Carbon Disulfide	75-15-0	< 340	340	69	55.51
10950	Carbon Tetrachloride	56-23-5	< 340	340	69	55.51
10950	Chlorobenzene	108-90-7	< 340	340	69	55.51
10950	Chloroethane	75-00-3	< 340	340	140	55.51
10950	Chloroform	67-66-3	< 340	340	69	55.51
10950	Chloromethane	74-87-3	< 340	340	140	55.51
10950	Cyclohexane	110-82-7	2,100	340	69	55.51
10950	1,2-Dibromo-3-chloropropane	96-12-8	< 340	340	140	55.51
10950	Dibromochloromethane	124-48-1	< 340	340	69	55.51
10950	1,2-Dibromoethane	106-93-4	< 340	340	69	55.51
10950	1,2-Dichlorobenzene	95-50-1	< 340	340	69	55.51
10950	1,3-Dichlorobenzene	541-73-1	< 340	340	69	55.51
10950	1,4-Dichlorobenzene	106-46-7	< 340	340	69	55.51
10950	Dichlorodifluoromethane	75-71-8	< 340	340	140	55.51
10950	1,1-Dichloroethane	75-34-3	< 340	340	69	55.51
10950	1,2-Dichloroethane	107-06-2	< 340	340	69	55.51
10950	1,1-Dichloroethene	75-35-4	< 340	340	69	55.51
10950	cis-1,2-Dichloroethene	156-59-2	< 340	340	69	55.51
10950	trans-1,2-Dichloroethene	156-60-5	< 340	340	69	55.51
10950	1,2-Dichloropropane	78-87-5	< 340	340	69	55.51
10950	cis-1,3-Dichloropropene	10061-01-5	< 340	340	69	55.51
10950	trans-1,3-Dichloropropene	10061-02-6	< 340	340	69	55.51
10950	Ethylbenzene	100-41-4	780	340	69	55.51
10950	Freon 113	76-13-1	< 690	690	140	55.51
10950	2-Hexanone	591-78-6	< 690	690	210	55.51
10950	Isopropylbenzene	98-82-8	440	340	69	55.51
10950	Methyl Acetate	79-20-9	< 340	340	140	55.51
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 340	340	34	55.51
10950	4-Methyl-2-pentanone	108-10-1	< 690	690	210	55.51
10950	Methylcyclohexane	108-87-2	5,800	340	69	55.51
10950	Methylene Chloride	75-09-2	< 340	340	140	55.51
10950	Styrene	100-42-5	< 340	340	69	55.51
10950	1,1,2,2-Tetrachloroethane	79-34-5	< 340	340	69	55.51
10950	Tetrachloroethene	127-18-4	< 340	340	69	55.51
10950	Toluene	108-88-3	390	340	69	55.51
10950	1,2,4-Trichlorobenzene	120-82-1	< 340	340	69	55.51
10950	1,1,1-Trichloroethane	71-55-6	< 340	340	69	55.51
10950	1,1,2-Trichloroethane	79-00-5	< 340	340	69	55.51
10950	Trichloroethene	79-01-6	< 340	340	69	55.51
10950	Trichlorofluoromethane	75-69-4	< 340	340	140	55.51
10950	Vinyl Chloride	75-01-4	< 340	340	69	55.51
10950	Xylene (Total)	1330-20-7	3,800	340	69	55.51

*=This limit was used in the evaluation of the final result

Sample Description: BH-10-70-WC@15.5-16' Grab Soil
Philadelphia Refinery AOI-10
COC: 260713 BH-10-70-WC@15.5-

LLI Sample # SW 6256390
LLI Group # 1241810
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/11/2011 16:20 by TD

Submitted: 04/12/2011 17:00
Reported: 04/21/2011 17:55

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

B7013

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Semivolatiles SW-846 8270C			**ug/kg**	**ug/kg**	**ug/kg**	
10727	Acenaphthene	83-32-9	< 2,100	2,100	410	10
10727	Acenaphthylene	208-96-8	< 2,100	2,100	410	10
10727	Acetophenone	98-86-2	< 2,100	2,100	820	10
10727	Anthracene	120-12-7	< 2,100	2,100	410	10
10727	Atrazine	1912-24-9	< 2,100	2,100	410	10
10727	Benzaldehyde	100-52-7	< 2,100	2,100	820	10
10727	Benzo(a)anthracene	56-55-3	< 2,100	2,100	410	10
10727	Benzo(a)pyrene	50-32-8	< 2,100	2,100	410	10
10727	Benzo(b)fluoranthene	205-99-2	< 2,100	2,100	410	10
10727	Benzo(g,h,i)perylene	191-24-2	< 2,100	2,100	410	10
10727	Benzo(k)fluoranthene	207-08-9	< 2,100	2,100	410	10
10727	1,1'-Biphenyl	92-52-4	< 2,100	2,100	410	10
10727	4-Bromophenyl-phenylether	101-55-3	< 2,100	2,100	410	10
10727	Butylbenzylphthalate	85-68-7	< 2,100	2,100	820	10
10727	Di-n-butylphthalate	84-74-2	< 2,100	2,100	820	10
10727	Caprolactam	105-60-2	3,600	2,100	410	10
10727	Carbazole	86-74-8	< 2,100	2,100	410	10
10727	4-Chloro-3-methylphenol	59-50-7	< 2,100	2,100	820	10
10727	4-Chloroaniline	106-47-8	< 2,100	2,100	820	10
10727	bis(2-Chloroethoxy)methane	111-91-1	< 2,100	2,100	410	10
10727	bis(2-Chloroethyl)ether	111-44-4	< 2,100	2,100	410	10
10727	2-Chloronaphthalene	91-58-7	< 2,100	2,100	410	10
10727	2-Chlorophenol	95-57-8	< 2,100	2,100	410	10
10727	4-Chlorophenyl-phenylether	7005-72-3	< 2,100	2,100	410	10
10727	2,2'-oxybis(1-Chloropropane)	108-60-1	< 2,100	2,100	410	10
10727	Chrysene	218-01-9	< 2,100	2,100	410	10
10727	Dibenz(a,h)anthracene	53-70-3	< 2,100	2,100	410	10
10727	Dibenzofuran	132-64-9	< 2,100	2,100	410	10
10727	3,3'-Dichlorobenzidine	91-94-1	< 4,100	4,100	1,200	10
10727	2,4-Dichlorophenol	120-83-2	< 2,100	2,100	410	10
10727	Diethylphthalate	84-66-2	< 2,100	2,100	820	10
10727	2,4-Dimethylphenol	105-67-9	< 2,100	2,100	820	10
10727	Dimethylphthalate	131-11-3	< 2,100	2,100	820	10
10727	4,6-Dinitro-2-methylphenol	534-52-1	< 6,200	6,200	2,100	10
10727	2,4-Dinitrophenol	51-28-5	< 12,000	12,000	4,100	10
10727	2,4-Dinitrotoluene	121-14-2	< 2,100	2,100	820	10
10727	2,6-Dinitrotoluene	606-20-2	< 2,100	2,100	410	10
10727	bis(2-Ethylhexyl)phthalate	117-81-7	< 4,100	4,100	820	10
10727	Fluoranthene	206-44-0	< 2,100	2,100	410	10
10727	Fluorene	86-73-7	< 2,100	2,100	410	10
10727	Hexachlorobenzene	118-74-1	< 2,100	2,100	410	10
10727	Hexachlorobutadiene	87-68-3	< 2,100	2,100	820	10
10727	Hexachlorocyclopentadiene	77-47-4	< 6,200	6,200	2,100	10
10727	Hexachloroethane	67-72-1	< 2,100	2,100	410	10
10727	Indeno(1,2,3-cd)pyrene	193-39-5	< 2,100	2,100	410	10
10727	Isophorone	78-59-1	< 2,100	2,100	410	10
10727	2-Methylnaphthalene	91-57-6	4,900	2,100	410	10
10727	2-Methylphenol	95-48-7	< 2,100	2,100	820	10
10727	4-Methylphenol	106-44-5	< 2,100	2,100	820	10

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-70-WC@15.5-16' Grab Soil
Philadelphia Refinery AOI-10
COC: 260713 BH-10-70-WC@15.5-

LLI Sample # SW 6256390
LLI Group # 1241810
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/11/2011 16:20 by TD

Submitted: 04/12/2011 17:00
Reported: 04/21/2011 17:55

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

B7013

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
	3-Methylphenol and 4-methylphenol cannot be resolved under the chromatographic conditions used for sample analysis. The result reported for 4-methylphenol represents the combined total of both compounds.					
10727	Naphthalene	91-20-3	< 2,100	2,100	410	10
10727	2-Nitroaniline	88-74-4	< 2,100	2,100	410	10
10727	3-Nitroaniline	99-09-2	< 2,100	2,100	820	10
10727	4-Nitroaniline	100-01-6	< 2,100	2,100	820	10
10727	Nitrobenzene	98-95-3	< 2,100	2,100	410	10
10727	2-Nitrophenol	88-75-5	< 2,100	2,100	410	10
10727	4-Nitrophenol	100-02-7	< 6,200	6,200	2,100	10
10727	N-Nitroso-di-n-propylamine	621-64-7	< 2,100	2,100	410	10
10727	N-Nitrosodiphenylamine	86-30-6	< 2,100	2,100	410	10
	N-nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-nitrosodiphenylamine represents the combined total of both compounds.					
10727	Di-n-octylphthalate	117-84-0	< 2,100	2,100	820	10
10727	Pentachlorophenol	87-86-5	< 6,200	6,200	2,100	10
10727	Phenanthrene	85-01-8	2,100	2,100	410	10
10727	Phenol	108-95-2	< 2,100	2,100	410	10
10727	Pyrene	129-00-0	< 2,100	2,100	410	10
10727	2,4,5-Trichlorophenol	95-95-4	< 2,100	2,100	820	10
10727	2,4,6-Trichlorophenol	88-06-2	< 2,100	2,100	410	10
	Reporting limits were raised due to interference from the sample matrix.					
Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	12,800	24.7	6.22	1
06944	Antimony	7440-36-0	< 2.47	2.47	1.24	1
06935	Arsenic	7440-38-2	3.96	2.47	1.17	1
06946	Barium	7440-39-3	74.9	0.618	0.0494	1
06947	Beryllium	7440-41-7	< 0.618	0.618	0.0841	1
06949	Cadmium	7440-43-9	0.876	0.618	0.173	1
01650	Calcium	7440-70-2	2,120	24.7	7.58	1
06951	Chromium	7440-47-3	27.3	1.85	0.729	1
06952	Cobalt	7440-48-4	6.88	0.618	0.235	1
06953	Copper	7440-50-8	10.8	1.24	0.272	1
01654	Iron	7439-89-6	19,600	24.7	5.82	1
06955	Lead	7439-92-1	40.9	1.85	0.742	1
01657	Magnesium	7439-95-4	3,870	12.4	3.14	1
06958	Manganese	7439-96-5	405	0.618	0.0964	1
06961	Nickel	7440-02-0	16.0	1.24	0.235	1
01662	Potassium	7440-09-7	2,020	61.8	22.2	1
06936	Selenium	7782-49-2	< 2.47	2.47	1.21	1
06966	Silver	7440-22-4	< 0.618	0.618	0.222	1
01667	Sodium	7440-23-5	1,150	124	46.1	1
06925	Thallium	7440-28-0	< 3.71	3.71	1.79	1
06971	Vanadium	7440-62-2	28.7	0.618	0.235	1
06972	Zinc	7440-66-6	44.8	2.47	0.816	1
	SW-846 7471A		**mg/kg**	**mg/kg**	**mg/kg**	

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-70-WC@15.5-16' Grab Soil
Philadelphia Refinery AOI-10
COC: 260713 BH-10-70-WC@15.5-

LLI Sample # SW 6256390
LLI Group # 1241810
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/11/2011 16:20 by TD

Submitted: 04/12/2011 17:00
Reported: 04/21/2011 17:55

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

B7013

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
Metals	**SW-846 7471A**		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	< 0.120	0.120	0.0034	1
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	19.1	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	TCL(4.3)by 8260(soil)	SW-846 8260B	1	Q111051AA	04/15/2011 14:45	Nicholas R Rossi	55.51
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201110324087	04/11/2011 16:20	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201110324087	04/11/2011 16:20	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201110324087	04/11/2011 16:20	Client Supplied	1
10727	TCL 8270 (microwave)	SW-846 8270C	1	11104SLA026	04/16/2011 06:52	Linda M Hartenstine	10
10809	BNA Soil Microwave	SW-846 3546	1	11104SLA026	04/14/2011 14:10	Wanda F Oswald	1
01643	Aluminum	SW-846 6010B	1	111035708001	04/14/2011 07:25	Tara L Snyder	1
06944	Antimony	SW-846 6010B	1	111035708001	04/14/2011 07:25	Tara L Snyder	1
06935	Arsenic	SW-846 6010B	1	111035708001	04/14/2011 07:25	Tara L Snyder	1
06946	Barium	SW-846 6010B	1	111035708001	04/14/2011 07:25	Tara L Snyder	1
06947	Beryllium	SW-846 6010B	1	111035708001	04/14/2011 07:25	Tara L Snyder	1
06949	Cadmium	SW-846 6010B	1	111035708001	04/14/2011 07:25	Tara L Snyder	1
01650	Calcium	SW-846 6010B	1	111035708001	04/14/2011 07:25	Tara L Snyder	1
06951	Chromium	SW-846 6010B	1	111035708001	04/14/2011 07:25	Tara L Snyder	1
06952	Cobalt	SW-846 6010B	1	111035708001	04/14/2011 07:25	Tara L Snyder	1
06953	Copper	SW-846 6010B	1	111035708001	04/14/2011 07:25	Tara L Snyder	1
01654	Iron	SW-846 6010B	1	111035708001	04/14/2011 07:25	Tara L Snyder	1
06955	Lead	SW-846 6010B	1	111035708001	04/15/2011 07:57	Joanne M Gates	1
01657	Magnesium	SW-846 6010B	1	111035708001	04/14/2011 07:25	Tara L Snyder	1
06958	Manganese	SW-846 6010B	1	111035708001	04/14/2011 07:25	Tara L Snyder	1
06961	Nickel	SW-846 6010B	1	111035708001	04/14/2011 07:25	Tara L Snyder	1
01662	Potassium	SW-846 6010B	1	111035708001	04/14/2011 07:25	Tara L Snyder	1
06936	Selenium	SW-846 6010B	1	111035708001	04/14/2011 07:25	Tara L Snyder	1
06966	Silver	SW-846 6010B	1	111035708001	04/14/2011 07:25	Tara L Snyder	1
01667	Sodium	SW-846 6010B	1	111035708001	04/14/2011 07:25	Tara L Snyder	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-70-WC@15.5-16' Grab Soil
Philadelphia Refinery AOI-10
COC: 260713 BH-10-70-WC@15.5-

LLI Sample # SW 6256390
LLI Group # 1241810
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/11/2011 16:20 by TD

Submitted: 04/12/2011 17:00
Reported: 04/21/2011 17:55

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

B7013

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06925	Thallium	SW-846 6010B	1	111035708001	04/14/2011 07:25	Tara L Snyder	1
06971	Vanadium	SW-846 6010B	1	111035708001	04/14/2011 07:25	Tara L Snyder	1
06972	Zinc	SW-846 6010B	1	111035708001	04/14/2011 07:25	Tara L Snyder	1
00159	Mercury	SW-846 7471A	1	111035711001	04/14/2011 08:36	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111035708001	04/13/2011 20:09	Annamaria Stipkovits	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111035711001	04/13/2011 23:40	Annamaria Stipkovits	1
00111	Moisture	SM20 2540 G	1	11103820005B	04/13/2011 18:27	Scott W Freisher	1

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1241810
Reported: 04/21/11 at 05:55 PM

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Laboratory Compliance Quality Control

Analysis Name	Blank Result	Blank LOQ**	Blank MDL	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: Q111051AA	Sample number(s): 6256390								
Acetone	< 1,000	1,000.	350	ug/kg	121	128	32-209	6	30
Benzene	< 250	250.	25	ug/kg	99	102	80-120	2	30
Bromodichloromethane	< 250	250.	50	ug/kg	94	96	78-120	2	30
Bromoform	< 250	250.	50	ug/kg	84	89	70-120	6	30
Bromomethane	< 250	250.	100	ug/kg	106	91	32-162	15	30
2-Butanone	< 500	500.	200	ug/kg	101	109	46-153	8	30
Carbon Disulfide	< 250	250.	50	ug/kg	98	101	67-122	3	30
Carbon Tetrachloride	< 250	250.	50	ug/kg	92	94	69-122	3	30
Chlorobenzene	< 250	250.	50	ug/kg	93	96	80-120	2	30
Chloroethane	< 250	250.	100	ug/kg	107	91	37-154	16	30
Chloroform	< 250	250.	50	ug/kg	95	98	80-120	3	30
Chloromethane	< 250	250.	100	ug/kg	86	84	54-132	3	30
Cyclohexane	< 250	250.	50	ug/kg	88	89	62-121	1	30
1,2-Dibromo-3-chloropropane	< 250	250.	100	ug/kg	71	78	58-120	9	30
Dibromochloromethane	< 250	250.	50	ug/kg	91	95	77-120	4	30
1,2-Dibromoethane	< 250	250.	50	ug/kg	93	98	80-120	5	30
1,2-Dichlorobenzene	< 250	250.	50	ug/kg	88	90	79-120	2	30
1,3-Dichlorobenzene	< 250	250.	50	ug/kg	90	92	78-120	2	30
1,4-Dichlorobenzene	< 250	250.	50	ug/kg	89	92	79-120	3	30
Dichlorodifluoromethane	< 250	250.	100	ug/kg	56	52	20-120	7	30
1,1-Dichloroethane	< 250	250.	50	ug/kg	98	100	80-120	2	30
1,2-Dichloroethane	< 250	250.	50	ug/kg	95	97	71-129	3	30
1,1-Dichloroethene	< 250	250.	50	ug/kg	100	105	73-123	4	30
cis-1,2-Dichloroethene	< 250	250.	50	ug/kg	97	101	80-120	4	30
trans-1,2-Dichloroethene	< 250	250.	50	ug/kg	100	101	79-120	1	30
1,2-Dichloropropane	< 250	250.	50	ug/kg	97	99	80-120	3	30
cis-1,3-Dichloropropene	< 250	250.	50	ug/kg	95	99	80-120	4	30
trans-1,3-Dichloropropene	< 250	250.	50	ug/kg	89	94	77-120	6	30
Ethylbenzene	< 250	250.	50	ug/kg	93	96	80-120	3	30
Freon 113	< 500	500.	100	ug/kg	90	89	61-126	1	30
2-Hexanone	< 500	500.	150	ug/kg	76	83	45-155	9	30
Isopropylbenzene	< 250	250.	50	ug/kg	94	97	76-120	3	30
Methyl Acetate	< 250	250.	100	ug/kg	101	105	61-152	4	30
Methyl Tertiary Butyl Ether	< 250	250.	25	ug/kg	88	95	74-121	8	30
4-Methyl-2-pentanone	< 500	500.	150	ug/kg	87	96	61-134	9	30
Methylcyclohexane	< 250	250.	50	ug/kg	101	103	57-138	2	30
Methylene Chloride	< 250	250.	100	ug/kg	99	101	76-124	2	30
Styrene	< 250	250.	50	ug/kg	94	97	76-120	3	30
1,1,2,2-Tetrachloroethane	< 250	250.	50	ug/kg	84	89	71-123	6	30
Tetrachloroethene	< 250	250.	50	ug/kg	92	95	77-120	4	30
Toluene	< 250	250.	50	ug/kg	95	98	80-120	3	30
1,2,4-Trichlorobenzene	< 250	250.	50	ug/kg	70	78	68-120	11	30
1,1,1-Trichloroethane	< 250	250.	50	ug/kg	95	99	71-125	4	30
1,1,2-Trichloroethane	< 250	250.	50	ug/kg	91	94	80-120	3	30
Trichloroethene	< 250	250.	50	ug/kg	98	101	80-120	3	30
Trichlorofluoromethane	< 250	250.	100	ug/kg	84	83	58-133	1	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1241810
Reported: 04/21/11 at 05:55 PM

Analysis Name	Blank Result	Blank LOQ**	Blank MDL	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Vinyl Chloride	< 250	250.	50	ug/kg	85	85	53-120	0	30
Xylene (Total)	< 250	250.	50	ug/kg	95	97	80-120	3	30
Batch number: X111061AA	Sample number(s): 6256388-6256389								
Acetone	< 20	20.	7	ug/kg	125		32-209		
Benzene	< 5	5.	0.5	ug/kg	97		80-120		
Bromodichloromethane	< 5	5.	1	ug/kg	90		78-120		
Bromoform	< 5	5.	1	ug/kg	89		70-120		
Bromomethane	< 5	5.	2	ug/kg	83		32-162		
2-Butanone	< 10	10.	4	ug/kg	121		46-153		
Carbon Disulfide	< 5	5.	1	ug/kg	81		67-122		
Carbon Tetrachloride	< 5	5.	1	ug/kg	90		69-122		
Chlorobenzene	< 5	5.	1	ug/kg	93		80-120		
Chloroethane	< 5	5.	2	ug/kg	84		37-154		
Chloroform	< 5	5.	1	ug/kg	95		80-120		
Chloromethane	< 5	5.	2	ug/kg	86		54-132		
Cyclohexane	< 5	5.	1	ug/kg	89		62-121		
1,2-Dibromo-3-chloropropane	< 5	5.	2	ug/kg	113		58-120		
Dibromochloromethane	< 5	5.	1	ug/kg	92		77-120		
1,2-Dibromoethane	< 5	5.	1	ug/kg	101		80-120		
1,2-Dichlorobenzene	< 5	5.	1	ug/kg	97		79-120		
1,3-Dichlorobenzene	< 5	5.	1	ug/kg	94		78-120		
1,4-Dichlorobenzene	< 5	5.	1	ug/kg	97		79-120		
Dichlorodifluoromethane	< 5	5.	2	ug/kg	75		20-120		
1,1-Dichloroethane	< 5	5.	1	ug/kg	95		80-120		
1,2-Dichloroethane	< 5	5.	1	ug/kg	100		71-129		
1,1-Dichloroethene	< 5	5.	1	ug/kg	93		73-123		
cis-1,2-Dichloroethene	< 5	5.	1	ug/kg	94		80-120		
trans-1,2-Dichloroethene	< 5	5.	1	ug/kg	95		79-120		
1,2-Dichloropropane	< 5	5.	1	ug/kg	95		80-120		
cis-1,3-Dichloropropene	< 5	5.	1	ug/kg	91		80-120		
trans-1,3-Dichloropropene	< 5	5.	1	ug/kg	90		77-120		
Ethylbenzene	< 5	5.	1	ug/kg	97		80-120		
Freon 113	< 10	10.	2	ug/kg	89		61-126		
2-Hexanone	< 10	10.	3	ug/kg	121		45-155		
Isopropylbenzene	< 5	5.	1	ug/kg	97		76-120		
Methyl Acetate	< 5	5.	2	ug/kg	122		61-152		
Methyl Tertiary Butyl Ether	< 5	5.	0.5	ug/kg	95		74-121		
4-Methyl-2-pentanone	< 10	10.	3	ug/kg	118		61-134		
Methylcyclohexane	< 5	5.	1	ug/kg	93		57-138		
Methylene Chloride	< 5	5.	2	ug/kg	93		76-124		
Styrene	< 5	5.	1	ug/kg	92		76-120		
1,1,2,2-Tetrachloroethane	< 5	5.	1	ug/kg	106		71-123		
Tetrachloroethene	< 5	5.	1	ug/kg	95		77-120		
Toluene	< 5	5.	1	ug/kg	96		80-120		
1,2,4-Trichlorobenzene	< 5	5.	1	ug/kg	90		68-120		
1,1,1-Trichloroethane	< 5	5.	1	ug/kg	92		71-125		
1,1,2-Trichloroethane	< 5	5.	1	ug/kg	97		80-120		
Trichloroethene	< 5	5.	1	ug/kg	95		80-120		
Trichlorofluoromethane	< 5	5.	2	ug/kg	88		58-133		
Vinyl Chloride	< 5	5.	1	ug/kg	89		53-120		
Xylene (Total)	< 5	5.	1	ug/kg	97		80-120		
Batch number: 11104SLA026	Sample number(s): 6256388-6256390								
Acenaphthene	< 170	170.	33	ug/kg	98		83-111		
Acenaphthylene	< 170	170.	33	ug/kg	101		68-120		
Acetophenone	< 170	170.	67	ug/kg	88		70-106		
Anthracene	< 170	170.	33	ug/kg	100		83-111		

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1241810
Reported: 04/21/11 at 05:55 PM

Analysis Name	Blank Result	Blank LOQ**	Blank MDL	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Atrazine	< 170	170.	33	ug/kg	105		69-122		
Benzaldehyde	< 170	170.	67	ug/kg	33		10-74		
Benzo(a)anthracene	< 170	170.	33	ug/kg	97		82-111		
Benzo(a)pyrene	< 170	170.	33	ug/kg	102		63-138		
Benzo(b)fluoranthene	< 170	170.	33	ug/kg	101		61-133		
Benzo(g,h,i)perylene	< 170	170.	33	ug/kg	96		63-130		
Benzo(k)fluoranthene	< 170	170.	33	ug/kg	105		71-135		
1,1'-Biphenyl	< 170	170.	33	ug/kg	98		82-106		
4-Bromophenyl-phenylether	< 170	170.	33	ug/kg	99		79-117		
Butylbenzylphthalate	< 170	170.	67	ug/kg	97		83-122		
Di-n-butylphthalate	< 170	170.	67	ug/kg	99		79-112		
Caprolactam	< 170	170.	33	ug/kg	83		65-113		
Carbazole	< 170	170.	33	ug/kg	99		83-111		
4-Chloro-3-methylphenol	< 170	170.	67	ug/kg	91		74-119		
4-Chloroaniline	< 170	170.	67	ug/kg	36		10-97		
bis(2-Chloroethoxy)methane	< 170	170.	33	ug/kg	98		82-113		
bis(2-Chloroethyl)ether	< 170	170.	33	ug/kg	95		77-115		
2-Chloronaphthalene	< 170	170.	33	ug/kg	102		59-139		
2-Chlorophenol	< 170	170.	33	ug/kg	97		83-119		
4-Chlorophenyl-phenylether	< 170	170.	33	ug/kg	97		79-110		
2,2'-oxybis(1-Chloropropane)	< 170	170.	33	ug/kg	87		67-130		
Chrysene	< 170	170.	33	ug/kg	98		81-111		
Dibenz(a,h)anthracene	< 170	170.	33	ug/kg	95		67-129		
Dibenzofuran	< 170	170.	33	ug/kg	98		85-110		
3,3'-Dichlorobenzidine	< 330	330.	100	ug/kg	40		35-94		
2,4-Dichlorophenol	< 170	170.	33	ug/kg	99		87-117		
Diethylphthalate	< 170	170.	67	ug/kg	95		82-113		
2,4-Dimethylphenol	< 170	170.	67	ug/kg	97		83-120		
Dimethylphthalate	< 170	170.	67	ug/kg	97		85-111		
4,6-Dinitro-2-methylphenol	< 500	500.	170	ug/kg	89		60-113		
2,4-Dinitrophenol	< 1,000	1,000.	330	ug/kg	84		51-124		
2,4-Dinitrotoluene	< 170	170.	67	ug/kg	96		80-116		
2,6-Dinitrotoluene	< 170	170.	33	ug/kg	96		79-115		
bis(2-Ethylhexyl)phthalate	< 330	330.	67	ug/kg	99		80-119		
Fluoranthene	< 170	170.	33	ug/kg	102		80-113		
Fluorene	< 170	170.	33	ug/kg	99		81-117		
Hexachlorobenzene	< 170	170.	33	ug/kg	101		79-115		
Hexachlorobutadiene	< 170	170.	67	ug/kg	97		70-112		
Hexachlorocyclopentadiene	< 500	500.	170	ug/kg	104		64-127		
Hexachloroethane	< 170	170.	33	ug/kg	88		76-109		
Indeno(1,2,3-cd)pyrene	< 170	170.	33	ug/kg	93		64-128		
Isophorone	< 170	170.	33	ug/kg	92		72-107		
2-Methylnaphthalene	< 170	170.	33	ug/kg	90		79-110		
2-Methylphenol	< 170	170.	67	ug/kg	91		80-119		
4-Methylphenol	< 170	170.	67	ug/kg	97		74-116		
Naphthalene	< 170	170.	33	ug/kg	94		83-112		
2-Nitroaniline	< 170	170.	33	ug/kg	96		83-118		
3-Nitroaniline	< 170	170.	67	ug/kg	86		66-114		
4-Nitroaniline	< 170	170.	67	ug/kg	69		52-92		
Nitrobenzene	< 170	170.	33	ug/kg	97		78-122		
2-Nitrophenol	< 170	170.	33	ug/kg	94		81-114		
4-Nitrophenol	< 500	500.	170	ug/kg	85		57-131		
N-Nitroso-di-n-propylamine	< 170	170.	33	ug/kg	86		70-113		
N-Nitrosodiphenylamine	< 170	170.	33	ug/kg	105		86-112		
Di-n-octylphthalate	< 170	170.	67	ug/kg	100		65-141		
Pentachlorophenol	< 500	500.	170	ug/kg	83		50-133		
Phenanthrene	< 170	170.	33	ug/kg	100		83-109		
Phenol	< 170	170.	33	ug/kg	92		74-115		

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1241810
Reported: 04/21/11 at 05:55 PM

Analysis Name	Blank Result	Blank LOQ**	Blank MDL	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Pyrene	< 170	170.	33	ug/kg	102		80-121		
2,4,5-Trichlorophenol	< 170	170.	67	ug/kg	99		84-109		
2,4,6-Trichlorophenol	< 170	170.	33	ug/kg	99		88-114		
Batch number: 111035708001	Sample number(s): 6256388-6256390								
Aluminum	< 20.0	20.0	5.03	mg/kg	95		61-110		
Antimony	< 2.00	2.00	1.00	mg/kg	124		38-150		
Arsenic	< 2.00	2.00	0.950	mg/kg	98		90-110		
Barium	< 0.500	0.500	0.0400	mg/kg	103		90-117		
Beryllium	< 0.500	0.500	0.0680	mg/kg	97		87-110		
Cadmium	< 0.500	0.500	0.140	mg/kg	100		90-114		
Calcium	< 20.0	20.0	6.13	mg/kg	103		88-110		
Chromium	< 1.50	1.50	0.590	mg/kg	98		85-110		
Cobalt	< 0.500	0.500	0.190	mg/kg	103		90-114		
Copper	< 1.00	1.00	0.220	mg/kg	105		83-112		
Iron	< 20.0	20.0	4.71	mg/kg	98		61-110		
Lead	< 1.50	1.50	0.600	mg/kg	101		80-120		
Magnesium	< 10.0	10.0	2.54	mg/kg	100		82-110		
Manganese	< 0.500	0.500	0.0780	mg/kg	103		89-112		
Nickel	< 1.00	1.00	0.190	mg/kg	102		90-114		
Potassium	< 50.0	50.0	18.0	mg/kg	103		78-110		
Selenium	< 2.00	2.00	0.980	mg/kg	98		57-110		
Silver	< 0.500	0.500	0.180	mg/kg	102		86-111		
Sodium	< 100	100.	37.3	mg/kg	100		87-110		
Thallium	< 3.00	3.00	1.45	mg/kg	106		90-116		
Vanadium	< 0.500	0.500	0.190	mg/kg	96		79-110		
Zinc	< 2.00	2.00	0.660	mg/kg	96		90-110		
Batch number: 111035711001	Sample number(s): 6256388-6256390								
Mercury	< 0.0992	0.0992	0.0028	mg/kg	94		88-123		
Batch number: 11103820005B	Sample number(s): 6256388-6256390								
Moisture					100		99-101		

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: X111061AA	Sample number(s): 6256388-6256389 UNSPK: P257457								
Acetone	99	108	15-210	15	30				
Benzene	102	103	55-143	12	30				
Bromodichloromethane	92	95	53-136	14	30				
Bromoform	74	79	38-124	16	30				
Bromomethane	90	89	42-168	9	30				
2-Butanone	106	108	37-163	12	30				
Carbon Disulfide	87	90	48-146	12	30				
Carbon Tetrachloride	96	98	45-153	12	30				
Chlorobenzene	98	99	49-135	11	30				
Chloroethane	93	91	39-152	8	30				
Chloroform	100	103	61-142	12	30				
Chloromethane	95	95	51-163	10	30				

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1241810
Reported: 04/21/11 at 05:55 PM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Cyclohexane	98	98	57-151	10	30				
1,2-Dibromo-3-chloropropane	81	97	30-139	27	30				
Dibromochloromethane	92	99	51-128	16	30				
1,2-Dibromoethane	97	106	54-129	18	30				
1,2-Dichlorobenzene	86	97	36-133	21	30				
1,3-Dichlorobenzene	91	100	34-134	19	30				
1,4-Dichlorobenzene	93	103	35-136	20	30				
Dichlorodifluoromethane	92	87	26-151	4	30				
1,1-Dichloroethane	104	107	63-142	13	30				
1,2-Dichloroethane	98	101	68-131	13	30				
1,1-Dichloroethene	105	106	61-149	10	30				
cis-1,2-Dichloroethene	100	103	60-136	13	30				
trans-1,2-Dichloroethene	101	102	59-142	10	30				
1,2-Dichloropropane	97	100	62-135	13	30				
cis-1,3-Dichloropropene	89	93	51-131	15	30				
trans-1,3-Dichloropropene	96	100	49-129	14	30				
Ethylbenzene	101	105	44-141	14	30				
Freon 113	103	102	56-156	9	30				
2-Hexanone	106	110	32-160	14	30				
Isopropylbenzene	96	96	38-144	10	30				
Methyl Acetate	107	110	48-161	12	30				
Methyl Tertiary Butyl Ether	99	101	55-129	12	30				
4-Methyl-2-pentanone	101	105	46-139	14	30				
Methylcyclohexane	92	90	39-168	8	30				
Methylene Chloride	100	101	61-141	11	30				
Styrene	77	72	35-134	3	30				
1,1,2,2-Tetrachloroethane	108	133	40-152	30	30				
Tetrachloroethene	103	106	42-149	13	30				
Toluene	110	115	50-146	15	30				
1,2,4-Trichlorobenzene	47	47	10-136	11	30				
1,1,1-Trichloroethane	102	102	64-142	10	30				
1,1,2-Trichloroethane	101	105	54-139	14	30				
Trichloroethene	96	98	53-144	12	30				
Trichlorofluoromethane	104	103	47-163	9	30				
Vinyl Chloride	100	103	50-154	13	30				
Xylene (Total)	100	103	44-136	12	30				
Batch number: 11104SLA026	Sample number(s): 6256388-6256390 UNSPK: 6256388								
Acenaphthene	94	93	51-135	2	30				
Acenaphthylene	97	95	47-137	2	30				
Acetophenone	88	90	38-136	2	30				
Anthracene	95	95	40-147	0	30				
Atrazine	102	102	52-124	0	30				
Benzaldehyde	49	50	10-85	2	30				
Benzo(a)anthracene	95	96	32-150	0	30				
Benzo(a)pyrene	96	98	57-129	2	30				
Benzo(b)fluoranthene	92	94	53-131	2	30				
Benzo(g,h,i)perylene	101	103	60-123	2	30				
Benzo(k)fluoranthene	98	98	61-131	1	30				
1,1'-Biphenyl	96	94	51-127	2	30				
4-Bromophenyl-phenylether	95	97	58-136	2	30				
Butylbenzylphthalate	107	107	42-155	1	30				
Di-n-butylphthalate	98	99	55-131	0	30				

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1241810
Reported: 04/21/11 at 05:55 PM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Caprolactam	79	79	36-137	1	30				
Carbazole	92	92	36-148	0	30				
4-Chloro-3-methylphenol	88	89	33-144	1	30				
4-Chloroaniline	75	78	11-114	4	30				
bis(2-Chloroethoxy)methane	94	95	60-118	0	30				
bis(2-Chloroethyl)ether	90	93	45-139	3	30				
2-Chloronaphthalene	81	81	43-149	1	30				
2-Chlorophenol	96	99	53-141	3	30				
4-Chlorophenyl-phenylether	91	91	57-127	1	30				
2,2'-oxybis(1-Chloropropane)	86	88	51-124	2	30				
Chrysene	92	93	76-114	1	30				
Dibenz(a,h)anthracene	102	102	37-151	0	30				
Dibenzofuran	92	93	38-148	0	30				
3,3'-Dichlorobenzidine	80	84	10-143	4	30				
2,4-Dichlorophenol	95	96	48-141	1	30				
Diethylphthalate	92	92	52-130	0	30				
2,4-Dimethylphenol	78	82	27-143	5	30				
Dimethylphthalate	92	92	49-134	0	30				
4,6-Dinitro-2-methylphenol	48	52	10-148	9	30				
2,4-Dinitrophenol	29	32	20-143	11	30				
2,4-Dinitrotoluene	89	91	27-147	1	30				
2,6-Dinitrotoluene	90	92	44-140	2	30				
bis(2-Ethylhexyl)phthalate	110	107	38-151	3	30				
Fluoranthene	90	92	48-122	1	30				
Fluorene	94	93	46-137	1	30				
Hexachlorobenzene	94	95	53-137	1	30				
Hexachlorobutadiene	90	89	52-124	1	30				
Hexachlorocyclopentadiene	26	25	10-153	2	30				
Hexachloroethane	80	83	71-104	4	30				
Indeno(1,2,3-cd)pyrene	99	102	61-123	3	30				
Isophorone	90	91	54-122	1	30				
2-Methylnaphthalene	86	88	34-139	1	30				
2-Methylphenol	86	90	30-145	5	30				
4-Methylphenol	96	100	36-149	4	30				
Naphthalene	91	92	52-132	0	30				
2-Nitroaniline	96	96	46-146	1	30				
3-Nitroaniline	90	87	34-134	4	30				
4-Nitroaniline	76	78	26-124	2	30				
Nitrobenzene	95	95	37-139	0	30				
2-Nitrophenol	92	92	25-151	0	30				
4-Nitrophenol	78	80	15-149	2	30				
N-Nitroso-di-n-propylamine	87	89	46-128	1	30				
N-Nitrosodiphenylamine	98	100	33-148	2	30				
Di-n-octylphthalate	102	105	43-149	3	30				
Pentachlorophenol	59	61	23-145	3	30				
Phenanthrene	93	95	34-147	2	30				
Phenol	91	94	39-151	3	30				
Pyrene	101	102	76-124	1	30				
2,4,5-Trichlorophenol	92	94	25-143	2	30				
2,4,6-Trichlorophenol	94	96	41-142	2	30				
Batch number: 111035708001	Sample number(s): 6256388-6256390 UNSPK: P256641 BKG: P256641								
Aluminum	2263	2011	90-110	2	20	14,500	15,100	4	20

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1241810
Reported: 04/21/11 at 05:55 PM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
	(2)	(2)							
Antimony	81	83	75-125	3	20	< 1.98	< 1.94	200* (1)	20
Arsenic	100	100	75-125	1	20	< 1.98	2.89	38* (1)	20
Barium	102	101	75-125	0	20	13.8	12.6	9	20
Beryllium	103	102	83-111	0	20	< 0.495	< 0.485	17 (1)	20
Cadmium	103	104	75-125	2	20	< 0.495	< 0.485	200* (1)	20
Calcium	91	99	75-125	7	20	121	90.7	29* (1)	20
Chromium	114	111	75-125	1	20	12.4	13.9	11	20
Cobalt	97	97	78-113	1	20	0.881	0.816	8 (1)	20
Copper	108	106	75-125	1	20	4.45	4.52	2 (1)	20
Iron	912 (2)	591 (2)	75-125	4	20	7,920	8,690	9	20
Lead	99	93	75-125	4	20	5.76	5.59	3 (1)	20
Magnesium	150*	124	75-125	8	20	303	274	10	20
Manganese	94	96	75-125	2	20	29.7	26.3	12	20
Nickel	104	104	75-125	2	20	4.03	4.05	1 (1)	20
Potassium	122	118	75-125	2	20	204	181	12 (1)	20
Selenium	97	98	75-125	1	20	< 1.98	< 1.94	0 (1)	20
Silver	113	111	75-125	0	20	< 0.495	< 0.485	0 (1)	20
Sodium	100	96	75-125	3	20	< 99.0	< 97.1	0 (1)	20
Thallium	118	117	75-125	0	20	< 2.97	< 2.91	0 (1)	20
Vanadium	110	107	75-125	1	20	21.6	23.8	10	20
Zinc	99	97	75-125	0	20	6.67	6.12	9 (1)	20
Batch number: 111035711001	Sample number(s): 6256388-6256390 UNSPK: P256641 BKG: P256641								
Mercury	98	100	80-120	1	20	< 0.0981	< 0.0963	200* (1)	20
Batch number: 11103820005B	Sample number(s): 6256388-6256390 BKG: 6256390								
Moisture						19.1	17.8	7	15

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: TCL(4.3)by 8260(soil)
Batch number: Q111051AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6256390	79	79	74	75
Blank	93	95	92	91
LCS	86	89	84	83
LCSD	89	92	87	90
Limits:	71-114	70-109	70-123	70-111

Analysis Name: TCL(4.3)by 8260(soil)
Batch number: X111061AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6256388	99	103	94	97

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1241810
Reported: 04/21/11 at 05:55 PM

Surrogate Quality Control

6256389	100	105	100	94
Blank	104	106	93	98
LCS	100	109	101	99
MS	101	105	111	89
MSD	100	105	112	82
Limits:	71-114	70-109	70-123	70-111

Analysis Name: TCL 8270 (microwave)
Batch number: 11104SLA026

	Phenol-d6	2-Fluorophenol	2,4,6-Tribromophenol	Nitrobenzene-d5	2-Fluorobiphenyl	Terphenyl-d14
6256388	89	94	78	86	87	88
6256389	71	79	66	78	83	60
6256390	68	71	61	71	70	66
Blank	88	94	99	86	94	90
LCS	91	97	98	91	97	90
MS	90	96	82	90	94	90
MSD	92	99	81	90	92	90
Limits:	42-130	39-136	28-139	55-121	56-121	43-124

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1241810 Sample # 6256388-90 **COC #** 260713

Please print. Instructions on reverse side correspond with circled numbers. 0.4-1.4°C

(1)
Client: Aquatera Acct. #:
Project Name/#: Sun Philly Ref A01-10 PWSID #:
Project Manager: T. DOERR P.O.#:
Sampler: T. DOERR Quote #:
Name of state where samples were collected: PA

(2) (3) (4) (5) (6)

Sample Identification	Date Collected	Time Collected	(3) Grab	(3) Composite	(4) Matrix: Soil	(4) Matrix: Water (☐ Potable ☐ NPDES)	(4) Matrix: Other	(4) Total # of Containers	(5) Analyses Requested / Preservation Codes: TCL VOCs	TCL SVOCs	TAL Metals	Remarks
BH-10-70-WC @ 0'-2'	4-11-11	1500	X		X			4	✓	✓	✓	
BH-10-70-WC @ 5'-8'	4-11-11	1600	X		X			4	✓	✓	✓	
BH-10-70-WC @ 15.5-16'	4-11-11	1620	X		X			4	✓	✓	✓	DEPTH 15.5-16' PER T. DOERR 4/13-11

For Lab Use Only
FSC:
SCR#:

Preservation Codes
H=HCl T=Thiosulfate
N=HNO_3 B=NaOH
S=H_2SO_4 O=Other

(6) Temperature of samples upon receipt (if requested)

(7) **Turnaround Time Requested** (TAT) (please circle): Normal Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax E-mail
Phone #: Fax #:
E-mail address: cc to Dennis Webster

(8) **Data Package Options** (please circle if required)
Type I (validation/NJ Reg) TX TRRP-13
Type II (Tier II) MA MCP CT RCP
Type III (Reduced NJ)
Type IV (CLP SOW)
Type VI (Raw Data Only)
SDG Complete? Yes No
Site-specific QC (MS/MSD/Dup)? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Internal COC Required? Yes No

(9)

Relinquished by:	Date	Time	Received by:	Date	Time
	4/11/11	1700	Aquatera Fridge	4/11/11	1730
	4/12/11	1415		4/12/11	1455
	4/12/11	1700			
				4/12/11	1700

Lancaster Laboratories, Inc., 2425 New Holland Pike, Lancaster, PA 17601 (717) 656-2300 Fax: (717) 656-6766
Copies: White and yellow should accompany samples to Lancaster Laboratories. The pink copy should be retained by the client.

Issued by Dept. 6042 Management
2102.05

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
ug	microgram(s)	**mg**	milligram(s)
ml	milliliter(s)	**l**	liter(s)
m3	cubic meter(s)	**ul**	microliter(s)

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

J estimated value – The result is ≥ the Method Detection Limit (MDL) and < the Limit of Quantitation (LOQ).

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

U.S. EPA CLP Data Qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
N	Presumptive evidence of a compound (TICs only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Analytical test results meet all requirements of NELAC unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL LANCASTER LABORATORIES BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF LANCASTER LABORATORIES AND (B) WHETHER LANCASTER LABORATORIES HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Lancaster Laboratories which includes any conditions that vary from the Standard Terms and Conditions, and Lancaster hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

ANALYTICAL RESULTS

Prepared by:

Lancaster Laboratories
2425 New Holland Pike
Lancaster, PA 17605-2425

Prepared for:

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

April 29, 2011

Project: SUN: Philadelphia Refinery AOI-10

Submittal Date: 04/08/2011
Group Number: 1241316
PO Number: PHILADELPHIA
State of Sample Origin: PA

Client Sample Description	Lancaster Labs (LLI) #
SED-1_040711 Grab Soil	6253879
SED-2_040711 Grab Soil	6253880
SED-3_040711 Grab Soil	6253881
SED-4_040711 Grab Soil	6253882
SED-5_040711 Grab Soil	6253883

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

ELECTRONIC COPY TO	Langan	Attn: Dennis Webster
ELECTRONIC COPY TO	SUN: Aquaterra Tech.	Attn: Tiffani Doerr
ELECTRONIC COPY TO	LLI	Attn: EDD Group
ELECTRONIC COPY TO	Langan	Attn: Kristen Ward
ELECTRONIC COPY TO	Aquaterra Tech	Attn: Loretta Belfiglio

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Questions? Contact your Client Services Representative
Jessica A Oknefski at (717) 656-2300 Ext. 1815

Respectfully Submitted,

Robert Heisey

Robert Heisey
Senior Specialist

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SED-1_040711 Grab Soil
Philadelphia Refinery AOI-10
COC: 258845 SED-1_040711

LLI Sample # SW 6253879
LLI Group # 1241316
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 13:40 by SS

Submitted: 04/08/2011 14:10
Reported: 04/29/2011 13:53

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SED-1

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		ug/kg	ug/kg	ug/kg	
10950	Benzene	71-43-2	10	10	1	1.06
10950	1,2-Dibromoethane	106-93-4	< 10	10	2	1.06
10950	1,2-Dichlorobenzene	95-50-1	< 10	10	2	1.06
10950	1,3-Dichlorobenzene	541-73-1	< 10	10	2	1.06
10950	1,4-Dichlorobenzene	106-46-7	< 10	10	2	1.06
10950	1,2-Dichloroethane	107-06-2	< 10	10	2	1.06
10950	Ethylbenzene	100-41-4	< 10	10	2	1.06
10950	Isopropylbenzene	98-82-8	< 10	10	2	1.06
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 10	10	1	1.06
10950	Toluene	108-88-3	< 10	10	2	1.06
10950	1,2,4-Trimethylbenzene	95-63-6	< 10	10	2	1.06
10950	1,3,5-Trimethylbenzene	108-67-8	< 10	10	2	1.06
10950	Xylene (Total)	1330-20-7	< 10	10	2	1.06
GC/MS Semivolatiles	**SW-846 8270C**		ug/kg	ug/kg	ug/kg	
10728	Benzenethiol	108-98-5	< 18,000	18,000	6,200	10
10728	Benzo(k)fluoranthene	207-08-9	< 3,100	3,100	620	10
10728	Butylbenzylphthalate	85-68-7	< 3,100	3,100	1,200	10
10728	Di-n-butylphthalate	84-74-2	< 3,100	3,100	1,200	10
10728	Dibenz(a,h)acridine	226-36-8	< 3,100	3,100	620	10
10728	Dibenz(a,h)anthracene	53-70-3	< 3,100	3,100	620	10
10728	Diethylphthalate	84-66-2	< 3,100	3,100	1,200	10
10728	2,4-Dimethylphenol	105-67-9	< 3,100	3,100	1,200	10
10728	Dimethylphthalate	131-11-3	< 3,100	3,100	1,200	10
10728	2,4-Dinitrophenol	51-28-5	< 18,000	18,000	6,200	10
10728	bis(2-Ethylhexyl)phthalate	117-81-7	< 6,200	6,200	1,200	10
10728	Fluoranthene	206-44-0	< 3,100	3,100	620	10
10728	6-Methylchrysene	1705-85-7	< 3,100	3,100	620	10
10728	2-Methylphenol	95-48-7	< 3,100	3,100	1,200	10
10728	2-Nitrophenol	88-75-5	< 3,100	3,100	620	10
10728	Di-n-octylphthalate	117-84-0	< 3,100	3,100	1,200	10
10728	Phenol	108-95-2	< 3,100	3,100	620	10

Reporting limits were raised due to interference from the sample matrix.

A separate LCS/LCSD for benzenethiol were performed due to the instability of benzenethiol in a spike solution. The MS/MSD associated with this sample was not spiked with benzenethiol.

GC/MS Semivolatiles	**SW-846 8270C SIM**		ug/kg	ug/kg	ug/kg	
10722	Anthracene	120-12-7	660	31	6.1	10
10722	Benzo(a)anthracene	56-55-3	520	31	12	10
10722	Benzo(a)pyrene	50-32-8	540	31	12	10
10722	Benzo(b)fluoranthene	205-99-2	550	31	12	10
10722	Benzo(g,h,i)perylene	191-24-2	640	31	12	10
10722	Chrysene	218-01-9	890	31	6.1	10
10722	Fluorene	86-73-7	360	31	12	10
10722	1-Methylnaphthalene	90-12-0	6,000	310	120	100
10722	Naphthalene	91-20-3	7,700	310	120	100
10722	Phenanthrene	85-01-8	2,300	31	12	10

*=This limit was used in the evaluation of the final result

Sample Description: SED-1_040711 Grab Soil
Philadelphia Refinery AOI-10
COC: 258845 SED-1_040711

LLI Sample # SW 6253879
LLI Group # 1241316
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 13:40 by SS

Submitted: 04/08/2011 14:10
Reported: 04/29/2011 13:53

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SED-1

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C SIM**		**ug/kg**	**ug/kg**	**ug/kg**	
10722	Pyrene	129-00-0	1,200	31	12	10
	The LCS and/or LCSD recoveries are outside the stated QC window but within the marginal exceedance allowance of +/- 4 standard deviations as defined in the NELAC Standards. The following analytes are accepted based on this allowance: pyrene					
Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	15,400	36.4	9.15	1
06944	Antimony	7440-36-0	< 3.64	3.64	1.82	1
06935	Arsenic	7440-38-2	24.0	3.64	1.73	1
06946	Barium	7440-39-3	331	0.909	0.0728	1
06947	Beryllium	7440-41-7	1.12	0.909	0.124	1
06949	Cadmium	7440-43-9	2.22	0.909	0.255	1
01650	Calcium	7440-70-2	4,150	36.4	11.1	1
06951	Chromium	7440-47-3	89.7	2.73	1.07	1
06952	Cobalt	7440-48-4	15.0	0.909	0.346	1
06953	Copper	7440-50-8	573	1.82	0.400	1
01654	Iron	7439-89-6	44,500	36.4	8.57	1
06955	Lead	7439-92-1	3,610	13.6	5.46	5
01657	Magnesium	7439-95-4	3,370	18.2	4.62	1
06958	Manganese	7439-96-5	461	0.909	0.142	1
06961	Nickel	7440-02-0	45.6	1.82	0.346	1
01662	Potassium	7440-09-7	1,780	90.9	32.7	1
06936	Selenium	7782-49-2	5.30	3.64	1.78	1
06966	Silver	7440-22-4	2.96	0.909	0.327	1
01667	Sodium	7440-23-5	264	182	67.8	1
06925	Thallium	7440-28-0	< 5.46	5.46	2.64	1
06971	Vanadium	7440-62-2	68.0	0.909	0.346	1
06972	Zinc	7440-66-6	503	3.64	1.20	1
	SW-846 7471A		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	3.59	0.882	0.0253	5
Wet Chemistry	**SM20 5310 B modified**		**mg/kg**	**mg/kg**	**mg/kg**	
02079	TOC Solids/Sludges Combustion	n.a.	302,000	18,300	6,100	1
Wet Chemistry	**ASTM D422**		**% Passing**	**% Passing**	**% Passing**	
07103	75 mm	n.a.	100	1.0	0.50	1
07103	37.5 mm	n.a.	100	1.0	0.50	1
07103	19 mm	n.a.	100	1.0	0.50	1
07103	4.75 mm	n.a.	84.6	1.0	0.50	1
07103	3.35 mm	n.a.	78.3	1.0	0.50	1
07103	2.36 mm	n.a.	68.8	1.0	0.50	1
07103	1.18 mm	n.a.	60.7	1.0	0.50	1
07103	0.6 mm	n.a.	52.3	1.0	0.50	1
07103	0.3 mm	n.a.	45.0	1.0	0.50	1
07103	0.15 mm	n.a.	37.3	1.0	0.50	1
07103	0.075 mm	n.a.	30.7	1.0	0.50	1

*=This limit was used in the evaluation of the final result

Sample Description: SED-1_040711 Grab Soil
Philadelphia Refinery AOI-10
COC: 258845 SED-1_040711

LLI Sample # SW 6253879
LLI Group # 1241316
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 13:40 by SS

Submitted: 04/08/2011 14:10
Reported: 04/29/2011 13:53

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SED-1

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
Wet Chemistry	**ASTM D422**		% Passing	% Passing	% Passing	
07103	0.064 mm	n.a.	28.0	1.0	0.50	1
07103	0.05 mm	n.a.	22.0	1.0	0.50	1
07103	0.02 mm	n.a.	13.0	1.0	0.50	1
07103	0.005 mm	n.a.	6.0	1.0	0.50	1
07103	0.002 mm	n.a.	2.0	1.0	0.50	1
07103	0.001 mm	n.a.	1.0	1.0	0.50	1
Wet Chemistry	**SM20 2540 G**		%	%	%	
00111	Moisture	n.a.	46.1	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Iso/TMB/DCBs	SW-846 8260B	1	X111021AA	04/12/2011 05:11	Stephanie A Selis	1.06
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201109824067	04/07/2011 13:40	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201109824067	04/07/2011 13:40	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201109824067	04/07/2011 13:40	Client Supplied	1
10728	Skinner 8270 (microwave)	SW-846 8270C	1	11102SLC026	04/14/2011 23:42	Gregory J Drahovsky	10
10722	SIM PAH 8270 (microwave)	SW-846 8270C SIM	1	11102SLG026	04/13/2011 21:20	Gregory J Drahovsky	10
10722	SIM PAH 8270 (microwave)	SW-846 8270C SIM	1	11102SLG026	04/14/2011 06:33	Joseph M Gambler	100
10810	BNA Soil Microwave SIM PAH	SW-846 3546	1	11102SLG026	04/13/2011 08:00	Kerrie A Freeburn	1
10812	BNA Soil Microwave Skinner	SW-846 3546	1	11102SLC026	04/13/2011 08:00	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111015708004	04/13/2011 01:16	John W Yanzuk II	1
06944	Antimony	SW-846 6010B	1	111015708004	04/13/2011 01:16	John W Yanzuk II	1
06935	Arsenic	SW-846 6010B	1	111015708004	04/14/2011 13:58	Joanne M Gates	1
06946	Barium	SW-846 6010B	1	111015708004	04/13/2011 01:16	John W Yanzuk II	1
06947	Beryllium	SW-846 6010B	1	111015708004	04/13/2011 01:16	John W Yanzuk II	1
06949	Cadmium	SW-846 6010B	1	111015708004	04/13/2011 01:16	John W Yanzuk II	1
01650	Calcium	SW-846 6010B	1	111015708004	04/13/2011 01:16	John W Yanzuk II	1
06951	Chromium	SW-846 6010B	1	111015708004	04/13/2011 01:16	John W Yanzuk II	1
06952	Cobalt	SW-846 6010B	1	111015708004	04/14/2011 13:58	Joanne M Gates	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SED-1_040711 Grab Soil
Philadelphia Refinery AOI-10
COC: 258845 SED-1_040711

LLI Sample # SW 6253879
LLI Group # 1241316
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 13:40 by SS

Submitted: 04/08/2011 14:10
Reported: 04/29/2011 13:53

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SED-1

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06953	Copper	SW-846 6010B	1	111015708004	04/13/2011 01:16	John W Yanzuk II	1
01654	Iron	SW-846 6010B	1	111015708004	04/13/2011 01:16	John W Yanzuk II	1
06955	Lead	SW-846 6010B	1	111015708004	04/14/2011 14:01	Joanne M Gates	5
01657	Magnesium	SW-846 6010B	1	111015708004	04/13/2011 01:16	John W Yanzuk II	1
06958	Manganese	SW-846 6010B	1	111015708004	04/13/2011 01:16	John W Yanzuk II	1
06961	Nickel	SW-846 6010B	1	111015708004	04/14/2011 13:58	Joanne M Gates	1
01662	Potassium	SW-846 6010B	1	111015708004	04/13/2011 01:16	John W Yanzuk II	1
06936	Selenium	SW-846 6010B	1	111015708004	04/14/2011 13:58	Joanne M Gates	1
06966	Silver	SW-846 6010B	1	111015708004	04/13/2011 01:16	John W Yanzuk II	1
01667	Sodium	SW-846 6010B	1	111015708004	04/13/2011 01:16	John W Yanzuk II	1
06925	Thallium	SW-846 6010B	1	111015708004	04/14/2011 13:58	Joanne M Gates	1
06971	Vanadium	SW-846 6010B	1	111015708004	04/13/2011 01:16	John W Yanzuk II	1
06972	Zinc	SW-846 6010B	1	111015708004	04/13/2011 01:16	John W Yanzuk II	1
00159	Mercury	SW-846 7471A	1	111015711003	04/13/2011 09:56	Damary Valentin	5
05708	SW SW846 ICP Digest	SW-846 3050B	1	111015708004	04/12/2011 09:58	Denise K Conners	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111015711003	04/12/2011 10:55	Denise K Conners	1
02079	TOC Solids/Sludges Combustion	SM20 5310 B modified	2	11101049531A	04/12/2011 21:39	James S Mathiot	1
07103	Grain Size to 1 um	ASTM D422	1	11098710301A	04/08/2011 22:00	Luz M Groff	1
00111	Moisture	SM20 2540 G	1	11103820003A	04/13/2011 20:31	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SED-2_040711 Grab Soil
Philadelphia Refinery AOI-10
COC: 258845 SED-2_040711

LLI Sample # SW 6253880
LLI Group # 1241316
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 13:00 by SS

Submitted: 04/08/2011 14:10
Reported: 04/29/2011 13:53

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SED-2

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		ug/kg	ug/kg	ug/kg	
10950	Benzene	71-43-2	< 14	14	1	1.15
10950	1,2-Dibromoethane	106-93-4	< 14	14	3	1.15
10950	1,2-Dichlorobenzene	95-50-1	< 14	14	3	1.15
10950	1,3-Dichlorobenzene	541-73-1	< 14	14	3	1.15
10950	1,4-Dichlorobenzene	106-46-7	< 14	14	3	1.15
10950	1,2-Dichloroethane	107-06-2	< 14	14	3	1.15
10950	Ethylbenzene	100-41-4	< 14	14	3	1.15
10950	Isopropylbenzene	98-82-8	< 14	14	3	1.15
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 14	14	1	1.15
10950	Toluene	108-88-3	< 14	14	3	1.15
10950	1,2,4-Trimethylbenzene	95-63-6	< 14	14	3	1.15
10950	1,3,5-Trimethylbenzene	108-67-8	< 14	14	3	1.15
10950	Xylene (Total)	1330-20-7	< 14	14	3	1.15
GC/MS Semivolatiles	**SW-846 8270C**		ug/kg	ug/kg	ug/kg	
10728	Benzenethiol	108-98-5	< 24,000	24,000	7,900	10
10728	Benzo(k)fluoranthene	207-08-9	< 4,000	4,000	790	10
10728	Butylbenzylphthalate	85-68-7	< 4,000	4,000	1,600	10
10728	Di-n-butylphthalate	84-74-2	< 4,000	4,000	1,600	10
10728	Dibenz(a,h)acridine	226-36-8	< 4,000	4,000	790	10
10728	Dibenz(a,h)anthracene	53-70-3	< 4,000	4,000	790	10
10728	Diethylphthalate	84-66-2	< 4,000	4,000	1,600	10
10728	2,4-Dimethylphenol	105-67-9	< 4,000	4,000	1,600	10
10728	Dimethylphthalate	131-11-3	< 4,000	4,000	1,600	10
10728	2,4-Dinitrophenol	51-28-5	< 24,000	24,000	7,900	10
10728	bis(2-Ethylhexyl)phthalate	117-81-7	< 7,900	7,900	1,600	10
10728	Fluoranthene	206-44-0	< 4,000	4,000	790	10
10728	6-Methylchrysene	1705-85-7	< 4,000	4,000	790	10
10728	2-Methylphenol	95-48-7	< 4,000	4,000	1,600	10
10728	2-Nitrophenol	88-75-5	< 4,000	4,000	790	10
10728	Di-n-octylphthalate	117-84-0	< 4,000	4,000	1,600	10
10728	Phenol	108-95-2	< 4,000	4,000	790	10

Reporting limits were raised due to interference from the sample matrix.

A separate LCS/LCSD for benzenethiol were performed due to the instability of benzenethiol in a spike solution. The MS/MSD associated with this sample was not spiked with benzenethiol.

GC/MS Semivolatiles	**SW-846 8270C SIM**		ug/kg	ug/kg	ug/kg	
10722	Anthracene	120-12-7	< 39	39	7.9	10
10722	Benzo(a)anthracene	56-55-3	< 39	39	16	10
10722	Benzo(a)pyrene	50-32-8	< 39	39	16	10
10722	Benzo(b)fluoranthene	205-99-2	< 39	39	16	10
10722	Benzo(g,h,i)perylene	191-24-2	< 39	39	16	10
10722	Chrysene	218-01-9	< 39	39	7.9	10
10722	Fluorene	86-73-7	< 39	39	16	10
10722	1-Methylnaphthalene	90-12-0	< 39	39	16	10
10722	Naphthalene	91-20-3	< 39	39	16	10
10722	Phenanthrene	85-01-8	< 39	39	16	10

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SED-2_040711 Grab Soil
Philadelphia Refinery AOI-10
COC: 258845 SED-2_040711

LLI Sample # SW 6253880
LLI Group # 1241316
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 13:00 by SS

Submitted: 04/08/2011 14:10
Reported: 04/29/2011 13:53

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SED-2

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C SIM**		**ug/kg**	**ug/kg**	**ug/kg**	
10722	Pyrene	129-00-0	< 39	39	16	10

Reporting limits were raised due to interference from the sample matrix.

The LCS and/or LCSD recoveries are outside the stated QC window but within the marginal exceedance allowance of +/- 4 standard deviations as defined in the NELAC Standards. The following analytes are accepted based on this allowance:
Pyrene

Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	35,900	47.5	11.9	1
06944	Antimony	7440-36-0	< 4.75	4.75	2.38	1
06935	Arsenic	7440-38-2	91.7	4.75	2.26	1
06946	Barium	7440-39-3	832	1.19	0.0950	1
06947	Beryllium	7440-41-7	< 1.19	1.19	0.162	1
06949	Cadmium	7440-43-9	2.03	1.19	0.333	1
01650	Calcium	7440-70-2	166,000	238	72.8	5
06951	Chromium	7440-47-3	186	3.56	1.40	1
06952	Cobalt	7440-48-4	14.2	1.19	0.451	1
06953	Copper	7440-50-8	425	2.38	0.523	1
01654	Iron	7439-89-6	21,300	47.5	11.2	1
06955	Lead	7439-92-1	897	3.56	1.43	1
01657	Magnesium	7439-95-4	31,600	23.8	6.03	1
06958	Manganese	7439-96-5	1,140	1.19	0.185	1
06961	Nickel	7440-02-0	207	2.38	0.451	1
01662	Potassium	7440-09-7	1,300	119	42.8	1
06936	Selenium	7782-49-2	< 4.75	4.75	2.33	1
06966	Silver	7440-22-4	2.01	1.19	0.428	1
01667	Sodium	7440-23-5	793	238	88.6	1
06925	Thallium	7440-28-0	< 7.13	7.13	3.44	1
06971	Vanadium	7440-62-2	287	1.19	0.451	1
06972	Zinc	7440-66-6	738	4.75	1.57	1
	SW-846 7471A		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	< 0.229	0.229	0.0066	1
Wet Chemistry	**SM20 5310 B modified**		**mg/kg**	**mg/kg**	**mg/kg**	
02079	TOC Solids/Sludges Combustion	n.a.	16,100	6,490	2,160	1
Wet Chemistry	**ASTM D422**		**% Passing**	**% Passing**	**% Passing**	
07103	75 mm	n.a.	100	1.0	0.50	1
07103	37.5 mm	n.a.	100	1.0	0.50	1
07103	19 mm	n.a.	100	1.0	0.50	1
07103	4.75 mm	n.a.	88.2	1.0	0.50	1
07103	3.35 mm	n.a.	84.0	1.0	0.50	1
07103	2.36 mm	n.a.	79.0	1.0	0.50	1
07103	1.18 mm	n.a.	65.0	1.0	0.50	1
07103	0.6 mm	n.a.	48.1	1.0	0.50	1
07103	0.3 mm	n.a.	23.3	1.0	0.50	1

*=This limit was used in the evaluation of the final result

Sample Description: SED-2_040711 Grab Soil
Philadelphia Refinery AOI-10
COC: 258845 SED-2_040711

LLI Sample # SW 6253880
LLI Group # 1241316
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 13:00 by SS

Submitted: 04/08/2011 14:10
Reported: 04/29/2011 13:53

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SED-2

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
Wet Chemistry	**ASTM D422**		% Passing	% Passing	% Passing	
07103	0.15 mm	n.a.	14.4	1.0	0.50	1
07103	0.075 mm	n.a.	11.6	1.0	0.50	1
07103	0.064 mm	n.a.	10.5	1.0	0.50	1
07103	0.05 mm	n.a.	8.5	1.0	0.50	1
07103	0.02 mm	n.a.	4.0	1.0	0.50	1
07103	0.005 mm	n.a.	< 1.0	1.0	0.50	1
07103	0.002 mm	n.a.	< 1.0	1.0	0.50	1
07103	0.001 mm	n.a.	< 1.0	1.0	0.50	1
Wet Chemistry	**SM20 2540 G**		%	%	%	
00111	Moisture	n.a.	57.9	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Iso/TMB/DCBs	SW-846 8260B	1	X111021AA	04/12/2011 05:47	Stephanie A Selis	1.15
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201109824067	04/07/2011 13:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201109824067	04/07/2011 13:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201109824067	04/07/2011 13:00	Client Supplied	1
10728	Skinner 8270 (microwave)	SW-846 8270C	1	11102SLC026	04/15/2011 00:59	Gregory J Drahovsky	10
10722	SIM PAH 8270 (microwave)	SW-846 8270C SIM	1	11102SLG026	04/14/2011 07:05	Joseph M Gambler	10
10810	BNA Soil Microwave SIM PAH	SW-846 3546	1	11102SLG026	04/13/2011 08:00	Kerrie A Freeburn	1
10812	BNA Soil Microwave Skinner	SW-846 3546	1	11102SLC026	04/13/2011 08:00	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111015708004	04/13/2011 01:26	John W Yanzuk II	1
06944	Antimony	SW-846 6010B	1	111015708004	04/13/2011 01:26	John W Yanzuk II	1
06935	Arsenic	SW-846 6010B	1	111015708004	04/14/2011 14:05	Joanne M Gates	1
06946	Barium	SW-846 6010B	1	111015708004	04/13/2011 01:26	John W Yanzuk II	1
06947	Beryllium	SW-846 6010B	1	111015708004	04/13/2011 01:26	John W Yanzuk II	1
06949	Cadmium	SW-846 6010B	1	111015708004	04/13/2011 01:26	John W Yanzuk II	1
01650	Calcium	SW-846 6010B	1	111015708004	04/14/2011 14:09	Joanne M Gates	5
06951	Chromium	SW-846 6010B	1	111015708004	04/13/2011 01:26	John W Yanzuk II	1
06952	Cobalt	SW-846 6010B	1	111015708004	04/14/2011 14:05	Joanne M Gates	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SED-2_040711 Grab Soil
Philadelphia Refinery AOI-10
COC: 258845 SED-2_040711

LLI Sample # SW 6253880
LLI Group # 1241316
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 13:00 by SS

Submitted: 04/08/2011 14:10
Reported: 04/29/2011 13:53

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SED-2

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06953	Copper	SW-846 6010B	1	111015708004	04/13/2011 01:26	John W Yanzuk II	1
01654	Iron	SW-846 6010B	1	111015708004	04/13/2011 01:26	John W Yanzuk II	1
06955	Lead	SW-846 6010B	1	111015708004	04/14/2011 14:05	Joanne M Gates	1
01657	Magnesium	SW-846 6010B	1	111015708004	04/13/2011 01:26	John W Yanzuk II	1
06958	Manganese	SW-846 6010B	1	111015708004	04/13/2011 01:26	John W Yanzuk II	1
06961	Nickel	SW-846 6010B	1	111015708004	04/14/2011 14:05	Joanne M Gates	1
01662	Potassium	SW-846 6010B	1	111015708004	04/13/2011 01:26	John W Yanzuk II	1
06936	Selenium	SW-846 6010B	1	111015708004	04/14/2011 14:05	Joanne M Gates	1
06966	Silver	SW-846 6010B	1	111015708004	04/13/2011 01:26	John W Yanzuk II	1
01667	Sodium	SW-846 6010B	1	111015708004	04/13/2011 01:26	John W Yanzuk II	1
06925	Thallium	SW-846 6010B	1	111015708004	04/14/2011 14:05	Joanne M Gates	1
06971	Vanadium	SW-846 6010B	1	111015708004	04/13/2011 01:26	John W Yanzuk II	1
06972	Zinc	SW-846 6010B	1	111015708004	04/13/2011 01:26	John W Yanzuk II	1
00159	Mercury	SW-846 7471A	1	111015711003	04/13/2011 08:51	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111015708004	04/12/2011 09:58	Denise K Conners	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111015711003	04/12/2011 10:55	Denise K Conners	1
02079	TOC Solids/Sludges Combustion	SM20 5310 B modified	1	11101049531A	04/12/2011 00:53	James S Mathiot	1
07103	Grain Size to 1 um	ASTM D422	1	11098710301A	04/08/2011 22:00	Luz M Groff	1
00111	Moisture	SM20 2540 G	1	11103820003A	04/13/2011 20:31	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SED-3_040711 Grab Soil
Philadelphia Refinery AOI-10
COC: 258845 SED-3_040711

LLI Sample # SW 6253881
LLI Group # 1241316
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 11:50 by SS

Submitted: 04/08/2011 14:10
Reported: 04/29/2011 13:53

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SED-3

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		ug/kg	ug/kg	ug/kg	
10950	Benzene	71-43-2	10	6	0.6	0.81
10950	1,2-Dibromoethane	106-93-4	< 6	6	1	0.81
10950	1,2-Dichlorobenzene	95-50-1	< 6	6	1	0.81
10950	1,3-Dichlorobenzene	541-73-1	< 6	6	1	0.81
10950	1,4-Dichlorobenzene	106-46-7	< 6	6	1	0.81
10950	1,2-Dichloroethane	107-06-2	< 6	6	1	0.81
10950	Ethylbenzene	100-41-4	< 6	6	1	0.81
10950	Isopropylbenzene	98-82-8	< 6	6	1	0.81
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 6	6	0.6	0.81
10950	Toluene	108-88-3	< 6	6	1	0.81
10950	1,2,4-Trimethylbenzene	95-63-6	7	6	1	0.81
10950	1,3,5-Trimethylbenzene	108-67-8	< 6	6	1	0.81
10950	Xylene (Total)	1330-20-7	10	6	1	0.81

The GC/MS volatile internal standard peak areas were outside the QC limits. A re-analysis was performed, and the matrix effect was confirmed.

GC/MS Semivolatiles	**SW-846 8270C**		ug/kg	ug/kg	ug/kg	
10728	Benzenethiol	108-98-5	< 14,000	14,000	4,800	10
10728	Benzo(k)fluoranthene	207-08-9	< 2,400	2,400	480	10
10728	Butylbenzylphthalate	85-68-7	< 2,400	2,400	950	10
10728	Di-n-butylphthalate	84-74-2	< 2,400	2,400	950	10
10728	Dibenz(a,h)acridine	226-36-8	< 2,400	2,400	480	10
10728	Dibenz(a,h)anthracene	53-70-3	< 2,400	2,400	480	10
10728	Diethylphthalate	84-66-2	< 2,400	2,400	950	10
10728	2,4-Dimethylphenol	105-67-9	< 2,400	2,400	950	10
10728	Dimethylphthalate	131-11-3	< 2,400	2,400	950	10
10728	2,4-Dinitrophenol	51-28-5	< 14,000	14,000	4,800	10
10728	bis(2-Ethylhexyl)phthalate	117-81-7	< 4,800	4,800	950	10
10728	Fluoranthene	206-44-0	< 2,400	2,400	480	10
10728	6-Methylchrysene	1705-85-7	< 2,400	2,400	480	10
10728	2-Methylphenol	95-48-7	< 2,400	2,400	950	10
10728	2-Nitrophenol	88-75-5	< 2,400	2,400	480	10
10728	Di-n-octylphthalate	117-84-0	< 2,400	2,400	950	10
10728	Phenol	108-95-2	< 2,400	2,400	480	10

Reporting limits were raised due to interference from the sample matrix.

A separate LCS/LCSD for benzenethiol were performed due to the instability of benzenethiol in a spike solution. The MS/MSD associated with this sample was not spiked with benzenethiol.

GC/MS Semivolatiles	**SW-846 8270C SIM**		ug/kg	ug/kg	ug/kg	
10722	Anthracene	120-12-7	180	24	4.7	10
10722	Benzo(a)anthracene	56-55-3	600	24	9.5	10
10722	Benzo(a)pyrene	50-32-8	370	24	9.5	10
10722	Benzo(b)fluoranthene	205-99-2	640	24	9.5	10
10722	Benzo(g,h,i)perylene	191-24-2	190	24	9.5	10
10722	Chrysene	218-01-9	1,100	24	4.7	10
10722	Fluorene	86-73-7	46	24	9.5	10
10722	1-Methylnaphthalene	90-12-0	34	24	9.5	10

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SED-3_040711 Grab Soil
Philadelphia Refinery AOI-10
COC: 258845 SED-3_040711

LLI Sample # SW 6253881
LLI Group # 1241316
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 11:50 by SS

Submitted: 04/08/2011 14:10
Reported: 04/29/2011 13:53

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SED-3

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C SIM**		**ug/kg**	**ug/kg**	**ug/kg**	
10722	Naphthalene	91-20-3	70	24	9.5	10
10722	Phenanthrene	85-01-8	430	24	9.5	10
10722	Pyrene	129-00-0	1,600	24	9.5	10
	The LCS and/or LCSD recoveries are outside the stated QC window but within the marginal exceedance allowance of +/- 4 standard deviations as defined in the NELAC Standards. The following analytes are accepted based on this allowance: pyrene					
Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	12,300	28.4	7.15	1
06944	Antimony	7440-36-0	< 2.84	2.84	1.42	1
06935	Arsenic	7440-38-2	7.48	2.84	1.35	1
06946	Barium	7440-39-3	236	0.710	0.0568	1
06947	Beryllium	7440-41-7	< 0.710	0.710	0.0966	1
06949	Cadmium	7440-43-9	1.58	0.710	0.199	1
01650	Calcium	7440-70-2	7,130	28.4	8.71	1
06951	Chromium	7440-47-3	45.2	2.13	0.838	1
06952	Cobalt	7440-48-4	8.29	0.710	0.270	1
06953	Copper	7440-50-8	111	1.42	0.313	1
01654	Iron	7439-89-6	19,300	28.4	6.69	1
06955	Lead	7439-92-1	328	2.13	0.852	1
01657	Magnesium	7439-95-4	6,940	14.2	3.61	1
06958	Manganese	7439-96-5	236	0.710	0.111	1
06961	Nickel	7440-02-0	31.3	1.42	0.270	1
01662	Potassium	7440-09-7	2,290	71.0	25.6	1
06936	Selenium	7782-49-2	< 2.84	2.84	1.39	1
06966	Silver	7440-22-4	0.969	0.710	0.256	1
01667	Sodium	7440-23-5	295	142	53.0	1
06925	Thallium	7440-28-0	< 4.26	4.26	2.06	1
06971	Vanadium	7440-62-2	50.1	0.710	0.270	1
06972	Zinc	7440-66-6	503	2.84	0.938	1
	SW-846 7471A		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.604	0.139	0.0040	1
Wet Chemistry	**SM20 5310 B modified**		**mg/kg**	**mg/kg**	**mg/kg**	
02079	TOC Solids/Sludges Combustion	n.a.	55,900	3,490	1,160	1
Wet Chemistry	**ASTM D422**		**% Passing**	**% Passing**	**% Passing**	
07103	75 mm	n.a.	100	1.0	0.50	1
07103	37.5 mm	n.a.	100	1.0	0.50	1
07103	19 mm	n.a.	100	1.0	0.50	1
07103	4.75 mm	n.a.	74.1	1.0	0.50	1
07103	3.35 mm	n.a.	66.5	1.0	0.50	1
07103	2.36 mm	n.a.	60.7	1.0	0.50	1
07103	1.18 mm	n.a.	54.4	1.0	0.50	1
07103	0.6 mm	n.a.	44.7	1.0	0.50	1
07103	0.3 mm	n.a.	26.3	1.0	0.50	1

*=This limit was used in the evaluation of the final result

Sample Description: SED-3_040711 Grab Soil
Philadelphia Refinery AOI-10
COC: 258845 SED-3_040711

LLI Sample # SW 6253881
LLI Group # 1241316
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 11:50 by SS

Submitted: 04/08/2011 14:10
Reported: 04/29/2011 13:53

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SED-3

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
Wet Chemistry	**ASTM D422**		% Passing	% Passing	% Passing	
07103	0.15 mm	n.a.	14.0	1.0	0.50	1
07103	0.075 mm	n.a.	9.5	1.0	0.50	1
07103	0.064 mm	n.a.	9.0	1.0	0.50	1
07103	0.05 mm	n.a.	7.5	1.0	0.50	1
07103	0.02 mm	n.a.	3.0	1.0	0.50	1
07103	0.005 mm	n.a.	1.0	1.0	0.50	1
07103	0.002 mm	n.a.	< 1.0	1.0	0.50	1
07103	0.001 mm	n.a.	< 1.0	1.0	0.50	1
Wet Chemistry	**SM20 2540 G**		%	%	%	
00111	Moisture	n.a.	30.3	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Iso/TMB/DCBs	SW-846 8260B	1	X111021AA	04/12/2011 06:10	Stephanie A Selis	0.81
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201109824067	04/07/2011 11:50	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201109824067	04/07/2011 11:50	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201109824067	04/07/2011 11:50	Client Supplied	1
10728	Skinner 8270 (microwave)	SW-846 8270C	1	11102SLC026	04/15/2011 01:25	Gregory J Drahovsky	10
10722	SIM PAH 8270 (microwave)	SW-846 8270C SIM	1	11102SLG026	04/14/2011 07:37	Joseph M Gambler	10
10810	BNA Soil Microwave SIM PAH	SW-846 3546	1	11102SLG026	04/13/2011 08:00	Kerrie A Freeburn	1
10812	BNA Soil Microwave Skinner	SW-846 3546	1	11102SLC026	04/13/2011 08:00	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111015708004	04/13/2011 01:29	John W Yanzuk II	1
06944	Antimony	SW-846 6010B	1	111015708004	04/13/2011 01:29	John W Yanzuk II	1
06935	Arsenic	SW-846 6010B	1	111015708004	04/14/2011 14:12	Joanne M Gates	1
06946	Barium	SW-846 6010B	1	111015708004	04/13/2011 01:29	John W Yanzuk II	1
06947	Beryllium	SW-846 6010B	1	111015708004	04/13/2011 01:29	John W Yanzuk II	1
06949	Cadmium	SW-846 6010B	1	111015708004	04/13/2011 01:29	John W Yanzuk II	1
01650	Calcium	SW-846 6010B	1	111015708004	04/13/2011 01:29	John W Yanzuk II	1
06951	Chromium	SW-846 6010B	1	111015708004	04/13/2011 01:29	John W Yanzuk II	1
06952	Cobalt	SW-846 6010B	1	111015708004	04/14/2011 14:12	Joanne M Gates	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SED-3_040711 Grab Soil
Philadelphia Refinery AOI-10
COC: 258845 SED-3_040711

LLI Sample # SW 6253881
LLI Group # 1241316
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 11:50 by SS

Submitted: 04/08/2011 14:10
Reported: 04/29/2011 13:53

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SED-3

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06953	Copper	SW-846 6010B	1	111015708004	04/13/2011 01:29	John W Yanzuk II	1
01654	Iron	SW-846 6010B	1	111015708004	04/13/2011 01:29	John W Yanzuk II	1
06955	Lead	SW-846 6010B	1	111015708004	04/14/2011 14:12	Joanne M Gates	1
01657	Magnesium	SW-846 6010B	1	111015708004	04/13/2011 01:29	John W Yanzuk II	1
06958	Manganese	SW-846 6010B	1	111015708004	04/13/2011 01:29	John W Yanzuk II	1
06961	Nickel	SW-846 6010B	1	111015708004	04/14/2011 14:12	Joanne M Gates	1
01662	Potassium	SW-846 6010B	1	111015708004	04/13/2011 01:29	John W Yanzuk II	1
06936	Selenium	SW-846 6010B	1	111015708004	04/14/2011 14:12	Joanne M Gates	1
06966	Silver	SW-846 6010B	1	111015708004	04/13/2011 01:29	John W Yanzuk II	1
01667	Sodium	SW-846 6010B	1	111015708004	04/13/2011 01:29	John W Yanzuk II	1
06925	Thallium	SW-846 6010B	1	111015708004	04/14/2011 14:12	Joanne M Gates	1
06971	Vanadium	SW-846 6010B	1	111015708004	04/13/2011 01:29	John W Yanzuk II	1
06972	Zinc	SW-846 6010B	1	111015708004	04/13/2011 01:29	John W Yanzuk II	1
00159	Mercury	SW-846 7471A	1	111015711003	04/13/2011 08:53	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111015708004	04/12/2011 09:58	Denise K Conners	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111015711003	04/12/2011 10:55	Denise K Conners	1
02079	TOC Solids/Sludges Combustion	SM20 5310 B modified	1	11101049531A	04/12/2011 01:13	James S Mathiot	1
07103	Grain Size to 1 um	ASTM D422	1	11098710301A	04/08/2011 22:00	Luz M Groff	1
00111	Moisture	SM20 2540 G	1	11103820003A	04/13/2011 20:31	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SED-4_040711 Grab Soil
Philadelphia Refinery AOI-10
COC: 258845 SED-4_040711

LLI Sample # SW 6253882
LLI Group # 1241316
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 10:55 by SS

Submitted: 04/08/2011 14:10
Reported: 04/29/2011 13:53

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SED-4

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		ug/kg	ug/kg	ug/kg	
10950	Benzene	71-43-2	32	7	0.7	0.92
10950	1,2-Dibromoethane	106-93-4	< 7	7	1	0.92
10950	1,2-Dichlorobenzene	95-50-1	< 7	7	1	0.92
10950	1,3-Dichlorobenzene	541-73-1	< 7	7	1	0.92
10950	1,4-Dichlorobenzene	106-46-7	< 7	7	1	0.92
10950	1,2-Dichloroethane	107-06-2	< 7	7	1	0.92
10950	Ethylbenzene	100-41-4	< 7	7	1	0.92
10950	Isopropylbenzene	98-82-8	< 7	7	1	0.92
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 7	7	0.7	0.92
10950	Toluene	108-88-3	29	7	1	0.92
10950	1,2,4-Trimethylbenzene	95-63-6	< 7	7	1	0.92
10950	1,3,5-Trimethylbenzene	108-67-8	< 7	7	1	0.92
10950	Xylene (Total)	1330-20-7	15	7	1	0.92

The GC/MS volatile internal standard peak areas were outside the QC limits. A re-analysis was performed, and the matrix effect was confirmed.

GC/MS Semivolatiles	**SW-846 8270C**		ug/kg	ug/kg	ug/kg	
10728	Benzenethiol	108-98-5	< 14,000	14,000	4,800	10
10728	Benzo(k)fluoranthene	207-08-9	< 2,400	2,400	480	10
10728	Butylbenzylphthalate	85-68-7	< 2,400	2,400	960	10
10728	Di-n-butylphthalate	84-74-2	< 2,400	2,400	960	10
10728	Dibenz(a,h)acridine	226-36-8	< 2,400	2,400	480	10
10728	Dibenz(a,h)anthracene	53-70-3	< 2,400	2,400	480	10
10728	Diethylphthalate	84-66-2	< 2,400	2,400	960	10
10728	2,4-Dimethylphenol	105-67-9	< 2,400	2,400	960	10
10728	Dimethylphthalate	131-11-3	< 2,400	2,400	960	10
10728	2,4-Dinitrophenol	51-28-5	< 14,000	14,000	4,800	10
10728	bis(2-Ethylhexyl)phthalate	117-81-7	< 4,800	4,800	960	10
10728	Fluoranthene	206-44-0	< 2,400	2,400	480	10
10728	6-Methylchrysene	1705-85-7	< 2,400	2,400	480	10
10728	2-Methylphenol	95-48-7	< 2,400	2,400	960	10
10728	2-Nitrophenol	88-75-5	< 2,400	2,400	480	10
10728	Di-n-octylphthalate	117-84-0	< 2,400	2,400	960	10
10728	Phenol	108-95-2	< 2,400	2,400	480	10

Reporting limits were raised due to interference from the sample matrix.

A separate LCS/LCSD for benzenethiol were performed due to the instability of benzenethiol in a spike solution. The MS/MSD associated with this sample was not spiked with benzenethiol.

GC/MS Semivolatiles	**SW-846 8270C SIM**		ug/kg	ug/kg	ug/kg	
10722	Anthracene	120-12-7	150	24	4.8	10
10722	Benzo(a)anthracene	56-55-3	380	24	9.6	10
10722	Benzo(a)pyrene	50-32-8	320	24	9.6	10
10722	Benzo(b)fluoranthene	205-99-2	420	24	9.6	10
10722	Benzo(g,h,i)perylene	191-24-2	210	24	9.6	10
10722	Chrysene	218-01-9	440	24	4.8	10
10722	Fluorene	86-73-7	46	24	9.6	10
10722	1-Methylnaphthalene	90-12-0	290	24	9.6	10

*=This limit was used in the evaluation of the final result

Sample Description: SED-4_040711 Grab Soil
Philadelphia Refinery AOI-10
COC: 258845 SED-4_040711

LLI Sample # SW 6253882
LLI Group # 1241316
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 10:55 by SS

Submitted: 04/08/2011 14:10
Reported: 04/29/2011 13:53

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SED-4

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C SIM**		**ug/kg**	**ug/kg**	**ug/kg**	
10722	Naphthalene	91-20-3	530	24	9.6	10
10722	Phenanthrene	85-01-8	530	24	9.6	10
10722	Pyrene	129-00-0	630	24	9.6	10
	The LCS and/or LCSD recoveries are outside the stated QC window but within the marginal exceedance allowance of +/- 4 standard deviations as defined in the NELAC Standards. The following analytes are accepted based on this allowance: pyrene					
Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	14,300	28.7	7.21	1
06944	Antimony	7440-36-0	< 2.87	2.87	1.43	1
06935	Arsenic	7440-38-2	21.9	2.87	1.36	1
06946	Barium	7440-39-3	96.3	0.716	0.0573	1
06947	Beryllium	7440-41-7	0.956	0.716	0.0974	1
06949	Cadmium	7440-43-9	1.26	0.716	0.201	1
01650	Calcium	7440-70-2	6,660	28.7	8.78	1
06951	Chromium	7440-47-3	64.7	2.15	0.845	1
06952	Cobalt	7440-48-4	7.98	0.716	0.272	1
06953	Copper	7440-50-8	74.4	1.43	0.315	1
01654	Iron	7439-89-6	19,400	28.7	6.75	1
06955	Lead	7439-92-1	306	2.15	0.860	1
01657	Magnesium	7439-95-4	3,870	14.3	3.64	1
06958	Manganese	7439-96-5	375	0.716	0.112	1
06961	Nickel	7440-02-0	85.6	1.43	0.272	1
01662	Potassium	7440-09-7	1,670	71.6	25.8	1
06936	Selenium	7782-49-2	< 2.87	2.87	1.40	1
06966	Silver	7440-22-4	0.855	0.716	0.258	1
01667	Sodium	7440-23-5	< 143	143	53.4	1
06925	Thallium	7440-28-0	< 4.30	4.30	2.08	1
06971	Vanadium	7440-62-2	71.6	0.716	0.272	1
06972	Zinc	7440-66-6	1,710	14.3	4.73	5
	SW-846 7471A		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.288	0.140	0.0040	1
Wet Chemistry	**SM20 5310 B modified**		**mg/kg**	**mg/kg**	**mg/kg**	
02079	TOC Solids/Sludges Combustion	n.a.	47,800	3,400	1,130	1
Wet Chemistry	**ASTM D422**		**% Passing**	**% Passing**	**% Passing**	
07103	75 mm	n.a.	100	1.0	0.50	1
07103	37.5 mm	n.a.	100	1.0	0.50	1
07103	19 mm	n.a.	100	1.0	0.50	1
07103	4.75 mm	n.a.	72.0	1.0	0.50	1
07103	3.35 mm	n.a.	60.6	1.0	0.50	1
07103	2.36 mm	n.a.	50.5	1.0	0.50	1
07103	1.18 mm	n.a.	37.6	1.0	0.50	1
07103	0.6 mm	n.a.	26.1	1.0	0.50	1
07103	0.3 mm	n.a.	19.8	1.0	0.50	1

*=This limit was used in the evaluation of the final result

Sample Description: SED-4_040711 Grab Soil
Philadelphia Refinery AOI-10
COC: 258845 SED-4_040711

LLI Sample # SW 6253882
LLI Group # 1241316
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 10:55 by SS

Submitted: 04/08/2011 14:10
Reported: 04/29/2011 13:53

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SED-4

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
Wet Chemistry	**ASTM D422**		% Passing	% Passing	% Passing	
07103	0.15 mm	n.a.	16.8	1.0	0.50	1
07103	0.075 mm	n.a.	14.9	1.0	0.50	1
07103	0.064 mm	n.a.	14.0	1.0	0.50	1
07103	0.05 mm	n.a.	13.0	1.0	0.50	1
07103	0.02 mm	n.a.	9.5	1.0	0.50	1
07103	0.005 mm	n.a.	3.5	1.0	0.50	1
07103	0.002 mm	n.a.	2.0	1.0	0.50	1
07103	0.001 mm	n.a.	1.0	1.0	0.50	1
Wet Chemistry	**SM20 2540 G**		%	%	%	
00111	Moisture	n.a.	30.9	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Iso/TMB/DCBs	SW-846 8260B	1	X111021AA	04/12/2011 06:48	Stephanie A Selis	0.92
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201109824067	04/07/2011 10:55	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201109824067	04/07/2011 10:55	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201109824067	04/07/2011 10:55	Client Supplied	1
10728	Skinner 8270 (microwave)	SW-846 8270C	1	11102SLC026	04/15/2011 01:50	Gregory J Drahovsky	10
10722	SIM PAH 8270 (microwave)	SW-846 8270C SIM	1	11102SLG026	04/14/2011 08:09	Joseph M Gambler	10
10810	BNA Soil Microwave SIM PAH	SW-846 3546	1	11102SLG026	04/13/2011 08:00	Kerrie A Freeburn	1
10812	BNA Soil Microwave Skinner	SW-846 3546	1	11102SLC026	04/13/2011 08:00	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111015708004	04/13/2011 01:33	John W Yanzuk II	1
06944	Antimony	SW-846 6010B	1	111015708004	04/13/2011 01:33	John W Yanzuk II	1
06935	Arsenic	SW-846 6010B	1	111015708004	04/14/2011 14:15	Joanne M Gates	1
06946	Barium	SW-846 6010B	1	111015708004	04/13/2011 01:33	John W Yanzuk II	1
06947	Beryllium	SW-846 6010B	1	111015708004	04/13/2011 01:33	John W Yanzuk II	1
06949	Cadmium	SW-846 6010B	1	111015708004	04/13/2011 01:33	John W Yanzuk II	1
01650	Calcium	SW-846 6010B	1	111015708004	04/13/2011 01:33	John W Yanzuk II	1
06951	Chromium	SW-846 6010B	1	111015708004	04/13/2011 01:33	John W Yanzuk II	1
06952	Cobalt	SW-846 6010B	1	111015708004	04/14/2011 14:15	Joanne M Gates	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: **SED-4_040711 Grab Soil**
Philadelphia Refinery AOI-10
COC: 258845 SED-4_040711

LLI Sample # SW 6253882
LLI Group # 1241316
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 10:55 by SS

Submitted: 04/08/2011 14:10
Reported: 04/29/2011 13:53

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SED-4

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06953	Copper	SW-846 6010B	1	111015708004	04/13/2011 01:33	John W Yanzuk II	1
01654	Iron	SW-846 6010B	1	111015708004	04/13/2011 01:33	John W Yanzuk II	1
06955	Lead	SW-846 6010B	1	111015708004	04/14/2011 14:15	Joanne M Gates	1
01657	Magnesium	SW-846 6010B	1	111015708004	04/13/2011 01:33	John W Yanzuk II	1
06958	Manganese	SW-846 6010B	1	111015708004	04/13/2011 01:33	John W Yanzuk II	1
06961	Nickel	SW-846 6010B	1	111015708004	04/14/2011 14:15	Joanne M Gates	1
01662	Potassium	SW-846 6010B	1	111015708004	04/13/2011 01:33	John W Yanzuk II	1
06936	Selenium	SW-846 6010B	1	111015708004	04/14/2011 14:15	Joanne M Gates	1
06966	Silver	SW-846 6010B	1	111015708004	04/13/2011 01:33	John W Yanzuk II	1
01667	Sodium	SW-846 6010B	1	111015708004	04/13/2011 01:33	John W Yanzuk II	1
06925	Thallium	SW-846 6010B	1	111015708004	04/14/2011 14:15	Joanne M Gates	1
06971	Vanadium	SW-846 6010B	1	111015708004	04/13/2011 01:33	John W Yanzuk II	1
06972	Zinc	SW-846 6010B	1	111015708004	04/14/2011 14:19	Joanne M Gates	5
00159	Mercury	SW-846 7471A	1	111015711003	04/13/2011 08:54	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111015708004	04/12/2011 09:58	Denise K Conners	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111015711003	04/12/2011 10:55	Denise K Conners	1
02079	TOC Solids/Sludges Combustion	SM20 5310 B modified	1	11101049531A	04/12/2011 01:53	James S Mathiot	1
07103	Grain Size to 1 um	ASTM D422	1	11098710301A	04/08/2011 22:00	Luz M Groff	1
00111	Moisture	SM20 2540 G	1	11103820003A	04/13/2011 20:31	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SED-5_040711 Grab Soil
Philadelphia Refinery AOI-10
COC: 258845 SED-5_040711

LLI Sample # SW 6253883
LLI Group # 1241316
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 10:10 by SS

Submitted: 04/08/2011 14:10
Reported: 04/29/2011 13:53

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SED-5

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	41	9	0.9	1.03
10950	1,2-Dibromoethane	106-93-4	< 9	9	2	1.03
10950	1,2-Dichlorobenzene	95-50-1	< 9	9	2	1.03
10950	1,3-Dichlorobenzene	541-73-1	< 9	9	2	1.03
10950	1,4-Dichlorobenzene	106-46-7	< 9	9	2	1.03
10950	1,2-Dichloroethane	107-06-2	< 9	9	2	1.03
10950	Ethylbenzene	100-41-4	24	9	2	1.03
10950	Isopropylbenzene	98-82-8	< 9	9	2	1.03
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 9	9	0.9	1.03
10950	Toluene	108-88-3	340	9	2	1.03
10950	1,2,4-Trimethylbenzene	95-63-6	35	9	2	1.03
10950	1,3,5-Trimethylbenzene	108-67-8	15	9	2	1.03
10950	Xylene (Total)	1330-20-7	310	9	2	1.03

The GC/MS volatile internal standard peak areas were outside the QC limits. A re-analysis was performed, and the matrix effect was confirmed.

GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10728	Benzenethiol	108-98-5	< 17,000	17,000	5,600	10
10728	Benzo(k)fluoranthene	207-08-9	< 2,800	2,800	560	10
10728	Butylbenzylphthalate	85-68-7	< 2,800	2,800	1,100	10
10728	Di-n-butylphthalate	84-74-2	< 2,800	2,800	1,100	10
10728	Dibenz(a,h)acridine	226-36-8	< 2,800	2,800	560	10
10728	Dibenz(a,h)anthracene	53-70-3	< 2,800	2,800	560	10
10728	Diethylphthalate	84-66-2	< 2,800	2,800	1,100	10
10728	2,4-Dimethylphenol	105-67-9	< 2,800	2,800	1,100	10
10728	Dimethylphthalate	131-11-3	< 2,800	2,800	1,100	10
10728	2,4-Dinitrophenol	51-28-5	< 17,000	17,000	5,600	10
10728	bis(2-Ethylhexyl)phthalate	117-81-7	< 5,600	5,600	1,100	10
10728	Fluoranthene	206-44-0	< 2,800	2,800	560	10
10728	6-Methylchrysene	1705-85-7	< 2,800	2,800	560	10
10728	2-Methylphenol	95-48-7	< 2,800	2,800	1,100	10
10728	2-Nitrophenol	88-75-5	< 2,800	2,800	560	10
10728	Di-n-octylphthalate	117-84-0	< 2,800	2,800	1,100	10
10728	Phenol	108-95-2	< 2,800	2,800	560	10

Reporting limits were raised due to interference from the sample matrix.

A separate LCS/LCSD for benzenethiol were performed due to the instability of benzenethiol in a spike solution. The MS/MSD associated with this sample was not spiked with benzenethiol.

GC/MS Semivolatiles	**SW-846 8270C SIM**		**ug/kg**	**ug/kg**	**ug/kg**	
10722	Anthracene	120-12-7	150	28	5.6	10
10722	Benzo(a)anthracene	56-55-3	280	28	11	10
10722	Benzo(a)pyrene	50-32-8	250	28	11	10
10722	Benzo(b)fluoranthene	205-99-2	380	28	11	10
10722	Benzo(g,h,i)perylene	191-24-2	180	28	11	10
10722	Chrysene	218-01-9	350	28	5.6	10
10722	Fluorene	86-73-7	40	28	11	10
10722	1-Methylnaphthalene	90-12-0	180	28	11	10

*=This limit was used in the evaluation of the final result

Sample Description: SED-5_040711 Grab Soil
Philadelphia Refinery AOI-10
COC: 258845 SED-5_040711

LLI Sample # SW 6253883
LLI Group # 1241316
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 10:10 by SS

Submitted: 04/08/2011 14:10
Reported: 04/29/2011 13:53

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SED-5

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Semivolatiles	**SW-846 8270C SIM**		**ug/kg**	**ug/kg**	**ug/kg**	
10722	Naphthalene	91-20-3	680	28	11	10
10722	Phenanthrene	85-01-8	460	28	11	10
10722	Pyrene	129-00-0	410	28	11	10
	The LCS and/or LCSD recoveries are outside the stated QC window but within the marginal exceedance allowance of +/- 4 standard deviations as defined in the NELAC Standards. The following analytes are accepted based on this allowance: pyrene					
Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
01643	Aluminum	7429-90-5	22,300	32.9	8.27	1
06944	Antimony	7440-36-0	< 3.29	3.29	1.64	1
06935	Arsenic	7440-38-2	14.6	3.29	1.56	1
06946	Barium	7440-39-3	225	0.822	0.0658	1
06947	Beryllium	7440-41-7	0.936	0.822	0.112	1
06949	Cadmium	7440-43-9	1.20	0.822	0.230	1
01650	Calcium	7440-70-2	12,600	32.9	10.1	1
06951	Chromium	7440-47-3	66.4	2.47	0.971	1
06952	Cobalt	7440-48-4	11.5	0.822	0.313	1
06953	Copper	7440-50-8	109	1.64	0.362	1
01654	Iron	7439-89-6	21,700	32.9	7.75	1
06955	Lead	7439-92-1	319	2.47	0.987	1
01657	Magnesium	7439-95-4	7,190	16.4	4.18	1
06958	Manganese	7439-96-5	508	0.822	0.128	1
06961	Nickel	7440-02-0	44.1	1.64	0.313	1
01662	Potassium	7440-09-7	1,530	82.2	29.6	1
06936	Selenium	7782-49-2	< 3.29	3.29	1.61	1
06966	Silver	7440-22-4	1.11	0.822	0.296	1
01667	Sodium	7440-23-5	188	164	61.4	1
06925	Thallium	7440-28-0	< 4.93	4.93	2.39	1
06971	Vanadium	7440-62-2	94.7	0.822	0.313	1
06972	Zinc	7440-66-6	339	3.29	1.09	1
	SW-846 7471A		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.524	0.156	0.0045	1
Wet Chemistry	**SM20 5310 B modified**		**mg/kg**	**mg/kg**	**mg/kg**	
02079	TOC Solids/Sludges Combustion	n.a.	59,900	6,360	2,120	1
Wet Chemistry	**ASTM D422**		**% Passing**	**% Passing**	**% Passing**	
07103	75 mm	n.a.	100	1.0	0.50	1
07103	37.5 mm	n.a.	100	1.0	0.50	1
07103	19 mm	n.a.	100	1.0	0.50	1
07103	4.75 mm	n.a.	95.0	1.0	0.50	1
07103	3.35 mm	n.a.	91.1	1.0	0.50	1
07103	2.36 mm	n.a.	84.9	1.0	0.50	1
07103	1.18 mm	n.a.	80.9	1.0	0.50	1
07103	0.6 mm	n.a.	78.3	1.0	0.50	1
07103	0.3 mm	n.a.	75.1	1.0	0.50	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SED-5_040711 Grab Soil
Philadelphia Refinery AOI-10
COC: 258845 SED-5_040711

LLI Sample # SW 6253883
LLI Group # 1241316
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 10:10 by SS

Submitted: 04/08/2011 14:10
Reported: 04/29/2011 13:53

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SED-5

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
Wet Chemistry	**ASTM D422**		% Passing	% Passing	% Passing	
07103	0.15 mm	n.a.	67.9	1.0	0.50	1
07103	0.075 mm	n.a.	53.9	1.0	0.50	1
07103	0.064 mm	n.a.	48.5	1.0	0.50	1
07103	0.05 mm	n.a.	38.0	1.0	0.50	1
07103	0.02 mm	n.a.	22.5	1.0	0.50	1
07103	0.005 mm	n.a.	12.5	1.0	0.50	1
07103	0.002 mm	n.a.	8.0	1.0	0.50	1
07103	0.001 mm	n.a.	2.0	1.0	0.50	1
Wet Chemistry	**SM20 2540 G**		%	%	%	
00111	Moisture	n.a.	40.4	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Iso/TMB/DCBs	SW-846 8260B	1	X111021AA	04/12/2011 07:11	Stephanie A Selis	1.03
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201109824067	04/07/2011 10:10	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201109824067	04/07/2011 10:10	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201109824067	04/07/2011 10:10	Client Supplied	1
10728	Skinner 8270 (microwave)	SW-846 8270C	1	11102SLC026	04/15/2011 02:16	Gregory J Drahovsky	10
10722	SIM PAH 8270 (microwave)	SW-846 8270C SIM	1	11102SLG026	04/14/2011 08:41	Joseph M Gambler	10
10810	BNA Soil Microwave SIM PAH	SW-846 3546	1	11102SLG026	04/13/2011 08:00	Kerrie A Freeburn	1
10812	BNA Soil Microwave Skinner	SW-846 3546	1	11102SLC026	04/13/2011 08:00	Kerrie A Freeburn	1
01643	Aluminum	SW-846 6010B	1	111015708004	04/13/2011 01:36	John W Yanzuk II	1
06944	Antimony	SW-846 6010B	1	111015708004	04/13/2011 01:36	John W Yanzuk II	1
06935	Arsenic	SW-846 6010B	1	111015708004	04/14/2011 14:22	Joanne M Gates	1
06946	Barium	SW-846 6010B	1	111015708004	04/13/2011 01:36	John W Yanzuk II	1
06947	Beryllium	SW-846 6010B	1	111015708004	04/13/2011 01:36	John W Yanzuk II	1
06949	Cadmium	SW-846 6010B	1	111015708004	04/13/2011 01:36	John W Yanzuk II	1
01650	Calcium	SW-846 6010B	1	111015708004	04/13/2011 01:36	John W Yanzuk II	1
06951	Chromium	SW-846 6010B	1	111015708004	04/13/2011 01:36	John W Yanzuk II	1
06952	Cobalt	SW-846 6010B	1	111015708004	04/14/2011 14:22	Joanne M Gates	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SED-5_040711 Grab Soil
Philadelphia Refinery AOI-10
COC: 258845 SED-5_040711

LLI Sample # SW 6253883
LLI Group # 1241316
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 10:10 by SS

Submitted: 04/08/2011 14:10
Reported: 04/29/2011 13:53

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SED-5

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06953	Copper	SW-846 6010B	1	111015708004	04/13/2011 01:36	John W Yanzuk II	1
01654	Iron	SW-846 6010B	1	111015708004	04/13/2011 01:36	John W Yanzuk II	1
06955	Lead	SW-846 6010B	1	111015708004	04/14/2011 14:22	Joanne M Gates	1
01657	Magnesium	SW-846 6010B	1	111015708004	04/13/2011 01:36	John W Yanzuk II	1
06958	Manganese	SW-846 6010B	1	111015708004	04/13/2011 01:36	John W Yanzuk II	1
06961	Nickel	SW-846 6010B	1	111015708004	04/14/2011 14:22	Joanne M Gates	1
01662	Potassium	SW-846 6010B	1	111015708004	04/13/2011 01:36	John W Yanzuk II	1
06936	Selenium	SW-846 6010B	1	111015708004	04/14/2011 14:22	Joanne M Gates	1
06966	Silver	SW-846 6010B	1	111015708004	04/13/2011 01:36	John W Yanzuk II	1
01667	Sodium	SW-846 6010B	1	111015708004	04/13/2011 01:36	John W Yanzuk II	1
06925	Thallium	SW-846 6010B	1	111015708004	04/14/2011 14:22	Joanne M Gates	1
06971	Vanadium	SW-846 6010B	1	111015708004	04/13/2011 01:36	John W Yanzuk II	1
06972	Zinc	SW-846 6010B	1	111015708004	04/13/2011 01:36	John W Yanzuk II	1
00159	Mercury	SW-846 7471A	1	111015711003	04/13/2011 08:55	Damary Valentin	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	111015708004	04/12/2011 09:58	Denise K Conners	1
05711	SW SW846 Hg Digest	SW-846 7471A modified	1	111015711003	04/12/2011 10:55	Denise K Conners	1
02079	TOC Solids/Sludges Combustion	SM20 5310 B modified	1	11101049531A	04/12/2011 02:38	James S Mathiot	1
07103	Grain Size to 1 um	ASTM D422	1	11098710301A	04/08/2011 22:00	Luz M Groff	1
00111	Moisture	SM20 2540 G	1	11103820003A	04/13/2011 20:31	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1241316
Reported: 04/29/11 at 01:53 PM

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Laboratory Compliance Quality Control

Analysis Name	Blank Result	Blank LOQ**	Blank MDL	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: X111021AA	Sample number(s): 6253879-6253883								
Benzene	< 5	5.	0.5	ug/kg	100	98	80-120	3	30
1,2-Dibromoethane	< 5	5.	1	ug/kg	89	100	80-120	12	30
1,2-Dichlorobenzene	< 5	5.	1	ug/kg	92	94	79-120	3	30
1,3-Dichlorobenzene	< 5	5.	1	ug/kg	91	90	78-120	1	30
1,4-Dichlorobenzene	< 5	5.	1	ug/kg	91	90	79-120	1	30
1,2-Dichloroethane	< 5	5.	1	ug/kg	92	94	71-129	2	30
Ethylbenzene	< 5	5.	1	ug/kg	99	97	80-120	2	30
Isopropylbenzene	< 5	5.	1	ug/kg	98	96	76-120	3	30
Methyl Tertiary Butyl Ether	< 5	5.	0.5	ug/kg	82	90	74-121	9	30
Toluene	< 5	5.	1	ug/kg	101	99	80-120	2	30
1,2,4-Trimethylbenzene	< 5	5.	1	ug/kg	103	101	79-120	2	30
1,3,5-Trimethylbenzene	< 5	5.	1	ug/kg	105	103	78-120	2	30
Xylene (Total)	< 5	5.	1	ug/kg	98	97	80-120	1	30
Batch number: 11102SLC026	Sample number(s): 6253879-6253883								
Benzenethiol	< 1,000	1,000.	330	ug/kg	78	74	43-123	5	30
Benzo(k)fluoranthene	< 170	170.	33	ug/kg	104		71-135		
Butylbenzylphthalate	< 170	170.	67	ug/kg	101		83-122		
Di-n-butylphthalate	< 170	170.	67	ug/kg	92		79-112		
Dibenz(a,h)acridine	< 170	170.	33	ug/kg	110		72-122		
Dibenz(a,h)anthracene	< 170	170.	33	ug/kg	107		67-129		
Diethylphthalate	< 170	170.	67	ug/kg	100		82-113		
2,4-Dimethylphenol	< 170	170.	67	ug/kg	104		83-120		
Dimethylphthalate	< 170	170.	67	ug/kg	102		85-111		
2,4-Dinitrophenol	< 1,000	1,000.	330	ug/kg	87		51-124		
bis(2-Ethylhexyl)phthalate	< 330	330.	67	ug/kg	96		80-119		
Fluoranthene	< 170	170.	33	ug/kg	96		80-113		
6-Methylchrysene	< 170	170.	33	ug/kg	99		77-110		
2-Methylphenol	< 170	170.	67	ug/kg	91		80-119		
2-Nitrophenol	< 170	170.	33	ug/kg	100		81-114		
Di-n-octylphthalate	< 170	170.	67	ug/kg	105		65-141		
Phenol	< 170	170.	33	ug/kg	82		74-115		
Batch number: 11102SLG026	Sample number(s): 6253879-6253883								
Anthracene	< 1.7	1.7	0.33	ug/kg	106		69-107		
Benzo(a)anthracene	< 1.7	1.7	0.67	ug/kg	98		74-112		
Benzo(a)pyrene	< 1.7	1.7	0.67	ug/kg	79		70-109		
Benzo(b)fluoranthene	< 1.7	1.7	0.67	ug/kg	78		60-126		
Benzo(g,h,i)perylene	< 1.7	1.7	0.67	ug/kg	85		49-135		
Chrysene	< 1.7	1.7	0.33	ug/kg	99		79-111		
Fluorene	< 1.7	1.7	0.67	ug/kg	98		75-110		
1-Methylnaphthalene	< 1.7	1.7	0.67	ug/kg	97		72-114		
Naphthalene	< 1.7	1.7	0.67	ug/kg	96		67-105		
Phenanthrene	< 1.7	1.7	0.67	ug/kg	95		76-109		
Pyrene	< 1.7	1.7	0.67	ug/kg	112*		71-109		

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1241316
Reported: 04/29/11 at 01:53 PM

Analysis Name	Blank Result	Blank LOQ**	Blank MDL	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 111015708004	Sample number(s): 6253879-6253883								
Aluminum	< 19.8	19.8	4.98	mg/kg	107		61-110		
Antimony	< 1.98	1.98	0.990	mg/kg	63		38-150		
Arsenic	< 1.98	1.98	0.941	mg/kg	96		90-110		
Barium	< 0.495	0.495	0.0396	mg/kg	109		90-117		
Beryllium	< 0.495	0.495	0.0673	mg/kg	100		87-110		
Cadmium	< 0.495	0.495	0.139	mg/kg	112		90-114		
Calcium	< 19.8	19.8	6.07	mg/kg	103		88-110		
Chromium	< 1.49	1.49	0.584	mg/kg	103		85-110		
Cobalt	< 0.495	0.495	0.188	mg/kg	98		90-114		
Copper	< 0.990	0.990	0.218	mg/kg	105		83-112		
Iron	< 19.8	19.8	4.66	mg/kg	100		61-110		
Lead	< 1.49	1.49	0.594	mg/kg	94		80-120		
Magnesium	< 9.90	9.90	2.51	mg/kg	105		82-110		
Manganese	< 0.495	0.495	0.0772	mg/kg	103		89-112		
Nickel	< 0.990	0.990	0.188	mg/kg	98		90-114		
Potassium	< 49.5	49.5	17.8	mg/kg	105		78-110		
Selenium	< 1.98	1.98	0.970	mg/kg	94		57-110		
Silver	< 0.495	0.495	0.178	mg/kg	106		86-111		
Sodium	< 99.0	99.0	36.9	mg/kg	104		87-110		
Thallium	< 2.97	2.97	1.44	mg/kg	101		90-116		
Vanadium	< 0.495	0.495	0.188	mg/kg	100		79-110		
Zinc	< 1.98	1.98	0.653	mg/kg	109		90-110		
Batch number: 111015711003	Sample number(s): 6253879-6253883								
Mercury	< 0.0960	0.0960	0.0028	mg/kg	94		88-123		
Batch number: 11101049531A	Sample number(s): 6253879-6253883								
TOC Solids/Sludges Combustion	< 300	300.	100	mg/kg	55		35-144		
Batch number: 11103820003A	Sample number(s): 6253879-6253883								
Moisture					100		99-101		

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: 11102SLC026	Sample number(s): 6253879-6253883 UNSPK: 6253879								
Benzo(k)fluoranthene	74	65	61-131	13	30				
Butylbenzylphthalate	119	100	42-155	17	30				
Di-n-butylphthalate	73	59	55-131	20	30				
Dibenz(a,h)acridine	70	67	10-159	4	30				
Dibenz(a,h)anthracene	90	84	37-151	7	30				
Diethylphthalate	71	66	52-130	8	30				
2,4-Dimethylphenol	86	78	27-143	10	30				
Dimethylphthalate	68	58	49-134	15	30				
2,4-Dinitrophenol	0*	0*	20-143	0	30				
bis(2-Ethylhexyl)phthalate	103	92	38-151	12	30				
Fluoranthene	71	67	48-122	6	30				
6-Methylchrysene	79	75	11-167	5	30				
2-Methylphenol	74	73	30-145	0	30				

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1241316
Reported: 04/29/11 at 01:53 PM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
2-Nitrophenol	63	58	25-151	8	30				
Di-n-octylphthalate	92	77	43-149	18	30				
Phenol	69	72	39-151	5	30				
Batch number: 11102SLG026	Sample number(s): 6253879-6253883 UNSPK: P250513								
Anthracene	107	99	56-121	8	30				
Benzo(a)anthracene	104	94	66-114	9	30				
Benzo(a)pyrene	83	74	57-117	10	30				
Benzo(b)fluoranthene	89	71	26-142	20	30				
Benzo(g,h,i)perylene	87	78	33-141	10	30				
Chrysene	102	92	41-126	9	30				
Fluorene	96	91	65-116	5	30				
1-Methylnaphthalene	97	95	50-118	1	30				
Naphthalene	104	107	61-113	3	30				
Phenanthrene	99	88	37-134	10	30				
Pyrene	121*	104	31-120	14	30				
Batch number: 111015708004	Sample number(s): 6253879-6253883 UNSPK: P252480 BKG: P252480								
Aluminum	1324 (2)	1667 (2)	90-110	5	20	9,090	8,630	5	20
Antimony	78	70*	75-125	10	20	< 2.00	< 2.00	17 (1)	20
Arsenic	102	97	75-125	4	20	3.98	3.66	8 (1)	20
Barium	107	103	75-125	4	20	41.2	41.5	1	20
Beryllium	101	101	83-111	1	20	< 0.500	< 0.500	8 (1)	20
Cadmium	108	104	75-125	4	20	< 0.500	< 0.500	20 (1)	20
Calcium	1002*	92	75-125	117*	20	926	3,100	108*	20
Chromium	75	66*	75-125	3	20	43.1	38.0	13	20
Cobalt	98	99	78-113	0	20	4.25	2.93	37*	20
Copper	102	100	75-125	2	20	15.1	16.8	11	20
Iron	-631 (2)	-932 (2)	75-125	4	20	8,710	7,760	12	20
Lead	-65 (2)	-219 (2)	75-125	17	20	151	189	22*	20
Magnesium	-256 (2)	-1271 (2)	75-125	55*	20	5,110	4,100	22*	20
Manganese	70*	92	75-125	11	20	54.9	41.9	27*	20
Nickel	44*	58*	75-125	8	20	56.6	31.5	57*	20
Potassium	136*	135*	75-125	1	20	1,300	1,260	3	20
Selenium	100	95	75-125	6	20	< 2.00	< 2.00	200* (1)	20
Silver	108	108	75-125	1	20	< 0.500	< 0.500	17 (1)	20
Sodium	108	106	75-125	3	20	< 100	< 100	0 (1)	20
Thallium	105	106	75-125	1	20	< 3.00	< 3.00	0 (1)	20
Vanadium	106	108	75-125	0	20	18.9	18.3	3	20
Zinc	107	101	75-125	5	20	22.1	23.5	6	20
Batch number: 111015711003	Sample number(s): 6253879-6253883 UNSPK: P252480 BKG: P252480								
Mercury	274*	130*	80-120	38*	20	0.272	0.449	49* (1)	20
Batch number: 11101049531A	Sample number(s): 6253879-6253883 UNSPK: P248979 BKG: P248979								
TOC Solids/Sludges Combustion	71		32-142			7,020	7,240	3	13
Batch number: 11103820003A	Sample number(s): 6253879-6253883 BKG: P253875								
Moisture						17.8	17.6	1	15

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1241316
Reported: 04/29/11 at 01:53 PM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed
unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: TCL(4.3)by 8260(soil)
Batch number: X111021AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6253879	92	95	109	90
6253880	87	105	108	88
6253881	97	103	117	85
6253882	104	109	118	85
6253883	93	99	124*	82
Blank	96	101	98	101
LCS	92	100	109	103
LCSD	93	102	109	104
Limits:	71-114	70-109	70-123	70-111

Analysis Name: Skinner 8270 (microwave)
Batch number: 11102SLC026

	Phenol-d6	2-Fluorophenol	2,4,6-Tribromophenol	Nitrobenzene-d5	2-Fluorobiphenyl	Terphenyl-d14
6253879	72	72	73	78	79	79
6253880	81	80	86	86	87	96
6253881	68	67	62	69	67	65
6253882	70	72	72	64	85	78
6253883	82	71	59	70	75	82
Blank	96	105	129	100	109	106
LCS	101	107	119	99	102	100
LCSD	104	110	123	87	95	105
MS	58	60	61	62	59	74
MSD	58	59	57	62	62	63
Limits:	42-130	39-136	28-139	55-121	56-121	43-124

Analysis Name: SIM PAH 8270 (microwave)
Batch number: 11102SLG026

	Nitrobenzene-d5	2-Fluorobiphenyl	Terphenyl-d14
6253879	85	56	92
6253880	79	69	67
6253881	82	74	178*
6253882	93	79	85
6253883	84	72	72
Blank	105	107	123
LCS	101	101	117
MS	121	98	111

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1241316
Reported: 04/29/11 at 01:53 PM

Surrogate Quality Control

MSD	125	92	103
Limits:	53-152	52-132	51-141

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 124316 Sample # 6253879-83

COC # 258845

Please print. Instructions on reverse side correspond with circled numbers. 0.8 -5.2 °C

(1)
Client: SUN-AQUATERRA Acct. #:
Project Name/#: PHILA REF ACT-10 PWSID #:
Project Manager: T. DOERR P.O.#:
Sampler: S. SYKES Quote #:
Name of state where samples were collected: PA

For Lab Use Only
FSC:
SCR#: 103564

Preservation Codes
H=HCl T=Thiosulfate
N=HNO_3 B=NaOH
S=H_2SO_4 O=Other

(6) Temperature of samples upon receipt (if requested)

(2) Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix: Soil	Water	Other	(4) Total # of Containers	(5) Analyses Requested / Preservation Codes ☆	Remarks
SED-1_040711	4/7/11	1340	X		X			5	X	☆ See attatched list for analyses
SED-2_040711	4/7/11	1300	X		X			5	X	
SED-3_040711	4/7/11	1150	X		X			5	X	
SED-4_040711	4/7/11	1055	X		X			5	X	
SED-5_040711	4/7/11	1010	X		X			5	X	

Matrix: Potable ☐ NPDES ☐ Check if Applicable

(7) **Turnaround Time Requested** (TAT) (please circle): Normal Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax E-mail
Phone #: Fax #:
E-mail address:

(8) **Data Package Options** (please circle if required)
Type I (validation/NJ Reg)
Type II (Tier II)
Type III (Reduced NJ)
Type IV (CLP SOW)
Type VI (Raw Data Only)
TX TRRP-13
MA MCP CT RCP
Site-specific QC (MS/MSD/Dup)? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Internal COC Required? Yes / No

SDG Complete? Yes No

(9)

Relinquished by:	Date	Time	Received by:	Date	Time
Bottles Storage			D Ryder	3/31/11	715
D Ryder	3/31/11	1040			
	4/7/11	1830	Sample Fridge	4/7/11	1830
	4/8/11	1108	P. Lefever	4/8/11	1108
P. Lefever	4/8/11	1410		4/8/11	1410

Lancaster Laboratories, Inc., 2425 New Holland Pike, Lancaster, PA 17601 (717) 656-2300 Fax: (717) 656-2766
Copies: White and yellow should accompany samples to Lancaster Laboratories. The pink copy should be retained by the client.

Issued by Dept. 6042 Management
2102.05

10132/1241316/6253879-83
0.8-5.2"

Table 1d
Constituents of Concern for Sediment Samples
AOI 10 Work Plan for Site Characterization
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

VOLATILE ORGANIC COMPOUNDS	CAS No.
1,2-Dichloroethane	107-06-2
1,2,4-Trimethylbenzene	95-63-6
1,3,5-Trimethylbenzene	108-67-8
Benzene	71-43-2
Cumene	98-82-8
Ethylbenzene	100-41-4
Ethylene dibromide	106-93-4
Methyl tertiary butyl ether	1634-04-4
Toluene	108-88-3
Xylenes (total)	1330-20-7
Additional Volatile Compounds To Be Analyzed[2]	
1,2-Dichlorobenzene	95-50-1
1,3-Dichlorobenzene	541-73-1
1,4-Dichlorobenzene	106-46-7
1-Methylnaphthalene	90-12-0

SEMI-VOLATILE ORGANIC COMPOUNDS (via SIMS Method)	CAS No.
Anthracene	120-12-7
Benzo(a)anthracene	56-55-3
Benzo (g,h,i) perylene	191-24-2
Benzo(a)pyrene	50-32-8
Benzo(b)fluoranthene	205-99-2
Chrysene	218-01-9
Fluorene	86-73-7
Naphthalene	91-20-3
Phenanthrene	85-01-8
Pyrene	129-00-0
Additional Semi-Volatile Compounds To Be Analyzed[2]	
Phenol	108-95-2
2,4-Dimethylphenol	105-67-9
2,4-Dinitrophenol	51-28-5
2-Methylphenol	95-48-7
6-Methyl Chrysene	1705-85-7
2-Nitrophenol	88-75-5
Benzenethiol	108-98-5
Dibenz(a,h)acridine	224-53-3
Benzo(k)fluoranthene	207-08-9
Benzyl Butyl Phthalate	85-68-7
bis(2-Ethylhexyl) phthalate	117-81-7
Dibenzo(a,h)anthracene	53-70-3
Diethyl Phthalate	84-66-2
Dimethyl Phthalate	131-11-3
Di-n-butyl phthalate	84-74-2
Di-n-octyl phthalate	117-84-0
Fluoranthene	206-44-0

Notes:

1. Constituents are from Pennsylvania Corrective Action Process (CAP) Regulation Amendments effective December 1, 2001; provided in Chapter VI, Section E (pgs. 29-30) of PADEP Document, *Closure Requirements for Underground Storage Tank Systems*, effective April 1, 1998 and the March 18, 2008 revised PADEP Petroleum Short List.

2. Additional compounds to be analyzed obtained from a modified analyte list from the 1992 RCRA RFI.

10132 | 1241316 | 6253879-83
0.8-5.2

Table 1d (continued)
Constituents of Concern for Sediment Samples
AOI 10 Work Plan for Site Characterization
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

TAL METALS	CAS No.
Aluminum	7429-90-5
Antimony	7440-36-0
Arsenic	7440-38-2
Barium	7440-39-3
Beryllium	7440-41-7
Cadmium	7440-43-9
Calcium	7440-70-2
Chromium	7440-47-3
Cobalt	7440-48-4
Copper	7440-50-8
Iron	7439-89-6
Lead (total)	7439-92-1
Magnesium	7439-95-4
Manganese	7439-96-5
Mercury	7439-97-6
Nickel	7440-02-0
Potassium	9/7/7440
Selenium	7782-49-2
Silver	7440-22-4
Sodium	7440-23-5
Thallium	7440-28-0
Vanadium	7440-62-2
Zinc	7440-66-6
Additional Analysis	
Total Organic Carbon	
Particle Grain Size	

Notes:
1. Constituents are from Pennsylvania Corrective Action Process (CAP) Regulation Amendments effective December 1, 2001; provided in Chapter VI, Section E (pgs. 29-30) of PADEP Document, *Closure Requirements for Underground Storage Tank Systems,* effective April 1, 1998 and the March 18, 2008 revised PADEP Petroleum Short List.

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
ug	microgram(s)	**mg**	milligram(s)
ml	milliliter(s)	**l**	liter(s)
m3	cubic meter(s)	**ul**	microliter(s)

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

J estimated value – The result is ≥ the Method Detection Limit (MDL) and < the Limit of Quantitation (LOQ).

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

U.S. EPA CLP Data Qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
N	Presumptive evidence of a compound (TICs only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Analytical test results meet all requirements of NELAC unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL LANCASTER LABORATORIES BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF LANCASTER LABORATORIES AND (B) WHETHER LANCASTER LABORATORIES HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Lancaster Laboratories which includes any conditions that vary from the Standard Terms and Conditions, and Lancaster hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

ANALYTICAL RESULTS

Prepared by:

Lancaster Laboratories
2425 New Holland Pike
Lancaster, PA 17605-2425

Prepared for:

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

April 19, 2011

Project: SUN: Philadelphia Refinery AOI-10

Submittal Date: 04/08/2011
Group Number: 1241314
PO Number: PHILADELPHIA
State of Sample Origin: PA

Client Sample Description	Lancaster Labs (LLI) #
SWS-1_040711 Grab Water	6253864
SWS-1_040711 Filtered Grab Water	6253865
SWS-2_040711 Grab Water	6253866
SWS-2_040711 Filtered Grab Water	6253867
SWS-3_040711 Grab Water	6253868
SWS-3_040711 Filtered Grab Water	6253869
SWS-4_040711 Grab Water	6253870
SWS-4_040711 Filtered Grab Water	6253871
SWS-5_040711 Grab Water	6253872
SWS-5_040711 Filtered Grab Water	6253873

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

ELECTRONIC COPY TO	Langan	Attn: Dennis Webster
ELECTRONIC COPY TO	SUN: Aquaterra Tech.	Attn: Tiffani Doerr
ELECTRONIC COPY TO	LLI	Attn: EDD Group
ELECTRONIC COPY TO	Langan	Attn: Kristen Ward
ELECTRONIC COPY TO	Aquaterra Tech	Attn: Loretta Belfiglio

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Questions? Contact your Client Services Representative
Jessica A Oknefski at (717) 656-2300 Ext. 1815

Respectfully Submitted,

Robert Heisey
Senior Specialist

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SWS-1_040711 Grab Water
Philadelphia Refinery AOI-10
COC: 258225 SWS-1_040711

LLI Sample # WW 6253864
LLI Group # 1241314
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 13:30 by SS

Submitted: 04/08/2011 14:10
Reported: 04/19/2011 11:17

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SWS01

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/l**	**ug/l**	**ug/l**	
10943	Benzene	71-43-2	< 1	1	0.5	1
10943	1,2-Dichloroethane	107-06-2	< 1	1	0.5	1
10943	Ethylbenzene	100-41-4	< 1	1	0.5	1
10943	Isopropylbenzene	98-82-8	< 2	2	0.5	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	< 1	1	0.5	1
10943	Toluene	108-88-3	< 1	1	0.5	1
10943	1,2,4-Trimethylbenzene	95-63-6	< 2	2	0.5	1
10943	1,3,5-Trimethylbenzene	108-67-8	< 2	2	0.5	1
10943	Xylene (Total)	1330-20-7	< 1	1	0.5	1
GC/MS Semivolatiles	**SW-846 8270C**		**ug/l**	**ug/l**	**ug/l**	
07805	Chrysene	218-01-9	< 5	5	1	1
07805	Fluorene	86-73-7	< 5	5	1	1
07805	Naphthalene	91-20-3	< 5	5	1	1
07805	Phenanthrene	85-01-8	< 5	5	1	1
07805	Pyrene	129-00-0	< 5	5	1	1
GC Miscellaneous	**SW-846 8011**		**ug/l**	**ug/l**	**ug/l**	
07879	Ethylene dibromide	106-93-4	< 0.029	0.029	0.0097	1
Metals	**SW-846 6010B**		**mg/l**	**mg/l**	**mg/l**	
01743	Aluminum	7429-90-5	< 0.200	0.200	0.0834	1
07044	Antimony	7440-36-0	< 0.0200	0.0200	0.0100	1
07035	Arsenic	7440-38-2	< 0.0200	0.0200	0.0098	1
07046	Barium	7440-39-3	0.0853	0.0050	0.00060	1
07047	Beryllium	7440-41-7	< 0.0050	0.0050	0.0014	1
07049	Cadmium	7440-43-9	< 0.0050	0.0050	0.0020	1
01750	Calcium	7440-70-2	68.3	0.200	0.0702	1
07051	Chromium	7440-47-3	< 0.0150	0.0150	0.0034	1
07052	Cobalt	7440-48-4	< 0.0050	0.0050	0.0023	1
07053	Copper	7440-50-8	< 0.0100	0.0100	0.0027	1
01754	Iron	7439-89-6	0.740	0.200	0.0522	1
07055	Lead	7439-92-1	0.0193	0.0150	0.0069	1
01757	Magnesium	7439-95-4	28.0	0.100	0.0172	1
07058	Manganese	7439-96-5	0.100	0.0050	0.00084	1
07061	Nickel	7440-02-0	< 0.0100	0.0100	0.0030	1
01762	Potassium	7440-09-7	5.43	0.500	0.239	1
07036	Selenium	7782-49-2	< 0.0200	0.0200	0.0089	1
07066	Silver	7440-22-4	< 0.0050	0.0050	0.0023	1
01767	Sodium	7440-23-5	18.7	1.00	0.433	1
07022	Thallium	7440-28-0	< 0.0300	0.0300	0.0140	1
07071	Vanadium	7440-62-2	< 0.0050	0.0050	0.0025	1
07072	Zinc	7440-66-6	0.0295	0.0200	0.0081	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	< 0.00020	0.00020	0.000046	1
Wet Chemistry	**SM20 2340 C**		**mg/l as CaCO3**	**mg/l as CaCO3**	**mg/l as CaCO3**	

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SWS-1_040711 Grab Water
Philadelphia Refinery AOI-10
COC: 258225 SWS-1_040711

LLI Sample # WW 6253864
LLI Group # 1241314
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 13:30 by SS

Submitted: 04/08/2011 14:10
Reported: 04/19/2011 11:17

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SWS01

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Dilution Factor
Wet Chemistry	**SM20 2340 C**		mg/l as CaCO3	mg/l as CaCO3	mg/l as CaCO3	
00216	Total Hardness	471-34-1	270	6.0	2.0	2

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	F111023AA	04/13/2011 01:27	Kelly E Keller	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	F111023AA	04/13/2011 01:27	Kelly E Keller	1
07805	PAHs by 8270	SW-846 8270C	1	11103WAB026	04/14/2011 10:13	Joseph M Gambler	1
07807	BNA Water Extraction	SW-846 3510C	1	11103WAB026	04/13/2011 13:30	Olivia I Santiago	1
07879	EDB in Wastewater	SW-846 8011	1	111030009A	04/15/2011 02:05	James H Place	1
07786	EDB Extraction	SW-846 8011	1	111030009A	04/13/2011 14:00	Kelli M Barto	1
01743	Aluminum	SW-846 6010B	1	111011848005	04/17/2011 09:03	Damary Valentin	1
07044	Antimony	SW-846 6010B	1	111011848005	04/17/2011 09:03	Damary Valentin	1
07035	Arsenic	SW-846 6010B	1	111011848005	04/17/2011 09:03	Damary Valentin	1
07046	Barium	SW-846 6010B	1	111011848005	04/17/2011 09:03	Damary Valentin	1
07047	Beryllium	SW-846 6010B	1	111011848005	04/17/2011 09:03	Damary Valentin	1
07049	Cadmium	SW-846 6010B	1	111011848005	04/17/2011 09:03	Damary Valentin	1
01750	Calcium	SW-846 6010B	1	111011848005	04/17/2011 09:03	Damary Valentin	1
07051	Chromium	SW-846 6010B	1	111011848005	04/17/2011 09:03	Damary Valentin	1
07052	Cobalt	SW-846 6010B	1	111011848005	04/17/2011 09:03	Damary Valentin	1
07053	Copper	SW-846 6010B	1	111011848005	04/17/2011 09:03	Damary Valentin	1
01754	Iron	SW-846 6010B	1	111011848005	04/17/2011 09:03	Damary Valentin	1
07055	Lead	SW-846 6010B	1	111011848005	04/17/2011 09:03	Damary Valentin	1
01757	Magnesium	SW-846 6010B	1	111011848005	04/17/2011 09:03	Damary Valentin	1
07058	Manganese	SW-846 6010B	1	111011848005	04/17/2011 09:03	Damary Valentin	1
07061	Nickel	SW-846 6010B	1	111011848005	04/17/2011 09:03	Damary Valentin	1
01762	Potassium	SW-846 6010B	1	111011848005	04/17/2011 09:03	Damary Valentin	1
07036	Selenium	SW-846 6010B	1	111011848005	04/18/2011 17:30	John P Hook	1
07066	Silver	SW-846 6010B	1	111011848005	04/17/2011 09:03	Damary Valentin	1
01767	Sodium	SW-846 6010B	1	111011848005	04/17/2011 09:03	Damary Valentin	1
07022	Thallium	SW-846 6010B	1	111011848005	04/17/2011 09:03	Damary Valentin	1
07071	Vanadium	SW-846 6010B	1	111011848005	04/17/2011 09:03	Damary Valentin	1
07072	Zinc	SW-846 6010B	1	111011848005	04/17/2011 09:03	Damary Valentin	1
00259	Mercury	SW-846 7470A	1	111025713002	04/12/2011 20:00	Nelli S Markaryan	1
01848	WW SW846 ICP Digest (tot rec)	SW-846 3005A	1	111011848005	04/11/2011 19:40	Mirit S Shenouda	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	111025713002	04/12/2011 15:30	Nelli S Markaryan	1
00216	Total Hardness	SM20 2340 C	1	11102021602B	04/12/2011 14:10	Susan A Engle	2

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SWS-1_040711 Filtered Grab Water
Philadelphia Refinery AOI-10
COC: 258225 SWS-1_040711

LLI Sample # WW 6253865
LLI Group # 1241314
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 13:30 by SS

Submitted: 04/08/2011 14:10
Reported: 04/19/2011 11:17

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Dilution Factor
Metals Dissolved	**SW-846 6010B**		**mg/l**	**mg/l**	**mg/l**	
01743	Aluminum	7429-90-5	< 0.200	0.200	0.0834	1
07044	Antimony	7440-36-0	< 0.0200	0.0200	0.0100	1
07035	Arsenic	7440-38-2	< 0.0200	0.0200	0.0098	1
07046	Barium	7440-39-3	0.0408	0.0050	0.00060	1
07047	Beryllium	7440-41-7	< 0.0050	0.0050	0.0014	1
07049	Cadmium	7440-43-9	< 0.0050	0.0050	0.0020	1
01750	Calcium	7440-70-2	67.0	0.200	0.0702	1
07051	Chromium	7440-47-3	< 0.0150	0.0150	0.0034	1
07052	Cobalt	7440-48-4	< 0.0050	0.0050	0.0023	1
07053	Copper	7440-50-8	< 0.0100	0.0100	0.0027	1
01754	Iron	7439-89-6	0.268	0.200	0.0522	1
07055	Lead	7439-92-1	< 0.0150	0.0150	0.0069	1
01757	Magnesium	7439-95-4	27.5	0.100	0.0172	1
07058	Manganese	7439-96-5	0.0673	0.0050	0.00084	1
07061	Nickel	7440-02-0	< 0.0100	0.0100	0.0030	1
01762	Potassium	7440-09-7	5.39	0.500	0.239	1
07036	Selenium	7782-49-2	< 0.0200	0.0200	0.0089	1
07066	Silver	7440-22-4	< 0.0050	0.0050	0.0023	1
01767	Sodium	7440-23-5	18.8	1.00	0.433	1
07022	Thallium	7440-28-0	< 0.0300	0.0300	0.0140	1
07071	Vanadium	7440-62-2	< 0.0050	0.0050	0.0025	1
07072	Zinc	7440-66-6	< 0.0200	0.0200	0.0081	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	< 0.00020	0.00020	0.000046	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
01743	Aluminum	SW-846 6010B	1	111011848005	04/17/2011 09:07	Damary Valentin	1
07044	Antimony	SW-846 6010B	1	111011848005	04/17/2011 09:07	Damary Valentin	1
07035	Arsenic	SW-846 6010B	1	111011848005	04/17/2011 09:07	Damary Valentin	1
07046	Barium	SW-846 6010B	1	111011848005	04/17/2011 09:07	Damary Valentin	1
07047	Beryllium	SW-846 6010B	1	111011848005	04/17/2011 09:07	Damary Valentin	1
07049	Cadmium	SW-846 6010B	1	111011848005	04/17/2011 09:07	Damary Valentin	1
01750	Calcium	SW-846 6010B	1	111011848005	04/17/2011 09:07	Damary Valentin	1
07051	Chromium	SW-846 6010B	1	111011848005	04/17/2011 09:07	Damary Valentin	1
07052	Cobalt	SW-846 6010B	1	111011848005	04/17/2011 09:07	Damary Valentin	1
07053	Copper	SW-846 6010B	1	111011848005	04/17/2011 09:07	Damary Valentin	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SWS-1_040711 Filtered Grab Water
Philadelphia Refinery AOI-10
COC: 258225 SWS-1_040711

LLI Sample # WW 6253865
LLI Group # 1241314
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 13:30 by SS

Submitted: 04/08/2011 14:10
Reported: 04/19/2011 11:17

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
01754	Iron	SW-846 6010B	1	111011848005	04/17/2011 09:07	Damary Valentin	1
07055	Lead	SW-846 6010B	1	111011848005	04/17/2011 09:07	Damary Valentin	1
01757	Magnesium	SW-846 6010B	1	111011848005	04/17/2011 09:07	Damary Valentin	1
07058	Manganese	SW-846 6010B	1	111011848005	04/17/2011 09:07	Damary Valentin	1
07061	Nickel	SW-846 6010B	1	111011848005	04/17/2011 09:07	Damary Valentin	1
01762	Potassium	SW-846 6010B	1	111011848005	04/17/2011 09:07	Damary Valentin	1
07036	Selenium	SW-846 6010B	1	111011848005	04/18/2011 17:33	John P Hook	1
07066	Silver	SW-846 6010B	1	111011848005	04/17/2011 09:07	Damary Valentin	1
01767	Sodium	SW-846 6010B	1	111011848005	04/17/2011 09:07	Damary Valentin	1
07022	Thallium	SW-846 6010B	1	111011848005	04/17/2011 09:07	Damary Valentin	1
07071	Vanadium	SW-846 6010B	1	111011848005	04/17/2011 09:07	Damary Valentin	1
07072	Zinc	SW-846 6010B	1	111011848005	04/17/2011 09:07	Damary Valentin	1
00259	Mercury	SW-846 7470A	1	111025713002	04/12/2011 20:01	Nelli S Markaryan	1
01848	WW SW846 ICP Digest (tot rec)	SW-846 3005A	1	111011848005	04/11/2011 19:40	Mirit S Shenouda	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	111025713002	04/12/2011 15:30	Nelli S Markaryan	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SWS-2_040711 Grab Water
Philadelphia Refinery AOI-10
COC: 258225 SWS-2_040711

LLI Sample # WW 6253866
LLI Group # 1241314
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 12:50 by SS

Submitted: 04/08/2011 14:10
Reported: 04/19/2011 11:17

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SWS02

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/l**	**ug/l**	**ug/l**	
10943	Benzene	71-43-2	< 1	1	0.5	1
10943	1,2-Dichloroethane	107-06-2	< 1	1	0.5	1
10943	Ethylbenzene	100-41-4	< 1	1	0.5	1
10943	Isopropylbenzene	98-82-8	< 2	2	0.5	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	< 1	1	0.5	1
10943	Toluene	108-88-3	< 1	1	0.5	1
10943	1,2,4-Trimethylbenzene	95-63-6	< 2	2	0.5	1
10943	1,3,5-Trimethylbenzene	108-67-8	< 2	2	0.5	1
10943	Xylene (Total)	1330-20-7	< 1	1	0.5	1
GC/MS Semivolatiles	**SW-846 8270C**		**ug/l**	**ug/l**	**ug/l**	
07805	Chrysene	218-01-9	< 5	5	1	1
07805	Fluorene	86-73-7	< 5	5	1	1
07805	Naphthalene	91-20-3	< 5	5	1	1
07805	Phenanthrene	85-01-8	< 5	5	1	1
07805	Pyrene	129-00-0	< 5	5	1	1
GC Miscellaneous	**SW-846 8011**		**ug/l**	**ug/l**	**ug/l**	
07879	Ethylene dibromide	106-93-4	< 0.029	0.029	0.0097	1
Metals	**SW-846 6010B**		**mg/l**	**mg/l**	**mg/l**	
01743	Aluminum	7429-90-5	< 0.200	0.200	0.0834	1
07044	Antimony	7440-36-0	< 0.0200	0.0200	0.0100	1
07035	Arsenic	7440-38-2	< 0.0200	0.0200	0.0098	1
07046	Barium	7440-39-3	0.0972	0.0050	0.00060	1
07047	Beryllium	7440-41-7	< 0.0050	0.0050	0.0014	1
07049	Cadmium	7440-43-9	< 0.0050	0.0050	0.0020	1
01750	Calcium	7440-70-2	75.7	0.200	0.0702	1
07051	Chromium	7440-47-3	< 0.0150	0.0150	0.0034	1
07052	Cobalt	7440-48-4	< 0.0050	0.0050	0.0023	1
07053	Copper	7440-50-8	< 0.0100	0.0100	0.0027	1
01754	Iron	7439-89-6	1.85	0.200	0.0522	1
07055	Lead	7439-92-1	< 0.0150	0.0150	0.0069	1
01757	Magnesium	7439-95-4	32.1	0.100	0.0172	1
07058	Manganese	7439-96-5	0.310	0.0050	0.00084	1
07061	Nickel	7440-02-0	0.0182	0.0100	0.0030	1
01762	Potassium	7440-09-7	5.63	0.500	0.239	1
07036	Selenium	7782-49-2	< 0.0200	0.0200	0.0089	1
07066	Silver	7440-22-4	< 0.0050	0.0050	0.0023	1
01767	Sodium	7440-23-5	18.7	1.00	0.433	1
07022	Thallium	7440-28-0	< 0.0300	0.0300	0.0140	1
07071	Vanadium	7440-62-2	< 0.0050	0.0050	0.0025	1
07072	Zinc	7440-66-6	0.138	0.0200	0.0081	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	< 0.00020	0.00020	0.000046	1
Wet Chemistry	**SM20 2340 C**		**mg/l as CaCO3**	**mg/l as CaCO3**	**mg/l as CaCO3**	

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SWS-2_040711 Grab Water
Philadelphia Refinery AOI-10
COC: 258225 SWS-2_040711

LLI Sample # WW 6253866
LLI Group # 1241314
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 12:50 by SS

Submitted: 04/08/2011 14:10
Reported: 04/19/2011 11:17

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SWS02

CAT No.	Analysis Name		CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Dilution Factor
Wet Chemistry		**SM20 2340 C**		**mg/l as CaCO3**	**mg/l as CaCO3**	**mg/l as CaCO3**	
00216	Total Hardness		471-34-1	327	15.0	5.0	5

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	F111023AA	04/13/2011 01:49	Kelly E Keller	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	F111023AA	04/13/2011 01:49	Kelly E Keller	1
07805	PAHs by 8270	SW-846 8270C	1	11103WAB026	04/14/2011 10:39	Joseph M Gambler	1
07807	BNA Water Extraction	SW-846 3510C	1	11103WAB026	04/13/2011 13:30	Olivia I Santiago	1
07879	EDB in Wastewater	SW-846 8011	1	111030009A	04/15/2011 02:35	James H Place	1
07786	EDB Extraction	SW-846 8011	1	111030009A	04/13/2011 14:00	Kelli M Barto	1
01743	Aluminum	SW-846 6010B	1	111011848005	04/17/2011 09:10	Damary Valentin	1
07044	Antimony	SW-846 6010B	1	111011848005	04/17/2011 09:10	Damary Valentin	1
07035	Arsenic	SW-846 6010B	1	111011848005	04/17/2011 09:10	Damary Valentin	1
07046	Barium	SW-846 6010B	1	111011848005	04/17/2011 09:10	Damary Valentin	1
07047	Beryllium	SW-846 6010B	1	111011848005	04/17/2011 09:10	Damary Valentin	1
07049	Cadmium	SW-846 6010B	1	111011848005	04/17/2011 09:10	Damary Valentin	1
01750	Calcium	SW-846 6010B	1	111011848005	04/17/2011 09:10	Damary Valentin	1
07051	Chromium	SW-846 6010B	1	111011848005	04/17/2011 09:10	Damary Valentin	1
07052	Cobalt	SW-846 6010B	1	111011848005	04/17/2011 09:10	Damary Valentin	1
07053	Copper	SW-846 6010B	1	111011848005	04/17/2011 09:10	Damary Valentin	1
01754	Iron	SW-846 6010B	1	111011848005	04/17/2011 09:10	Damary Valentin	1
07055	Lead	SW-846 6010B	1	111011848005	04/17/2011 09:10	Damary Valentin	1
01757	Magnesium	SW-846 6010B	1	111011848005	04/17/2011 09:10	Damary Valentin	1
07058	Manganese	SW-846 6010B	1	111011848005	04/17/2011 09:10	Damary Valentin	1
07061	Nickel	SW-846 6010B	1	111011848005	04/17/2011 09:10	Damary Valentin	1
01762	Potassium	SW-846 6010B	1	111011848005	04/17/2011 09:10	Damary Valentin	1
07036	Selenium	SW-846 6010B	1	111011848005	04/18/2011 17:44	John P Hook	1
07066	Silver	SW-846 6010B	1	111011848005	04/17/2011 09:10	Damary Valentin	1
01767	Sodium	SW-846 6010B	1	111011848005	04/17/2011 09:10	Damary Valentin	1
07022	Thallium	SW-846 6010B	1	111011848005	04/17/2011 09:10	Damary Valentin	1
07071	Vanadium	SW-846 6010B	1	111011848005	04/17/2011 09:10	Damary Valentin	1
07072	Zinc	SW-846 6010B	1	111011848005	04/17/2011 09:10	Damary Valentin	1
00259	Mercury	SW-846 7470A	1	111025713002	04/12/2011 20:02	Nelli S Markaryan	1
01848	WW SW846 ICP Digest (tot rec)	SW-846 3005A	1	111011848005	04/11/2011 19:40	Mirit S Shenouda	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	111025713002	04/12/2011 15:30	Nelli S Markaryan	1
00216	Total Hardness	SM20 2340 C	1	11102021602B	04/12/2011 14:10	Susan A Engle	5

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SWS-2_040711 Filtered Grab Water
Philadelphia Refinery AOI-10
COC: 258225 SWS-2_040711

LLI Sample # WW 6253867
LLI Group # 1241314
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 12:50 by SS

Submitted: 04/08/2011 14:10
Reported: 04/19/2011 11:17

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Dilution Factor
Metals Dissolved	**SW-846 6010B**		**mg/l**	**mg/l**	**mg/l**	
01743	Aluminum	7429-90-5	< 0.200	0.200	0.0834	1
07044	Antimony	7440-36-0	< 0.0200	0.0200	0.0100	1
07035	Arsenic	7440-38-2	< 0.0200	0.0200	0.0098	1
07046	Barium	7440-39-3	0.0939	0.0050	0.00060	1
07047	Beryllium	7440-41-7	< 0.0050	0.0050	0.0014	1
07049	Cadmium	7440-43-9	< 0.0050	0.0050	0.0020	1
01750	Calcium	7440-70-2	78.0	0.200	0.0702	1
07051	Chromium	7440-47-3	< 0.0150	0.0150	0.0034	1
07052	Cobalt	7440-48-4	< 0.0050	0.0050	0.0023	1
07053	Copper	7440-50-8	< 0.0100	0.0100	0.0027	1
01754	Iron	7439-89-6	0.540	0.200	0.0522	1
07055	Lead	7439-92-1	< 0.0150	0.0150	0.0069	1
01757	Magnesium	7439-95-4	33.6	0.100	0.0172	1
07058	Manganese	7439-96-5	0.260	0.0050	0.00084	1
07061	Nickel	7440-02-0	0.0181	0.0100	0.0030	1
01762	Potassium	7440-09-7	5.67	0.500	0.239	1
07036	Selenium	7782-49-2	< 0.0200	0.0200	0.0089	1
07066	Silver	7440-22-4	< 0.0050	0.0050	0.0023	1
01767	Sodium	7440-23-5	19.1	1.00	0.433	1
07022	Thallium	7440-28-0	< 0.0300	0.0300	0.0140	1
07071	Vanadium	7440-62-2	< 0.0050	0.0050	0.0025	1
07072	Zinc	7440-66-6	0.109	0.0200	0.0081	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	< 0.00020	0.00020	0.000046	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
01743	Aluminum	SW-846 6010B	1	111011848005	04/17/2011 09:14	Damary Valentin	1
07044	Antimony	SW-846 6010B	1	111011848005	04/17/2011 09:14	Damary Valentin	1
07035	Arsenic	SW-846 6010B	1	111011848005	04/17/2011 09:14	Damary Valentin	1
07046	Barium	SW-846 6010B	1	111011848005	04/17/2011 09:14	Damary Valentin	1
07047	Beryllium	SW-846 6010B	1	111011848005	04/17/2011 09:14	Damary Valentin	1
07049	Cadmium	SW-846 6010B	1	111011848005	04/17/2011 09:14	Damary Valentin	1
01750	Calcium	SW-846 6010B	1	111011848005	04/17/2011 09:14	Damary Valentin	1
07051	Chromium	SW-846 6010B	1	111011848005	04/17/2011 09:14	Damary Valentin	1
07052	Cobalt	SW-846 6010B	1	111011848005	04/17/2011 09:14	Damary Valentin	1
07053	Copper	SW-846 6010B	1	111011848005	04/17/2011 09:14	Damary Valentin	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SWS-2_040711 Filtered Grab Water
Philadelphia Refinery AOI-10
COC: 258225 SWS-2_040711

LLI Sample # WW 6253867
LLI Group # 1241314
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 12:50 by SS

Submitted: 04/08/2011 14:10
Reported: 04/19/2011 11:17

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
01754	Iron	SW-846 6010B	1	111011848005	04/17/2011 09:14	Damary Valentin	1
07055	Lead	SW-846 6010B	1	111011848005	04/17/2011 09:14	Damary Valentin	1
01757	Magnesium	SW-846 6010B	1	111011848005	04/17/2011 09:14	Damary Valentin	1
07058	Manganese	SW-846 6010B	1	111011848005	04/17/2011 09:14	Damary Valentin	1
07061	Nickel	SW-846 6010B	1	111011848005	04/17/2011 09:14	Damary Valentin	1
01762	Potassium	SW-846 6010B	1	111011848005	04/17/2011 09:14	Damary Valentin	1
07036	Selenium	SW-846 6010B	1	111011848005	04/18/2011 17:48	John P Hook	1
07066	Silver	SW-846 6010B	1	111011848005	04/17/2011 09:14	Damary Valentin	1
01767	Sodium	SW-846 6010B	1	111011848005	04/17/2011 09:14	Damary Valentin	1
07022	Thallium	SW-846 6010B	1	111011848005	04/17/2011 09:14	Damary Valentin	1
07071	Vanadium	SW-846 6010B	1	111011848005	04/17/2011 09:14	Damary Valentin	1
07072	Zinc	SW-846 6010B	1	111011848005	04/17/2011 09:14	Damary Valentin	1
00259	Mercury	SW-846 7470A	1	111025713002	04/12/2011 20:03	Nelli S Markaryan	1
01848	WW SW846 ICP Digest (tot rec)	SW-846 3005A	1	111011848005	04/11/2011 19:40	Mirit S Shenouda	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	111025713002	04/12/2011 15:30	Nelli S Markaryan	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SWS-3_040711 Grab Water
Philadelphia Refinery AOI-10
COC: 258225 SWS-3_040711

LLI Sample # WW 6253868
LLI Group # 1241314
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 11:40 by SS

Submitted: 04/08/2011 14:10
Reported: 04/19/2011 11:17

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SWS03

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/l**	**ug/l**	**ug/l**	
10943	Benzene	71-43-2	< 1	1	0.5	1
10943	1,2-Dichloroethane	107-06-2	< 1	1	0.5	1
10943	Ethylbenzene	100-41-4	< 1	1	0.5	1
10943	Isopropylbenzene	98-82-8	< 2	2	0.5	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	< 1	1	0.5	1
10943	Toluene	108-88-3	< 1	1	0.5	1
10943	1,2,4-Trimethylbenzene	95-63-6	< 2	2	0.5	1
10943	1,3,5-Trimethylbenzene	108-67-8	< 2	2	0.5	1
10943	Xylene (Total)	1330-20-7	< 1	1	0.5	1
GC/MS Semivolatiles	**SW-846 8270C**		**ug/l**	**ug/l**	**ug/l**	
07805	Chrysene	218-01-9	< 5	5	1	1
07805	Fluorene	86-73-7	< 5	5	1	1
07805	Naphthalene	91-20-3	< 5	5	1	1
07805	Phenanthrene	85-01-8	< 5	5	1	1
07805	Pyrene	129-00-0	< 5	5	1	1
GC Miscellaneous	**SW-846 8011**		**ug/l**	**ug/l**	**ug/l**	
07879	Ethylene dibromide	106-93-4	< 0.030	0.030	0.0098	1
Metals	**SW-846 6010B**		**mg/l**	**mg/l**	**mg/l**	
01743	Aluminum	7429-90-5	< 0.200	0.200	0.0834	1
07044	Antimony	7440-36-0	< 0.0200	0.0200	0.0100	1
07035	Arsenic	7440-38-2	< 0.0200	0.0200	0.0098	1
07046	Barium	7440-39-3	0.0910	0.0050	0.00060	1
07047	Beryllium	7440-41-7	< 0.0050	0.0050	0.0014	1
07049	Cadmium	7440-43-9	< 0.0050	0.0050	0.0020	1
01750	Calcium	7440-70-2	94.3	0.200	0.0702	1
07051	Chromium	7440-47-3	< 0.0150	0.0150	0.0034	1
07052	Cobalt	7440-48-4	< 0.0050	0.0050	0.0023	1
07053	Copper	7440-50-8	< 0.0100	0.0100	0.0027	1
01754	Iron	7439-89-6	0.693	0.200	0.0522	1
07055	Lead	7439-92-1	< 0.0150	0.0150	0.0069	1
01757	Magnesium	7439-95-4	57.6	0.100	0.0172	1
07058	Manganese	7439-96-5	0.167	0.0050	0.00084	1
07061	Nickel	7440-02-0	< 0.0100	0.0100	0.0030	1
01762	Potassium	7440-09-7	7.25	0.500	0.239	1
07036	Selenium	7782-49-2	< 0.0200	0.0200	0.0089	1
07066	Silver	7440-22-4	< 0.0050	0.0050	0.0023	1
01767	Sodium	7440-23-5	22.8	1.00	0.433	1
07022	Thallium	7440-28-0	< 0.0300	0.0300	0.0140	1
07071	Vanadium	7440-62-2	< 0.0050	0.0050	0.0025	1
07072	Zinc	7440-66-6	0.0425	0.0200	0.0081	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	< 0.00020	0.00020	0.000046	1
Wet Chemistry	**SM20 2340 C**		**mg/l as CaCO3**	**mg/l as CaCO3**	**mg/l as CaCO3**	

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SWS-3_040711 Grab Water
Philadelphia Refinery AOI-10
COC: 258225 SWS-3_040711

LLI Sample # WW 6253868
LLI Group # 1241314
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 11:40 by SS

Submitted: 04/08/2011 14:10
Reported: 04/19/2011 11:17

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SWS03

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Dilution Factor
Wet Chemistry	**SM20 2340 C**		**mg/l as CaCO3**	**mg/l as CaCO3**	**mg/l as CaCO3**	
00216	Total Hardness	471-34-1	487	15.0	5.0	5

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	F111023AA	04/13/2011 02:10	Kelly E Keller	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	F111023AA	04/13/2011 02:10	Kelly E Keller	1
07805	PAHs by 8270	SW-846 8270C	1	11103WAB026	04/14/2011 11:06	Joseph M Gambler	1
07807	BNA Water Extraction	SW-846 3510C	1	11103WAB026	04/13/2011 13:30	Olivia I Santiago	1
07879	EDB in Wastewater	SW-846 8011	1	111030009A	04/15/2011 03:05	James H Place	1
07786	EDB Extraction	SW-846 8011	1	111030009A	04/13/2011 14:00	Kelli M Barto	1
01743	Aluminum	SW-846 6010B	1	111011848005	04/17/2011 09:18	Damary Valentin	1
07044	Antimony	SW-846 6010B	1	111011848005	04/17/2011 09:18	Damary Valentin	1
07035	Arsenic	SW-846 6010B	1	111011848005	04/17/2011 09:18	Damary Valentin	1
07046	Barium	SW-846 6010B	1	111011848005	04/17/2011 09:18	Damary Valentin	1
07047	Beryllium	SW-846 6010B	1	111011848005	04/17/2011 09:18	Damary Valentin	1
07049	Cadmium	SW-846 6010B	1	111011848005	04/17/2011 09:18	Damary Valentin	1
01750	Calcium	SW-846 6010B	1	111011848005	04/17/2011 09:18	Damary Valentin	1
07051	Chromium	SW-846 6010B	1	111011848005	04/17/2011 09:18	Damary Valentin	1
07052	Cobalt	SW-846 6010B	1	111011848005	04/17/2011 09:18	Damary Valentin	1
07053	Copper	SW-846 6010B	1	111011848005	04/17/2011 09:18	Damary Valentin	1
01754	Iron	SW-846 6010B	1	111011848005	04/17/2011 09:18	Damary Valentin	1
07055	Lead	SW-846 6010B	1	111011848005	04/17/2011 09:18	Damary Valentin	1
01757	Magnesium	SW-846 6010B	1	111011848005	04/17/2011 09:18	Damary Valentin	1
07058	Manganese	SW-846 6010B	1	111011848005	04/17/2011 09:18	Damary Valentin	1
07061	Nickel	SW-846 6010B	1	111011848005	04/17/2011 09:18	Damary Valentin	1
01762	Potassium	SW-846 6010B	1	111011848005	04/17/2011 09:18	Damary Valentin	1
07036	Selenium	SW-846 6010B	1	111011848005	04/18/2011 17:52	John P Hook	1
07066	Silver	SW-846 6010B	1	111011848005	04/17/2011 09:18	Damary Valentin	1
01767	Sodium	SW-846 6010B	1	111011848005	04/17/2011 09:18	Damary Valentin	1
07022	Thallium	SW-846 6010B	1	111011848005	04/17/2011 09:18	Damary Valentin	1
07071	Vanadium	SW-846 6010B	1	111011848005	04/17/2011 09:18	Damary Valentin	1
07072	Zinc	SW-846 6010B	1	111011848005	04/17/2011 09:18	Damary Valentin	1
00259	Mercury	SW-846 7470A	1	111025713002	04/12/2011 20:08	Nelli S Markaryan	1
01848	WW SW846 ICP Digest (tot rec)	SW-846 3005A	1	111011848005	04/11/2011 19:40	Mirit S Shenouda	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	111025713002	04/12/2011 15:30	Nelli S Markaryan	1
00216	Total Hardness	SM20 2340 C	1	11102021602B	04/12/2011 14:10	Susan A Engle	5

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SWS-3_040711 Filtered Grab Water
Philadelphia Refinery AOI-10
COC: 258225 SWS-3_040711

LLI Sample # WW 6253869
LLI Group # 1241314
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 11:40 by SS

Submitted: 04/08/2011 14:10
Reported: 04/19/2011 11:17

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Dilution Factor
Metals Dissolved	**SW-846 6010B**		**mg/l**	**mg/l**	**mg/l**	
01743	Aluminum	7429-90-5	< 0.200	0.200	0.0834	1
07044	Antimony	7440-36-0	< 0.0200	0.0200	0.0100	1
07035	Arsenic	7440-38-2	< 0.0200	0.0200	0.0098	1
07046	Barium	7440-39-3	0.0823	0.0050	0.00060	1
07047	Beryllium	7440-41-7	< 0.0050	0.0050	0.0014	1
07049	Cadmium	7440-43-9	< 0.0050	0.0050	0.0020	1
01750	Calcium	7440-70-2	91.6	0.200	0.0702	1
07051	Chromium	7440-47-3	< 0.0150	0.0150	0.0034	1
07052	Cobalt	7440-48-4	< 0.0050	0.0050	0.0023	1
07053	Copper	7440-50-8	< 0.0100	0.0100	0.0027	1
01754	Iron	7439-89-6	< 0.200	0.200	0.0522	1
07055	Lead	7439-92-1	< 0.0150	0.0150	0.0069	1
01757	Magnesium	7439-95-4	56.4	0.100	0.0172	1
07058	Manganese	7439-96-5	0.0081	0.0050	0.00084	1
07061	Nickel	7440-02-0	< 0.0100	0.0100	0.0030	1
01762	Potassium	7440-09-7	7.10	0.500	0.239	1
07036	Selenium	7782-49-2	< 0.0200	0.0200	0.0089	1
07066	Silver	7440-22-4	< 0.0050	0.0050	0.0023	1
01767	Sodium	7440-23-5	21.6	1.00	0.433	1
07022	Thallium	7440-28-0	< 0.0300	0.0300	0.0140	1
07071	Vanadium	7440-62-2	< 0.0050	0.0050	0.0025	1
07072	Zinc	7440-66-6	0.0218	0.0200	0.0081	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	< 0.00020	0.00020	0.000046	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
01743	Aluminum	SW-846 6010B	1	111011848005	04/17/2011 09:21	Damary Valentin	1
07044	Antimony	SW-846 6010B	1	111011848005	04/17/2011 09:21	Damary Valentin	1
07035	Arsenic	SW-846 6010B	1	111011848005	04/17/2011 09:21	Damary Valentin	1
07046	Barium	SW-846 6010B	1	111011848005	04/17/2011 09:21	Damary Valentin	1
07047	Beryllium	SW-846 6010B	1	111011848005	04/17/2011 09:21	Damary Valentin	1
07049	Cadmium	SW-846 6010B	1	111011848005	04/17/2011 09:21	Damary Valentin	1
01750	Calcium	SW-846 6010B	1	111011848005	04/17/2011 09:21	Damary Valentin	1
07051	Chromium	SW-846 6010B	1	111011848005	04/17/2011 09:21	Damary Valentin	1
07052	Cobalt	SW-846 6010B	1	111011848005	04/17/2011 09:21	Damary Valentin	1
07053	Copper	SW-846 6010B	1	111011848005	04/17/2011 09:21	Damary Valentin	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SWS-3_040711 Filtered Grab Water
Philadelphia Refinery AOI-10
COC: 258225 SWS-3_040711

LLI Sample # WW 6253869
LLI Group # 1241314
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 11:40 by SS

Submitted: 04/08/2011 14:10
Reported: 04/19/2011 11:17

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
01754	Iron	SW-846 6010B	1	111011848005	04/17/2011 09:21	Damary Valentin	1
07055	Lead	SW-846 6010B	1	111011848005	04/17/2011 09:21	Damary Valentin	1
01757	Magnesium	SW-846 6010B	1	111011848005	04/17/2011 09:21	Damary Valentin	1
07058	Manganese	SW-846 6010B	1	111011848005	04/17/2011 09:21	Damary Valentin	1
07061	Nickel	SW-846 6010B	1	111011848005	04/17/2011 09:21	Damary Valentin	1
01762	Potassium	SW-846 6010B	1	111011848005	04/17/2011 09:21	Damary Valentin	1
07036	Selenium	SW-846 6010B	1	111011848005	04/18/2011 17:55	John P Hook	1
07066	Silver	SW-846 6010B	1	111011848005	04/17/2011 09:21	Damary Valentin	1
01767	Sodium	SW-846 6010B	1	111011848005	04/17/2011 09:21	Damary Valentin	1
07022	Thallium	SW-846 6010B	1	111011848005	04/17/2011 09:21	Damary Valentin	1
07071	Vanadium	SW-846 6010B	1	111011848005	04/17/2011 09:21	Damary Valentin	1
07072	Zinc	SW-846 6010B	1	111011848005	04/17/2011 09:21	Damary Valentin	1
00259	Mercury	SW-846 7470A	1	111025713002	04/12/2011 20:12	Nelli S Markaryan	1
01848	WW SW846 ICP Digest (tot rec)	SW-846 3005A	1	111011848005	04/11/2011 19:40	Mirit S Shenouda	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	111025713002	04/12/2011 15:30	Nelli S Markaryan	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SWS-4_040711 Grab Water
Philadelphia Refinery AOI-10
COC: 258225 SWS-4_040711

LLI Sample # WW 6253870
LLI Group # 1241314
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 10:45 by SS

Submitted: 04/08/2011 14:10
Reported: 04/19/2011 11:17

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SWS04

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		ug/l	ug/l	ug/l	
10943	Benzene	71-43-2	< 1	1	0.5	1
10943	1,2-Dichloroethane	107-06-2	< 1	1	0.5	1
10943	Ethylbenzene	100-41-4	< 1	1	0.5	1
10943	Isopropylbenzene	98-82-8	< 2	2	0.5	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	< 1	1	0.5	1
10943	Toluene	108-88-3	< 1	1	0.5	1
10943	1,2,4-Trimethylbenzene	95-63-6	< 2	2	0.5	1
10943	1,3,5-Trimethylbenzene	108-67-8	< 2	2	0.5	1
10943	Xylene (Total)	1330-20-7	< 1	1	0.5	1
GC/MS Semivolatiles	**SW-846 8270C**		ug/l	ug/l	ug/l	
07805	Chrysene	218-01-9	< 5	5	1	1
07805	Fluorene	86-73-7	< 5	5	1	1
07805	Naphthalene	91-20-3	< 5	5	1	1
07805	Phenanthrene	85-01-8	< 5	5	1	1
07805	Pyrene	129-00-0	< 5	5	1	1
GC Miscellaneous	**SW-846 8011**		ug/l	ug/l	ug/l	
07879	Ethylene dibromide	106-93-4	< 0.029	0.029	0.0098	1
Metals	**SW-846 6010B**		mg/l	mg/l	mg/l	
01743	Aluminum	7429-90-5	< 0.200	0.200	0.0834	1
07044	Antimony	7440-36-0	< 0.0200	0.0200	0.0100	1
07035	Arsenic	7440-38-2	< 0.0200	0.0200	0.0098	1
07046	Barium	7440-39-3	0.138	0.0050	0.00060	1
07047	Beryllium	7440-41-7	< 0.0050	0.0050	0.0014	1
07049	Cadmium	7440-43-9	< 0.0050	0.0050	0.0020	1
01750	Calcium	7440-70-2	119	0.200	0.0702	1
07051	Chromium	7440-47-3	< 0.0150	0.0150	0.0034	1
07052	Cobalt	7440-48-4	< 0.0050	0.0050	0.0023	1
07053	Copper	7440-50-8	< 0.0100	0.0100	0.0027	1
01754	Iron	7439-89-6	1.60	0.200	0.0522	1
07055	Lead	7439-92-1	< 0.0150	0.0150	0.0069	1
01757	Magnesium	7439-95-4	74.7	0.100	0.0172	1
07058	Manganese	7439-96-5	0.426	0.0050	0.00084	1
07061	Nickel	7440-02-0	< 0.0100	0.0100	0.0030	1
01762	Potassium	7440-09-7	11.1	0.500	0.239	1
07036	Selenium	7782-49-2	< 0.0200	0.0200	0.0089	1
07066	Silver	7440-22-4	< 0.0050	0.0050	0.0023	1
01767	Sodium	7440-23-5	17.8	1.00	0.433	1
07022	Thallium	7440-28-0	< 0.0300	0.0300	0.0140	1
07071	Vanadium	7440-62-2	< 0.0050	0.0050	0.0025	1
07072	Zinc	7440-66-6	< 0.0200	0.0200	0.0081	1
	SW-846 7470A		mg/l	mg/l	mg/l	
00259	Mercury	7439-97-6	< 0.00020	0.00020	0.000046	1
Wet Chemistry	**SM20 2340 C**		mg/l as CaCO3	mg/l as CaCO3	mg/l as CaCO3	

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SWS-4_040711 Grab Water
Philadelphia Refinery AOI-10
COC: 258225 SWS-4_040711

LLI Sample # WW 6253870
LLI Group # 1241314
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 10:45 by SS

Submitted: 04/08/2011 14:10
Reported: 04/19/2011 11:17

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SWS04

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Dilution Factor
Wet Chemistry	**SM20 2340 C**		mg/l as CaCO3	mg/l as CaCO3	mg/l as CaCO3	
00216	Total Hardness	471-34-1	614	15.0	5.0	5

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	F111023AA	04/13/2011 02:32	Kelly E Keller	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	F111023AA	04/13/2011 02:32	Kelly E Keller	1
07805	PAHs by 8270	SW-846 8270C	1	11103WAB026	04/14/2011 11:32	Joseph M Gambler	1
07807	BNA Water Extraction	SW-846 3510C	1	11103WAB026	04/13/2011 13:30	Olivia I Santiago	1
07879	EDB in Wastewater	SW-846 8011	1	111030009A	04/15/2011 03:35	James H Place	1
07786	EDB Extraction	SW-846 8011	1	111030009A	04/13/2011 14:00	Kelli M Barto	1
01743	Aluminum	SW-846 6010B	1	111011848005	04/17/2011 09:25	Damary Valentin	1
07044	Antimony	SW-846 6010B	1	111011848005	04/17/2011 09:25	Damary Valentin	1
07035	Arsenic	SW-846 6010B	1	111011848005	04/17/2011 09:25	Damary Valentin	1
07046	Barium	SW-846 6010B	1	111011848005	04/17/2011 09:25	Damary Valentin	1
07047	Beryllium	SW-846 6010B	1	111011848005	04/17/2011 09:25	Damary Valentin	1
07049	Cadmium	SW-846 6010B	1	111011848005	04/17/2011 09:25	Damary Valentin	1
01750	Calcium	SW-846 6010B	1	111011848005	04/17/2011 09:25	Damary Valentin	1
07051	Chromium	SW-846 6010B	1	111011848005	04/17/2011 09:25	Damary Valentin	1
07052	Cobalt	SW-846 6010B	1	111011848005	04/17/2011 09:25	Damary Valentin	1
07053	Copper	SW-846 6010B	1	111011848005	04/17/2011 09:25	Damary Valentin	1
01754	Iron	SW-846 6010B	1	111011848005	04/17/2011 09:25	Damary Valentin	1
07055	Lead	SW-846 6010B	1	111011848005	04/17/2011 09:25	Damary Valentin	1
01757	Magnesium	SW-846 6010B	1	111011848005	04/17/2011 09:25	Damary Valentin	1
07058	Manganese	SW-846 6010B	1	111011848005	04/17/2011 09:25	Damary Valentin	1
07061	Nickel	SW-846 6010B	1	111011848005	04/17/2011 09:25	Damary Valentin	1
01762	Potassium	SW-846 6010B	1	111011848005	04/17/2011 09:25	Damary Valentin	1
07036	Selenium	SW-846 6010B	1	111011848005	04/18/2011 17:59	John P Hook	1
07066	Silver	SW-846 6010B	1	111011848005	04/17/2011 09:25	Damary Valentin	1
01767	Sodium	SW-846 6010B	1	111011848005	04/17/2011 09:25	Damary Valentin	1
07022	Thallium	SW-846 6010B	1	111011848005	04/17/2011 09:25	Damary Valentin	1
07071	Vanadium	SW-846 6010B	1	111011848005	04/17/2011 09:25	Damary Valentin	1
07072	Zinc	SW-846 6010B	1	111011848005	04/17/2011 09:25	Damary Valentin	1
00259	Mercury	SW-846 7470A	1	111025713002	04/12/2011 20:13	Nelli S Markaryan	1
01848	WW SW846 ICP Digest (tot rec)	SW-846 3005A	1	111011848005	04/11/2011 19:40	Mirit S Shenouda	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	111025713002	04/12/2011 15:30	Nelli S Markaryan	1
00216	Total Hardness	SM20 2340 C	1	11102021602B	04/12/2011 14:10	Susan A Engle	5

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SWS-4_040711 Filtered Grab Water
Philadelphia Refinery AOI-10
COC: 258225 SWS-4_040711

LLI Sample # WW 6253871
LLI Group # 1241314
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 10:45 by SS

Submitted: 04/08/2011 14:10
Reported: 04/19/2011 11:17

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Dilution Factor
Metals Dissolved	**SW-846 6010B**		**mg/l**	**mg/l**	**mg/l**	
01743	Aluminum	7429-90-5	< 0.200	0.200	0.0834	1
07044	Antimony	7440-36-0	< 0.0200	0.0200	0.0100	1
07035	Arsenic	7440-38-2	< 0.0200	0.0200	0.0098	1
07046	Barium	7440-39-3	0.124	0.0050	0.00060	1
07047	Beryllium	7440-41-7	< 0.0050	0.0050	0.0014	1
07049	Cadmium	7440-43-9	< 0.0050	0.0050	0.0020	1
01750	Calcium	7440-70-2	119	0.200	0.0702	1
07051	Chromium	7440-47-3	< 0.0150	0.0150	0.0034	1
07052	Cobalt	7440-48-4	< 0.0050	0.0050	0.0023	1
07053	Copper	7440-50-8	< 0.0100	0.0100	0.0027	1
01754	Iron	7439-89-6	< 0.200	0.200	0.0522	1
07055	Lead	7439-92-1	< 0.0150	0.0150	0.0069	1
01757	Magnesium	7439-95-4	74.7	0.100	0.0172	1
07058	Manganese	7439-96-5	0.197	0.0050	0.00084	1
07061	Nickel	7440-02-0	< 0.0100	0.0100	0.0030	1
01762	Potassium	7440-09-7	11.0	0.500	0.239	1
07036	Selenium	7782-49-2	< 0.0200	0.0200	0.0089	1
07066	Silver	7440-22-4	< 0.0050	0.0050	0.0023	1
01767	Sodium	7440-23-5	18.5	1.00	0.433	1
07022	Thallium	7440-28-0	< 0.0300	0.0300	0.0140	1
07071	Vanadium	7440-62-2	< 0.0050	0.0050	0.0025	1
07072	Zinc	7440-66-6	< 0.0200	0.0200	0.0081	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	< 0.00020	0.00020	0.000046	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
01743	Aluminum	SW-846 6010B	1	111011848005	04/17/2011 09:29	Damary Valentin	1
07044	Antimony	SW-846 6010B	1	111011848005	04/17/2011 09:29	Damary Valentin	1
07035	Arsenic	SW-846 6010B	1	111011848005	04/17/2011 09:29	Damary Valentin	1
07046	Barium	SW-846 6010B	1	111011848005	04/17/2011 09:29	Damary Valentin	1
07047	Beryllium	SW-846 6010B	1	111011848005	04/17/2011 09:29	Damary Valentin	1
07049	Cadmium	SW-846 6010B	1	111011848005	04/17/2011 09:29	Damary Valentin	1
01750	Calcium	SW-846 6010B	1	111011848005	04/17/2011 09:29	Damary Valentin	1
07051	Chromium	SW-846 6010B	1	111011848005	04/17/2011 09:29	Damary Valentin	1
07052	Cobalt	SW-846 6010B	1	111011848005	04/17/2011 09:29	Damary Valentin	1
07053	Copper	SW-846 6010B	1	111011848005	04/17/2011 09:29	Damary Valentin	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SWS-4_040711 Filtered Grab Water
Philadelphia Refinery AOI-10
COC: 258225 SWS-4_040711

LLI Sample # WW 6253871
LLI Group # 1241314
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 10:45 by SS

Submitted: 04/08/2011 14:10
Reported: 04/19/2011 11:17

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
01754	Iron	SW-846 6010B	1	111011848005	04/17/2011 09:29	Damary Valentin	1
07055	Lead	SW-846 6010B	1	111011848005	04/17/2011 09:29	Damary Valentin	1
01757	Magnesium	SW-846 6010B	1	111011848005	04/17/2011 09:29	Damary Valentin	1
07058	Manganese	SW-846 6010B	1	111011848005	04/17/2011 09:29	Damary Valentin	1
07061	Nickel	SW-846 6010B	1	111011848005	04/17/2011 09:29	Damary Valentin	1
01762	Potassium	SW-846 6010B	1	111011848005	04/17/2011 09:29	Damary Valentin	1
07036	Selenium	SW-846 6010B	1	111011848005	04/18/2011 18:03	John P Hook	1
07066	Silver	SW-846 6010B	1	111011848005	04/17/2011 09:29	Damary Valentin	1
01767	Sodium	SW-846 6010B	1	111011848005	04/17/2011 09:29	Damary Valentin	1
07022	Thallium	SW-846 6010B	1	111011848005	04/17/2011 09:29	Damary Valentin	1
07071	Vanadium	SW-846 6010B	1	111011848005	04/17/2011 09:29	Damary Valentin	1
07072	Zinc	SW-846 6010B	1	111011848005	04/17/2011 09:29	Damary Valentin	1
00259	Mercury	SW-846 7470A	1	111025713002	04/12/2011 20:14	Nelli S Markaryan	1
01848	WW SW846 ICP Digest (tot rec)	SW-846 3005A	1	111011848005	04/11/2011 19:40	Mirit S Shenouda	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	111025713002	04/12/2011 15:30	Nelli S Markaryan	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SWS-5_040711 Grab Water
Philadelphia Refinery AOI-10
COC: 258225 SWS-5_040711

LLI Sample # WW 6253872
LLI Group # 1241314
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 10:00 by SS

Submitted: 04/08/2011 14:10
Reported: 04/19/2011 11:17

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SWS05

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/l**	**ug/l**	**ug/l**	
10943	Benzene	71-43-2	< 1	1	0.5	1
10943	1,2-Dichloroethane	107-06-2	< 1	1	0.5	1
10943	Ethylbenzene	100-41-4	< 1	1	0.5	1
10943	Isopropylbenzene	98-82-8	< 2	2	0.5	1
10943	Methyl Tertiary Butyl Ether	1634-04-4	< 1	1	0.5	1
10943	Toluene	108-88-3	< 1	1	0.5	1
10943	1,2,4-Trimethylbenzene	95-63-6	< 2	2	0.5	1
10943	1,3,5-Trimethylbenzene	108-67-8	< 2	2	0.5	1
10943	Xylene (Total)	1330-20-7	< 1	1	0.5	1
GC/MS Semivolatiles	**SW-846 8270C**		**ug/l**	**ug/l**	**ug/l**	
07805	Chrysene	218-01-9	< 5	5	1	1
07805	Fluorene	86-73-7	< 5	5	1	1
07805	Naphthalene	91-20-3	< 5	5	1	1
07805	Phenanthrene	85-01-8	< 5	5	1	1
07805	Pyrene	129-00-0	< 5	5	1	1
GC Miscellaneous	**SW-846 8011**		**ug/l**	**ug/l**	**ug/l**	
07879	Ethylene dibromide	106-93-4	< 0.030	0.030	0.0098	1
Metals	**SW-846 6010B**		**mg/l**	**mg/l**	**mg/l**	
01743	Aluminum	7429-90-5	0.217	0.200	0.0834	1
07044	Antimony	7440-36-0	< 0.0200	0.0200	0.0100	1
07035	Arsenic	7440-38-2	< 0.0200	0.0200	0.0098	1
07046	Barium	7440-39-3	0.124	0.0050	0.00060	1
07047	Beryllium	7440-41-7	< 0.0050	0.0050	0.0014	1
07049	Cadmium	7440-43-9	< 0.0050	0.0050	0.0020	1
01750	Calcium	7440-70-2	110	0.200	0.0702	1
07051	Chromium	7440-47-3	< 0.0150	0.0150	0.0034	1
07052	Cobalt	7440-48-4	< 0.0050	0.0050	0.0023	1
07053	Copper	7440-50-8	< 0.0100	0.0100	0.0027	1
01754	Iron	7439-89-6	1.47	0.200	0.0522	1
07055	Lead	7439-92-1	< 0.0150	0.0150	0.0069	1
01757	Magnesium	7439-95-4	69.6	0.100	0.0172	1
07058	Manganese	7439-96-5	0.304	0.0050	0.00084	1
07061	Nickel	7440-02-0	< 0.0100	0.0100	0.0030	1
01762	Potassium	7440-09-7	10.4	0.500	0.239	1
07036	Selenium	7782-49-2	< 0.0200	0.0200	0.0089	1
07066	Silver	7440-22-4	< 0.0050	0.0050	0.0023	1
01767	Sodium	7440-23-5	17.1	1.00	0.433	1
07022	Thallium	7440-28-0	< 0.0300	0.0300	0.0140	1
07071	Vanadium	7440-62-2	< 0.0050	0.0050	0.0025	1
07072	Zinc	7440-66-6	< 0.0200	0.0200	0.0081	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	< 0.00020	0.00020	0.000046	1
Wet Chemistry	**SM20 2340 C**		**mg/l as CaCO3**	**mg/l as CaCO3**	**mg/l as CaCO3**	

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SWS-5_040711 Grab Water
Philadelphia Refinery AOI-10
COC: 258225 SWS-5_040711

LLI Sample # WW 6253872
LLI Group # 1241314
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 10:00 by SS

Submitted: 04/08/2011 14:10
Reported: 04/19/2011 11:17

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

SWS05

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Dilution Factor
Wet Chemistry	**SM20 2340 C**		**mg/l as CaCO3**	**mg/l as CaCO3**	**mg/l as CaCO3**	
00216	Total Hardness	471-34-1	586	15.0	5.0	5

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10943	BTEX/MTBE/Cumene/EDC/TMBs	SW-846 8260B	1	F111023AA	04/13/2011 02:54	Kelly E Keller	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	F111023AA	04/13/2011 02:54	Kelly E Keller	1
07805	PAHs by 8270	SW-846 8270C	1	11103WAB026	04/14/2011 11:58	Joseph M Gambler	1
07807	BNA Water Extraction	SW-846 3510C	1	11103WAB026	04/13/2011 13:30	Olivia I Santiago	1
07879	EDB in Wastewater	SW-846 8011	1	111030009A	04/15/2011 04:05	James H Place	1
07786	EDB Extraction	SW-846 8011	1	111030009A	04/13/2011 14:00	Kelli M Barto	1
01743	Aluminum	SW-846 6010B	1	111011848005	04/17/2011 09:33	Damary Valentin	1
07044	Antimony	SW-846 6010B	1	111011848005	04/17/2011 09:33	Damary Valentin	1
07035	Arsenic	SW-846 6010B	1	111011848005	04/17/2011 09:33	Damary Valentin	1
07046	Barium	SW-846 6010B	1	111011848005	04/17/2011 09:33	Damary Valentin	1
07047	Beryllium	SW-846 6010B	1	111011848005	04/17/2011 09:33	Damary Valentin	1
07049	Cadmium	SW-846 6010B	1	111011848005	04/17/2011 09:33	Damary Valentin	1
01750	Calcium	SW-846 6010B	1	111011848005	04/17/2011 09:33	Damary Valentin	1
07051	Chromium	SW-846 6010B	1	111011848005	04/17/2011 09:33	Damary Valentin	1
07052	Cobalt	SW-846 6010B	1	111011848005	04/17/2011 09:33	Damary Valentin	1
07053	Copper	SW-846 6010B	1	111011848005	04/17/2011 09:33	Damary Valentin	1
01754	Iron	SW-846 6010B	1	111011848005	04/17/2011 09:33	Damary Valentin	1
07055	Lead	SW-846 6010B	1	111011848005	04/17/2011 09:33	Damary Valentin	1
01757	Magnesium	SW-846 6010B	1	111011848005	04/17/2011 09:33	Damary Valentin	1
07058	Manganese	SW-846 6010B	1	111011848005	04/17/2011 09:33	Damary Valentin	1
07061	Nickel	SW-846 6010B	1	111011848005	04/17/2011 09:33	Damary Valentin	1
01762	Potassium	SW-846 6010B	1	111011848005	04/17/2011 09:33	Damary Valentin	1
07036	Selenium	SW-846 6010B	1	111011848005	04/18/2011 18:07	John P Hook	1
07066	Silver	SW-846 6010B	1	111011848005	04/17/2011 09:33	Damary Valentin	1
01767	Sodium	SW-846 6010B	1	111011848005	04/17/2011 09:33	Damary Valentin	1
07022	Thallium	SW-846 6010B	1	111011848005	04/17/2011 09:33	Damary Valentin	1
07071	Vanadium	SW-846 6010B	1	111011848005	04/17/2011 09:33	Damary Valentin	1
07072	Zinc	SW-846 6010B	1	111011848005	04/17/2011 09:33	Damary Valentin	1
00259	Mercury	SW-846 7470A	1	111025713002	04/12/2011 20:15	Nelli S Markaryan	1
01848	WW SW846 ICP Digest (tot rec)	SW-846 3005A	1	111011848005	04/11/2011 19:40	Mirit S Shenouda	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	111025713002	04/12/2011 15:30	Nelli S Markaryan	1
00216	Total Hardness	SM20 2340 C	1	11102021602B	04/12/2011 14:10	Susan A Engle	5

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SWS-5_040711 Filtered Grab Water
Philadelphia Refinery AOI-10
COC: 258225 SWS-5_040711

LLI Sample # WW 6253873
LLI Group # 1241314
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 10:00 by SS

Submitted: 04/08/2011 14:10
Reported: 04/19/2011 11:17

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Dilution Factor
Metals Dissolved	**SW-846 6010B**		**mg/l**	**mg/l**	**mg/l**	
01743	Aluminum	7429-90-5	< 0.200	0.200	0.0834	1
07044	Antimony	7440-36-0	< 0.0200	0.0200	0.0100	1
07035	Arsenic	7440-38-2	< 0.0200	0.0200	0.0098	1
07046	Barium	7440-39-3	0.111	0.0050	0.00060	1
07047	Beryllium	7440-41-7	< 0.0050	0.0050	0.0014	1
07049	Cadmium	7440-43-9	< 0.0050	0.0050	0.0020	1
01750	Calcium	7440-70-2	109	0.200	0.0702	1
07051	Chromium	7440-47-3	< 0.0150	0.0150	0.0034	1
07052	Cobalt	7440-48-4	< 0.0050	0.0050	0.0023	1
07053	Copper	7440-50-8	< 0.0100	0.0100	0.0027	1
01754	Iron	7439-89-6	< 0.200	0.200	0.0522	1
07055	Lead	7439-92-1	< 0.0150	0.0150	0.0069	1
01757	Magnesium	7439-95-4	70.4	0.100	0.0172	1
07058	Manganese	7439-96-5	0.0943	0.0050	0.00084	1
07061	Nickel	7440-02-0	< 0.0100	0.0100	0.0030	1
01762	Potassium	7440-09-7	10.3	0.500	0.239	1
07036	Selenium	7782-49-2	< 0.0200	0.0200	0.0089	1
07066	Silver	7440-22-4	< 0.0050	0.0050	0.0023	1
01767	Sodium	7440-23-5	17.3	1.00	0.433	1
07022	Thallium	7440-28-0	< 0.0300	0.0300	0.0140	1
07071	Vanadium	7440-62-2	< 0.0050	0.0050	0.0025	1
07072	Zinc	7440-66-6	< 0.0200	0.0200	0.0081	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	< 0.00020	0.00020	0.000046	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12
This sample was filtered in the lab for dissolved metals.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
01743	Aluminum	SW-846 6010B	1	111011848005	04/17/2011 09:44	Damary Valentin	1
07044	Antimony	SW-846 6010B	1	111011848005	04/17/2011 09:44	Damary Valentin	1
07035	Arsenic	SW-846 6010B	1	111011848005	04/17/2011 09:44	Damary Valentin	1
07046	Barium	SW-846 6010B	1	111011848005	04/17/2011 09:44	Damary Valentin	1
07047	Beryllium	SW-846 6010B	1	111011848005	04/17/2011 09:44	Damary Valentin	1
07049	Cadmium	SW-846 6010B	1	111011848005	04/17/2011 09:44	Damary Valentin	1
01750	Calcium	SW-846 6010B	1	111011848005	04/17/2011 09:44	Damary Valentin	1
07051	Chromium	SW-846 6010B	1	111011848005	04/17/2011 09:44	Damary Valentin	1
07052	Cobalt	SW-846 6010B	1	111011848005	04/17/2011 09:44	Damary Valentin	1
07053	Copper	SW-846 6010B	1	111011848005	04/17/2011 09:44	Damary Valentin	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SWS-5_040711 Filtered Grab Water
Philadelphia Refinery AOI-10
COC: 258225 SWS-5_040711

LLI Sample # WW 6253873
LLI Group # 1241314
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 10:00 by SS

Submitted: 04/08/2011 14:10
Reported: 04/19/2011 11:17

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
01754	Iron	SW-846 6010B	1	111011848005	04/17/2011 09:44	Damary Valentin	1
07055	Lead	SW-846 6010B	1	111011848005	04/17/2011 09:44	Damary Valentin	1
01757	Magnesium	SW-846 6010B	1	111011848005	04/17/2011 09:44	Damary Valentin	1
07058	Manganese	SW-846 6010B	1	111011848005	04/17/2011 09:44	Damary Valentin	1
07061	Nickel	SW-846 6010B	1	111011848005	04/17/2011 09:44	Damary Valentin	1
01762	Potassium	SW-846 6010B	1	111011848005	04/17/2011 09:44	Damary Valentin	1
07036	Selenium	SW-846 6010B	1	111011848005	04/18/2011 18:10	John P Hook	1
07066	Silver	SW-846 6010B	1	111011848005	04/17/2011 09:44	Damary Valentin	1
01767	Sodium	SW-846 6010B	1	111011848005	04/17/2011 09:44	Damary Valentin	1
07022	Thallium	SW-846 6010B	1	111011848005	04/17/2011 09:44	Damary Valentin	1
07071	Vanadium	SW-846 6010B	1	111011848005	04/17/2011 09:44	Damary Valentin	1
07072	Zinc	SW-846 6010B	1	111011848005	04/17/2011 09:44	Damary Valentin	1
00259	Mercury	SW-846 7470A	1	111025713002	04/12/2011 20:16	Nelli S Markaryan	1
01848	WW SW846 ICP Digest (tot rec)	SW-846 3005A	1	111011848005	04/11/2011 19:40	Mirit S Shenouda	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	111025713002	04/12/2011 15:30	Nelli S Markaryan	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1241314
Reported: 04/19/11 at 11:17 AM

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Laboratory Compliance Quality Control

Analysis Name	Blank Result	Blank LOQ**	Blank MDL	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: F111023AA	Sample number(s): 6253864,6253866,6253868,6253870,6253872								
Benzene	< 1	1.	0.5	ug/l	101		79-120		
1,2-Dichloroethane	< 1	1.	0.5	ug/l	97		70-130		
Ethylbenzene	< 1	1.	0.5	ug/l	101		79-120		
Isopropylbenzene	< 2	2.	0.5	ug/l	100		77-120		
Methyl Tertiary Butyl Ether	< 1	1.	0.5	ug/l	93		76-120		
Toluene	< 1	1.	0.5	ug/l	100		79-120		
1,2,4-Trimethylbenzene	< 2	2.	0.5	ug/l	104		74-120		
1,3,5-Trimethylbenzene	< 2	2.	0.5	ug/l	105		75-120		
Xylene (Total)	< 1	1.	0.5	ug/l	96		80-120		
Batch number: 11103WAB026	Sample number(s): 6253864,6253866,6253868,6253870,6253872								
Chrysene	< 5	5.	1	ug/l	97	102	82-112	5	30
Fluorene	< 5	5.	1	ug/l	96	94	82-113	2	30
Naphthalene	< 5	5.	1	ug/l	93	93	77-107	0	30
Phenanthrene	< 5	5.	1	ug/l	95	96	83-112	2	30
Pyrene	< 5	5.	1	ug/l	100	104	80-115	3	30
Batch number: 111030009A	Sample number(s): 6253864,6253866,6253868,6253870,6253872								
Ethylene dibromide	< 0.030	0.030	0.010	ug/l	96	96	60-140	0	20
Batch number: 111011848005	Sample number(s): 6253864-6253873								
Aluminum	< 0.200	0.200	0.0834	mg/l	94		90-112		
Antimony	< 0.0200	0.0200	0.0100	mg/l	103		88-111		
Arsenic	< 0.0200	0.0200	0.0098	mg/l	102		89-115		
Barium	< 0.0050	0.0050	0.00060	mg/l	101		90-110		
Beryllium	< 0.0050	0.0050	0.0014	mg/l	97		88-110		
Cadmium	< 0.0050	0.0050	0.0020	mg/l	99		90-112		
Calcium	< 0.200	0.200	0.0702	mg/l	102		90-112		
Chromium	< 0.0150	0.0150	0.0034	mg/l	99		90-110		
Cobalt	< 0.0050	0.0050	0.0023	mg/l	102		90-110		
Copper	< 0.0100	0.0100	0.0027	mg/l	101		90-112		
Iron	< 0.200	0.200	0.0522	mg/l	103		90-112		
Lead	< 0.0150	0.0150	0.0069	mg/l	101		88-110		
Magnesium	< 0.100	0.100	0.0172	mg/l	102		89-110		
Manganese	< 0.0050	0.0050	0.00084	mg/l	101		90-110		
Nickel	< 0.0100	0.0100	0.0030	mg/l	103		90-111		
Potassium	< 0.500	0.500	0.239	mg/l	101		85-115		
Selenium	< 0.0200	0.0200	0.0089	mg/l	96		80-120		
Silver	< 0.0050	0.0050	0.0023	mg/l	104		83-120		
Sodium	< 1.00	1.00	0.433	mg/l	101		87-114		
Thallium	< 0.0300	0.0300	0.0140	mg/l	122*		85-113		
Vanadium	< 0.0050	0.0050	0.0025	mg/l	101		90-110		
Zinc	< 0.0200	0.0200	0.0081	mg/l	96		90-111		
Batch number: 111025713002	Sample number(s): 6253864-6253873								
Mercury	< 0.00020	0.00020	0.00004	mg/l	99		80-120		

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1241314
Reported: 04/19/11 at 11:17 AM

Analysis Name	Blank Result	Blank LOQ**	Blank MDL 6	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 11102021602B	Sample number(s): 6253864,6253866,6253868,6253870,6253872								
Total Hardness	< 3.0	3.0	1.0	mg/l as CaCO3	100		98-105		

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: F111023AA	Sample number(s): 6253864,6253866,6253868,6253870,6253872 UNSPK: P253314								
Benzene	110	106	80-126	4	30				
1,2-Dichloroethane	102	100	66-141	2	30				
Ethylbenzene	108	110	71-134	1	30				
Isopropylbenzene	109	110	75-128	1	30				
Methyl Tertiary Butyl Ether	101	98	72-126	2	30				
Toluene	107	106	80-125	1	30				
1,2,4-Trimethylbenzene	110	108	72-130	1	30				
1,3,5-Trimethylbenzene	112	112	72-131	1	30				
Xylene (Total)	102	101	79-125	1	30				
Batch number: 111030009A	Sample number(s): 6253864,6253866,6253868,6253870,6253872 UNSPK: P250619								
Ethylene dibromide	96	83	65-135	10	20				
Batch number: 111011848005	Sample number(s): 6253864-6253873 UNSPK: P253821 BKG: P253821								
Aluminum	96	96	75-125	1	20	< 0.200	< 0.200	0 (1)	20
Antimony	105	105	87-122	0	20	< 0.0200	< 0.0200	0 (1)	20
Arsenic	104	106	75-125	2	20	< 0.0200	< 0.0200	0 (1)	20
Barium	99	101	78-118	2	20	0.0713	0.0691	3	20
Beryllium	98	99	87-114	1	20	< 0.0050	< 0.0050	0 (1)	20
Cadmium	96	96	83-116	0	20	< 0.0050	< 0.0050	0 (1)	20
Calcium	100 (2)	76 (2)	81-118	2	20	48.3	47.5	2	20
Chromium	98	98	81-120	1	20	< 0.0150	< 0.0150	0 (1)	20
Cobalt	97	98	87-112	0	20	< 0.0050	< 0.0050	2 (1)	20
Copper	101	101	86-122	1	20	< 0.0100	< 0.0100	0 (1)	20
Iron	100	101	75-125	0	20	< 0.200	< 0.200	5 (1)	20
Lead	96	95	75-125	1	20	< 0.0150	< 0.0150	0 (1)	20
Magnesium	109 (2)	71 (2)	75-125	2	20	37.0	36.3	2	20
Manganese	95 (2)	90 (2)	75-125	1	20	3.00	2.93	2	20
Nickel	99	99	86-115	0	20	< 0.0100	< 0.0100	5 (1)	20
Potassium	101	100	83-123	0	20	6.88	6.76	2	20
Selenium	84	91	75-125	8	20	< 0.100	< 0.100	200* (1)	20
Silver	104	105	75-125	1	20	< 0.0050	< 0.0050	0 (1)	20
Sodium	68 (2)	82 (2)	75-125	1	20	87.1	84.7	3	20
Thallium	113	114	83-116	0	20	< 0.0300	< 0.0300	0 (1)	20
Vanadium	101	102	90-111	1	20	< 0.0050	< 0.0050	0 (1)	20
Zinc	95	95	85-117	0	20	< 0.0200	< 0.0200	0 (1)	20
Batch number: 111025713002	Sample number(s): 6253864-6253873 UNSPK: 6253867 BKG: 6253867								
Mercury	103	101	80-120	2	20	< 0.00020	< 0.00020	0 (1)	20

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1241314
Reported: 04/19/11 at 11:17 AM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: 11102021602B	Sample number(s): 6253864,6253866,6253868,6253870,6253872 UNSPK: P252938 BKG: 6253872								
Total Hardness	104		92-109			586	581	1	5

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: UST BTEX, MTBE in Water
Batch number: F111023AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6253864	101	99	102	97
6253866	100	99	103	99
6253868	101	97	102	99
6253870	104	101	102	99
6253872	100	98	102	98
Blank	103	100	101	99
LCS	102	101	101	103
MS	103	102	101	102
MSD	102	101	103	103
Limits:	80-116	77-113	80-113	78-113

Analysis Name: PAHs by 8270
Batch number: 11103WAB026

	Nitrobenzene-d5	2-Fluorobiphenyl	Terphenyl-d14
6253864	90	96	92
6253866	87	94	85
6253868	85	93	88
6253870	89	97	87
6253872	90	98	91
Blank	84	92	96
LCS	84	99	94
LCSD	85	95	96
Limits:	52-120	63-114	34-118

Analysis Name: EDB in Wastewater
Batch number: 111030009A

	1,1,2,2-Tetrachloroethane
6253864	78
6253866	75
6253868	86
6253870	81
6253872	76

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1241314
Reported: 04/19/11 at 11:17 AM

Surrogate Quality Control

Blank	91
LCS	91
LCSD	93
MS	93
MSD	84
Limits:	46-136

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1741314 Sample # 6253864-73

COC # 258225

Please print. Instructions on reverse side correspond with circled numbers. 0.8-5.2°C

(1)
Client: SUN-AQUATERRA Acct. #:
Project Name/#: PHILA REF AOI-10 PWSID #:
Project Manager: T. DOERR P.O.#:
Sampler: S. SYKES Quote #:
Name of state where samples were collected: PA

For Lab Use Only
FSC:
SCR#: 103730

Preservation Codes
H=HCl T=Thiosulfate
N=HNO3 B=NaOH
S=H2SO4 O=Other

(6) Temperature of samples upon receipt (if requested)

(2) Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix: Soil	Water (Potable / NPDES)	Other	(4) Total # of Containers	(5) Analyses Requested: Preservation Codes	Remarks
~~SWS-1-040711~~ SWS-1_040711	4/7/11	1330	X			X		10	X	* See attached list for analyses
SWS-2_040711	4/7/11	1250	X			X		10	X	
SWS-3_040711	4/7/11	1140	X			X		10	X	
SWS-4_040711	4/7/11	1045	X			X		10	X	
SWS-5_040711	4/7/11	1000	X			X		10	X	

(7) **Turnaround Time Requested** (TAT) (please circle): Normal Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax E-mail
Phone #: Fax #:
E-mail address:

(8) **Data Package Options** (please circle if required)
Type I (validation/NJ Reg)
Type II (Tier II)
Type III (Reduced NJ)
Type IV (CLP SOW)
Type VI (Raw Data Only)
TX TRRP-13
MA MCP CT RCP
SDG Complete? Yes No
Site-specific QC (MS/MSD/Dup)? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Internal COC Required? Yes / No

(9)

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]			[signature]	3/31/11	715
[signature]	3/31/11	1050			
[signature] / AQUATERRA	4/7/11	1830	Sample Fridge	4/7/11	1830
[signature]	4/8/11	1105	[signature]	4/8/11	1108
P. Lefevre	4/8/11	1410	[signature]	4/8/11	1410

10132|1241314|6253864-73
0.8-5.2 oc

Table 1c
Constituents of Concern for Surface Water
AOI 10 Work Plan for Site Characterization
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

VOLATILE ORGANIC COMPOUNDS	CAS No.
1,2-Dichloroethane	107-06-2
1,2,4-Trimethylbenzene	95-63-6
1,3,5-Trimethylbenzene	108-67-8
Benzene	71-43-2
Cumene	98-82-8
Ethylbenzene	100-41-4
Ethylene dibromide	106-93-4
Methyl tertiary butyl ether	1634-04-4
Toluene	108-88-3
Xylenes (total)	1330-20-7

SEMI-VOLATILE ORGANIC COMPOUNDS	CAS No.
Chrysene	218-01-9
Fluorene	86-73-7
Naphthalene	91-20-3
Phenanthrene	85-01-8
Pyrene	129-00-0

TOTAL AND DISSOLVED TAL METALS	CAS No.
Aluminum	7429-90-5
Antimony	7440-36-0
Arsenic	7440-38-2
Barium	7440-39-3
Beryllium	7440-41-7
Cadmium	7440-43-9
Calcium	7440-70-2
Chromium	7440-47-3
Cobalt	7440-48-4
Copper	7440-50-8
Iron	7439-89-6
Lead (total)	7439-92-1
Magnesium	7439-95-4
Manganese	7439-96-5
Mercury	7439-97-6
Nickel	7440-02-0
Potassium	9/7/7440
Selenium	7782-49-2
Silver	7440-22-4
Sodium	7440-23-5
Thallium	7440-28-0
Vanadium	7440-62-2
Zinc	7440-66-6
Additional Analysis	
Hardness	

Notes:
1. Constituents are from Pennsylvania Corrective Action Process (CAP) Regulation Amendments effective December 1, 2001; provided in Chapter VI, Section E (pgs. 29-30) of PADEP Document, *Closure Requirements for Underground Storage Tank Systems*, effective April 1, 1998 and the March 18, 2008 revised PADEP Petroleum Short List.

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
ug	microgram(s)	**mg**	milligram(s)
ml	milliliter(s)	**l**	liter(s)
m3	cubic meter(s)	**ul**	microliter(s)

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

J estimated value – The result is ≥ the Method Detection Limit (MDL) and < the Limit of Quantitation (LOQ).

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

U.S. EPA CLP Data Qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
N	Presumptive evidence of a compound (TICs only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Analytical test results meet all requirements of NELAC unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL LANCASTER LABORATORIES BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF LANCASTER LABORATORIES AND (B) WHETHER LANCASTER LABORATORIES HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Lancaster Laboratories which includes any conditions that vary from the Standard Terms and Conditions, and Lancaster hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

ANALYTICAL RESULTS

Prepared by:

Lancaster Laboratories
2425 New Holland Pike
Lancaster, PA 17605-2425

Prepared for:

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

April 15, 2011

Project: SUN: Philadelphia Refinery AOI-10

Submittal Date: 04/08/2011
Group Number: 1241313
PO Number: PHILADELPHIA
State of Sample Origin: PA

Client Sample Description	Lancaster Labs (LLI) #
W-32D_0-2' Grab Soil	6253863

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

ELECTRONIC COPY TO	Langan	Attn: Dennis Webster
ELECTRONIC COPY TO	SUN: Aquaterra Tech.	Attn: Tiffani Doerr
ELECTRONIC COPY TO	LLI	Attn: EDD Group
ELECTRONIC COPY TO	Langan	Attn: Kristen Ward
ELECTRONIC COPY TO	Aquaterra Tech	Attn: Loretta Belfiglio

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Questions? Contact your Client Services Representative
Jessica A Oknefski at (717) 656-2300 Ext. 1815

Respectfully Submitted,

Matthew E. Barton
Senior Specialist

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: W-32D_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 255058 W-32D_0-2'

LLI Sample # SW 6253863
LLI Group # 1241313
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 13:00 by SS

Submitted: 04/08/2011 14:10
Reported: 04/15/2011 09:35

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

W-32D

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	3	J	0.7	7	1.01
10950	1,2-Dibromoethane	106-93-4	N.D.		1	7	1.01
10950	1,2-Dichloroethane	107-06-2	N.D.		1	7	1.01
10950	Ethylbenzene	100-41-4	N.D.		1	7	1.01
10950	Isopropylbenzene	98-82-8	N.D.		1	7	1.01
10950	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.7	7	1.01
10950	Toluene	108-88-3	2	J	1	7	1.01
10950	1,2,4-Trimethylbenzene	95-63-6	N.D.		1	7	1.01
10950	1,3,5-Trimethylbenzene	108-67-8	N.D.		1	7	1.01
10950	Xylene (Total)	1330-20-7	N.D.		1	7	1.01
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**		**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	N.D.		240	1,200	5
10724	Benzo(a)anthracene	56-55-3	350	J	240	1,200	5
10724	Benzo(a)pyrene	50-32-8	430	J	240	1,200	5
10724	Benzo(b)fluoranthene	205-99-2	440	J	240	1,200	5
10724	Benzo(g,h,i)perylene	191-24-2	680	J	240	1,200	5
10724	Chrysene	218-01-9	440	J	240	1,200	5
10724	Fluorene	86-73-7	N.D.		240	1,200	5
10724	Naphthalene	91-20-3	N.D.		240	1,200	5
10724	Phenanthrene	85-01-8	420	J	240	1,200	5
10724	Pyrene	129-00-0	520	J	240	1,200	5
	Reporting limits were raised due to interference from the sample matrix.						
Metals	**SW-846 6020**		**mg/kg**		**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	1,200		0.181	3.49	25
Wet Chemistry	**SM20 2540 G**		**%**		**%**	**%**	
00111	Moisture	n.a.	29.7		0.50	0.50	1
	"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.						

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	X111021AA	04/12/2011 09:19	Stephanie A Selis	1.01

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: W-32D_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 255058 W-32D_0-2'

LLI Sample # SW 6253863
LLI Group # 1241313
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/07/2011 13:00 by SS

Submitted: 04/08/2011 14:10
Reported: 04/15/2011 09:35

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

W-32D

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201109824067	04/07/2011 13:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201109824067	04/07/2011 13:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201109824067	04/07/2011 13:00	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11102SLE026	04/14/2011 11:23	Brian K Graham	5
10814	BNA Soil Microwave PAH	SW-846 3546	1	11102SLE026	04/13/2011 06:00	Joseph S Feister	1
06135	Lead	SW-846 6020	1	111011026001A	04/12/2011 22:25	David K Beck	25
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111011026001	04/11/2011 20:48	Annamaria Stipkovits	1
00111	Moisture	SM20 2540 G	1	11103820003A	04/13/2011 20:31	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1241313
Reported: 04/15/11 at 09:35 AM

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Laboratory Compliance Quality Control

Analysis Name	Blank Result	Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: X111021AA	Sample number(s): 6253863								
Benzene	N.D.	0.5	5	ug/kg	100	98	80-120	3	30
1,2-Dibromoethane	N.D.	1.	5	ug/kg	89	100	80-120	12	30
1,2-Dichloroethane	N.D.	1.	5	ug/kg	92	94	71-129	2	30
Ethylbenzene	N.D.	1.	5	ug/kg	99	97	80-120	2	30
Isopropylbenzene	N.D.	1.	5	ug/kg	98	96	76-120	3	30
Methyl Tertiary Butyl Ether	N.D.	0.5	5	ug/kg	82	90	74-121	9	30
Toluene	N.D.	1.	5	ug/kg	101	99	80-120	2	30
1,2,4-Trimethylbenzene	N.D.	1.	5	ug/kg	103	101	79-120	2	30
1,3,5-Trimethylbenzene	N.D.	1.	5	ug/kg	105	103	78-120	2	30
Xylene (Total)	N.D.	1.	5	ug/kg	98	97	80-120	1	30
Batch number: 11102SLE026	Sample number(s): 6253863								
Anthracene	N.D.	33.	170	ug/kg	100		83-111		
Benzo(a)anthracene	N.D.	33.	170	ug/kg	91		82-111		
Benzo(a)pyrene	N.D.	33.	170	ug/kg	97		63-138		
Benzo(b)fluoranthene	N.D.	33.	170	ug/kg	106		61-133		
Benzo(g,h,i)perylene	N.D.	33.	170	ug/kg	104		63-130		
Chrysene	N.D.	33.	170	ug/kg	94		81-111		
Fluorene	N.D.	33.	170	ug/kg	98		81-117		
Naphthalene	N.D.	33.	170	ug/kg	91		83-112		
Phenanthrene	N.D.	33.	170	ug/kg	98		83-109		
Pyrene	N.D.	33.	170	ug/kg	101		80-121		
Batch number: 111011026001A	Sample number(s): 6253863								
Lead	N.D.	0.0104	0.200	mg/kg	100		83-110		
Batch number: 11103820003A	Sample number(s): 6253863								
Moisture					100		99-101		

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: 11102SLE026	Sample number(s): 6253863 UNSPK: P250832								
Anthracene	264*	105	40-147	58*	30				
Benzo(a)anthracene	435*	109	32-150	56*	30				
Benzo(a)pyrene	389*	99	57-129	53*	30				
Benzo(b)fluoranthene	342 (2)	114 (2)	53-131	34*	30				
Benzo(g,h,i)perylene	229*	106	60-123	35*	30				

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1241313
Reported: 04/15/11 at 09:35 AM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Chrysene	377*	112	76-114	49*	30				
Fluorene	181*	97	46-137	47*	30				
Naphthalene	210*	96	52-132	56*	30				
Phenanthrene	787 (2)	161 (2)	34-147	71*	30				
Pyrene	666 (2)	137 (2)	76-124	59*	30				
Batch number: 111011026001A	Sample number(s): 6253863 UNSPK: P252458 BKG: P252458								
Lead	108	101	75-125	2	20	4.06	4.30	6	20
Batch number: 11103820003A	Sample number(s): 6253863 BKG: P253875								
Moisture						17.8	17.6	1	15

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: TCL(4.3)by 8260(soil)
Batch number: X111021AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6253863	89	97	103	93
Blank	96	101	98	101
LCS	92	100	109	103
LCSD	93	102	109	104
Limits:	71-114	70-109	70-123	70-111

Analysis Name: PAH 8270 (microwave)
Batch number: 11102SLE026

	Nitrobenzene-d5	2-Fluorobiphenyl	Terphenyl-d14
6253863	87	88	82
Blank	103	110	108
LCS	101	110	103
MS	97	104	90
MSD	94	100	88
Limits:	55-121	56-121	43-124

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1241313 Sample # 6253863

COC # 255058

Please print. Instructions on reverse side correspond with circled numbers. 0.8-5.2°C

For Lab Use Only
FSC:
SCR#:

(1)
Client: SUN - AQUATERRA Acct. #:
Project Name/#: PHILA REF AOI-10 PWSID #:
Project Manager: T. DOERR P.O.#:
Sampler: S. SYICES Quote #:
Name of state where samples were collected: PA

Preservation Codes
H=HCl T=Thiosulfate
N=HNO_3 B=NaOH
S=H_2SO_4 O=Other

(6) Temperature of samples upon receipt (if requested)

(2) Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix: Soil (Potable / NPDES)	Matrix: Water	Matrix: Other	(4) Total # of Containers	(5) Analyses Requested / Preservation Codes	Remarks
W-32B_0-2'	4/7/11	1300	X		X			4	*	* See attached sheet for analyses

(7) **Turnaround Time Requested** (TAT) (please circle): Normal Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax E-mail
Phone #: Fax #:
E-mail address:

(8) **Data Package Options** (please circle if required)
Type I (validation/NJ Reg) TX TRRP-13
Type II (Tier II) MA MCP CT RCP
Type III (Reduced NJ)
Type IV (CLP SOW)
Type VI (Raw Data Only)
SDG Complete? Yes No
Site-specific QC (MS/MSD/Dup)? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Internal COC Required? Yes / No

(9) Relinquished by:	Date	Time	Received by:	Date	Time
AQT	4/7/11	1830	Sample Fridge	4/7/11	1830
	4/8/11	1108		4/8/11	1108
	4/8/11	1410			
				4/8/11	1410

10132|1241313|6253863 0.8-5.2

★ So. 1

Table 1b
Constituents of Concern for Soil
AOI 10 Work Plan for Site Characterization
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

METALS	CAS No.
Lead (total)	7439-92-1

VOLATILE ORGANIC COMPOUNDS	CAS No.
1,2-Dichloroethane	107-06-2
1,2,4-Trimethylbenzene	95-63-6
1,3,5-Trimethylbenzene	108-67-8
Benzene	71-43-2
Cumene	98-82-8
Ethylbenzene	100-41-4
Ethylene dibromide	106-93-4
Methyl tertiary butyl ether	1634-04-4
Toluene	108-88-3
Xylenes (total)	1330-20-7

SEMI-VOLATILE ORGANIC COMPOUNDS	CAS No.
Anthracene	120-12-7
Benzo(a)anthracene	56-55-3
Benzo (g,h,i) perylene	191-24-2
Benzo(a)pyrene	50-32-8
Benzo(b)fluoranthene	205-99-2
Chrysene	218-01-9
Fluorene	86-73-7
Naphthalene	91-20-3
Phenanthrene	85-01-8
Pyrene	129-00-0

Notes:

1. Constituents are from Pennsylvania Corrective Action Process (CAP) Regulation Amendments effective December 1, 2001; provided in Chapter VI, Section E (pgs. 29-30) of PADEP Document, *Closure Requirements for Underground Storage Tank Systems,* effective April 1, 1998 and the March 18, 2008 revised PADEP Petroleum Short List.
2. Select soil samples to be collected within the CAMU and delineation soil samples will be analyzed for full TCL VOCs, TCL SVOCs, and TAL metals.

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
ug	microgram(s)	**mg**	milligram(s)
ml	milliliter(s)	**l**	liter(s)
m3	cubic meter(s)	**ul**	microliter(s)

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

J estimated value – The result is ≥ the Method Detection Limit (MDL) and < the Limit of Quantitation (LOQ).

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

U.S. EPA CLP Data Qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
N	Presumptive evidence of a compound (TICs only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Analytical test results meet all requirements of NELAC unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL LANCASTER LABORATORIES BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF LANCASTER LABORATORIES AND (B) WHETHER LANCASTER LABORATORIES HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Lancaster Laboratories which includes any conditions that vary from the Standard Terms and Conditions, and Lancaster hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

ANALYTICAL RESULTS

Prepared by:

Lancaster Laboratories
2425 New Holland Pike
Lancaster, PA 17605-2425

Prepared for:

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

April 15, 2011

Project: SUN: Philadelphia Refinery AOI-10

Submittal Date: 04/06/2011
Group Number: 1240830
PO Number: PHILADELPHIA
State of Sample Origin: PA

Client Sample Description	Lancaster Labs (LLI) #
BH-10-37_0-2' Grab Soil	6250832
BH-10-36_0-2' Grab Soil	6250833
BH-10-38_0-2' Grab Soil	6250834
BH-10-41_0-2' Grab Soil	6250835
BH-10-40_0-2' Grab Soil	6250836
BH-10-39_0-2' Grab Soil	6250837
BH-10-71_0-2' Grab Soil	6250838
BH-10-72_0-2' Grab Soil	6250839
BH-10-73_0-2' Grab Soil	6250840
W-1D_0-2' Grab Soil	6250841

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

ELECTRONIC COPY TO	Langan	Attn: Dennis Webster
ELECTRONIC COPY TO	SUN: Aquaterra Tech.	Attn: Tiffani Doerr
ELECTRONIC COPY TO	LLI	Attn: EDD Group
ELECTRONIC COPY TO	Langan	Attn: Kristen Ward
ELECTRONIC COPY TO	Aquaterra Tech	Attn: Loretta Belfiglio

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Questions? Contact your Client Services Representative
Jessica A Oknefski at (717) 656-2300 Ext. 1815

Respectfully Submitted,



Christine Dulaney
Senior Specialist

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-37_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259432 BH-10-37

LLI Sample # SW 6250832
LLI Group # 1240830
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/05/2011 09:15 by SS

Submitted: 04/06/2011 16:15
Reported: 04/15/2011 13:54

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

10A37

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	8	6	0.6	0.93
10950	1,2-Dibromoethane	106-93-4	< 6	6	1	0.93
10950	1,2-Dichloroethane	107-06-2	< 6	6	1	0.93
10950	Ethylbenzene	100-41-4	< 6	6	1	0.93
10950	Isopropylbenzene	98-82-8	< 6	6	1	0.93
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 6	6	0.6	0.93
10950	Toluene	108-88-3	< 6	6	1	0.93
10950	1,2,4-Trimethylbenzene	95-63-6	< 6	6	1	0.93
10950	1,3,5-Trimethylbenzene	108-67-8	< 6	6	1	0.93
10950	Xylene (Total)	1330-20-7	< 6	6	1	0.93
	The GC/MS volatile internal standard peak areas were outside the QC limits. A re-analysis was performed, and the matrix effect was confirmed.					
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	1,900	1,100	210	5
10724	Benzo(a)anthracene	56-55-3	6,500	1,100	210	5
10724	Benzo(a)pyrene	50-32-8	6,500	1,100	210	5
10724	Benzo(b)fluoranthene	205-99-2	9,300	1,100	210	5
10724	Benzo(g,h,i)perylene	191-24-2	3,900	1,100	210	5
10724	Chrysene	218-01-9	6,200	1,100	210	5
10724	Fluorene	86-73-7	< 1,100	1,100	210	5
10724	Naphthalene	91-20-3	1,100	1,100	210	5
10724	Phenanthrene	85-01-8	8,600	1,100	210	5
10724	Pyrene	129-00-0	10,000	1,100	210	5
Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	540	2.53	0.132	20
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	21.8	0.50	0.50	1
	"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.					

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-37_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259432 BH-10-37

LLI Sample # SW 6250832
LLI Group # 1240830
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/05/2011 09:15 by SS

Submitted: 04/06/2011 16:15
Reported: 04/15/2011 13:54

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

10A37

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	X111011AA	04/11/2011 19:50	Emily R Styer	0.93
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201109724044	04/05/2011 09:15	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201109724044	04/05/2011 09:15	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201109724044	04/05/2011 09:15	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11102SLE026	04/14/2011 05:23	Brian K Graham	5
10814	BNA Soil Microwave PAH	SW-846 3546	1	11102SLE026	04/13/2011 06:00	Joseph S Feister	1
06135	Lead	SW-846 6020	1	111011026001A	04/12/2011 21:45	David K Beck	20
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111011026001	04/11/2011 20:48	Annamaria Stipkovits	1
00111	Moisture	SM20 2540 G	1	11098820002B	04/08/2011 16:55	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-36_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259432 BH-10-36

LLI Sample # SW 6250833
LLI Group # 1240830
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/05/2011 09:40 by SS

Submitted: 04/06/2011 16:15
Reported: 04/15/2011 13:54

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

10A36

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	8	6	0.6	0.91
10950	1,2-Dibromoethane	106-93-4	< 6	6	1	0.91
10950	1,2-Dichloroethane	107-06-2	< 6	6	1	0.91
10950	Ethylbenzene	100-41-4	< 6	6	1	0.91
10950	Isopropylbenzene	98-82-8	< 6	6	1	0.91
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 6	6	0.6	0.91
10950	Toluene	108-88-3	9	6	1	0.91
10950	1,2,4-Trimethylbenzene	95-63-6	< 6	6	1	0.91
10950	1,3,5-Trimethylbenzene	108-67-8	< 6	6	1	0.91
10950	Xylene (Total)	1330-20-7	< 6	6	1	0.91
	The GC/MS volatile internal standard peak areas were outside the QC limits. A re-analysis was performed, and the matrix effect was confirmed.					
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	< 1,000	1,000	200	5
10724	Benzo(a)anthracene	56-55-3	1,800	1,000	200	5
10724	Benzo(a)pyrene	50-32-8	1,800	1,000	200	5
10724	Benzo(b)fluoranthene	205-99-2	2,400	1,000	200	5
10724	Benzo(g,h,i)perylene	191-24-2	1,300	1,000	200	5
10724	Chrysene	218-01-9	2,200	1,000	200	5
10724	Fluorene	86-73-7	< 1,000	1,000	200	5
10724	Naphthalene	91-20-3	< 1,000	1,000	200	5
10724	Phenanthrene	85-01-8	1,900	1,000	200	5
10724	Pyrene	129-00-0	3,100	1,000	200	5
Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	390	1.21	0.0627	10
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	18.7	0.50	0.50	1
	"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.					

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-36_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259432 BH-10-36

LLI Sample # SW 6250833
LLI Group # 1240830
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/05/2011 09:40 by SS

Submitted: 04/06/2011 16:15
Reported: 04/15/2011 13:54

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

10A36

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	X111011AA	04/11/2011 20:13	Emily R Styer	0.91
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201109724044	04/05/2011 09:40	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201109724044	04/05/2011 09:40	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201109724044	04/05/2011 09:40	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11102SLE026	04/14/2011 07:32	Brian K Graham	5
10814	BNA Soil Microwave PAH	SW-846 3546	1	11102SLE026	04/13/2011 06:00	Joseph S Feister	1
06135	Lead	SW-846 6020	1	111011026001A	04/12/2011 21:47	David K Beck	10
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111011026001	04/11/2011 20:48	Annamaria Stipkovits	1
00111	Moisture	SM20 2540 G	1	11098820002B	04/08/2011 16:55	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-38_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259432 BH-10-38

LLI Sample # SW 6250834
LLI Group # 1240830
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/05/2011 10:00 by SS

Submitted: 04/06/2011 16:15
Reported: 04/15/2011 13:54

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

10A38

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	< 9	9	0.9	1.52
10950	1,2-Dibromoethane	106-93-4	< 9	9	2	1.52
10950	1,2-Dichloroethane	107-06-2	< 9	9	2	1.52
10950	Ethylbenzene	100-41-4	< 9	9	2	1.52
10950	Isopropylbenzene	98-82-8	< 9	9	2	1.52
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 9	9	0.9	1.52
10950	Toluene	108-88-3	< 9	9	2	1.52
10950	1,2,4-Trimethylbenzene	95-63-6	< 9	9	2	1.52
10950	1,3,5-Trimethylbenzene	108-67-8	< 9	9	2	1.52
10950	Xylene (Total)	1330-20-7	< 9	9	2	1.52

The GC/MS volatile internal standard peak areas were outside the QC limits. A re-analysis was performed, and the matrix effect was confirmed.

GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	< 1,000	1,000	200	5
10724	Benzo(a)anthracene	56-55-3	< 1,000	1,000	200	5
10724	Benzo(a)pyrene	50-32-8	< 1,000	1,000	200	5
10724	Benzo(b)fluoranthene	205-99-2	< 1,000	1,000	200	5
10724	Benzo(g,h,i)perylene	191-24-2	< 1,000	1,000	200	5
10724	Chrysene	218-01-9	< 1,000	1,000	200	5
10724	Fluorene	86-73-7	< 1,000	1,000	200	5
10724	Naphthalene	91-20-3	< 1,000	1,000	200	5
10724	Phenanthrene	85-01-8	< 1,000	1,000	200	5
10724	Pyrene	129-00-0	< 1,000	1,000	200	5

Reporting limits were raised due to interference from the sample matrix.

Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	11.6	0.231	0.0120	2
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	16.9	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-38_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259432 BH-10-38

LLI Sample # SW 6250834
LLI Group # 1240830
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/05/2011 10:00 by SS

Submitted: 04/06/2011 16:15
Reported: 04/15/2011 13:54

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

10A38

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	X111011AA	04/11/2011 20:36	Emily R Styer	1.52
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201109724044	04/05/2011 10:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201109724044	04/05/2011 10:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201109724044	04/05/2011 10:00	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11102SLE026	04/14/2011 07:58	Brian K Graham	5
10814	BNA Soil Microwave PAH	SW-846 3546	1	11102SLE026	04/13/2011 06:00	Joseph S Feister	1
06135	Lead	SW-846 6020	1	111011026001A	04/12/2011 21:55	David K Beck	2
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111011026001	04/11/2011 20:48	Annamaria Stipkovits	1
00111	Moisture	SM20 2540 G	1	11098820002B	04/08/2011 16:55	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-41_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259432 BH-10-41

LLI Sample # SW 6250835
LLI Group # 1240830
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/05/2011 10:25 by SS

Submitted: 04/06/2011 16:15
Reported: 04/15/2011 13:54

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

10A41

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	< 8	8	0.8	1.05
10950	1,2-Dibromoethane	106-93-4	< 8	8	2	1.05
10950	1,2-Dichloroethane	107-06-2	< 8	8	2	1.05
10950	Ethylbenzene	100-41-4	< 8	8	2	1.05
10950	Isopropylbenzene	98-82-8	< 8	8	2	1.05
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 8	8	0.8	1.05
10950	Toluene	108-88-3	10	8	2	1.05
10950	1,2,4-Trimethylbenzene	95-63-6	14	8	2	1.05
10950	1,3,5-Trimethylbenzene	108-67-8	< 8	8	2	1.05
10950	Xylene (Total)	1330-20-7	12	8	2	1.05
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	< 6,200	6,200	1,200	5
10724	Benzo(a)anthracene	56-55-3	< 6,200	6,200	1,200	5
10724	Benzo(a)pyrene	50-32-8	< 6,200	6,200	1,200	5
10724	Benzo(b)fluoranthene	205-99-2	< 6,200	6,200	1,200	5
10724	Benzo(g,h,i)perylene	191-24-2	< 6,200	6,200	1,200	5
10724	Chrysene	218-01-9	< 6,200	6,200	1,200	5
10724	Fluorene	86-73-7	< 6,200	6,200	1,200	5
10724	Naphthalene	91-20-3	< 6,200	6,200	1,200	5
10724	Phenanthrene	85-01-8	< 6,200	6,200	1,200	5
10724	Pyrene	129-00-0	< 6,200	6,200	1,200	5
	Reporting limits were raised due to interference from the sample matrix.					
Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	186	0.750	0.0390	5
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	34.0	0.50	0.50	1
	"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.					

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	X111011AA	04/11/2011 21:00	Emily R Styer	1.05

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-41_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259432 BH-10-41

LLI Sample # SW 6250835
LLI Group # 1240830
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/05/2011 10:25 by SS

Submitted: 04/06/2011 16:15
Reported: 04/15/2011 13:54

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

10A41

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201109724044	04/05/2011 10:25	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201109724044	04/05/2011 10:25	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201109724044	04/05/2011 10:25	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11102SLE026	04/14/2011 08:24	Brian K Graham	5
10814	BNA Soil Microwave PAH	SW-846 3546	1	11102SLE026	04/13/2011 06:00	Joseph S Feister	1
06135	Lead	SW-846 6020	1	111011026001A	04/12/2011 21:57	David K Beck	5
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111011026001	04/11/2011 20:48	Annamaria Stipkovits	1
00111	Moisture	SM20 2540 G	1	11098820002B	04/08/2011 16:55	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-40_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259432 BH-10-40

LLI Sample # SW 6250836
LLI Group # 1240830
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/05/2011 11:10 by SS

Submitted: 04/06/2011 16:15
Reported: 04/15/2011 13:54

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

10A40

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	< 5	5	0.5	0.79
10950	1,2-Dibromoethane	106-93-4	< 5	5	0.9	0.79
10950	1,2-Dichloroethane	107-06-2	< 5	5	0.9	0.79
10950	Ethylbenzene	100-41-4	< 5	5	0.9	0.79
10950	Isopropylbenzene	98-82-8	< 5	5	0.9	0.79
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 5	5	0.5	0.79
10950	Toluene	108-88-3	< 5	5	0.9	0.79
10950	1,2,4-Trimethylbenzene	95-63-6	< 5	5	0.9	0.79
10950	1,3,5-Trimethylbenzene	108-67-8	< 5	5	0.9	0.79
10950	Xylene (Total)	1330-20-7	< 5	5	0.9	0.79
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	4,700	970	190	5
10724	Benzo(a)anthracene	56-55-3	11,000	970	190	5
10724	Benzo(a)pyrene	50-32-8	9,200	970	190	5
10724	Benzo(b)fluoranthene	205-99-2	12,000	970	190	5
10724	Benzo(g,h,i)perylene	191-24-2	4,800	970	190	5
10724	Chrysene	218-01-9	10,000	970	190	5
10724	Fluorene	86-73-7	1,300	970	190	5
10724	Naphthalene	91-20-3	< 970	970	190	5
10724	Phenanthrene	85-01-8	18,000	970	190	5
10724	Pyrene	129-00-0	20,000	970	190	5
	Reporting limits were raised due to interference from the sample matrix.					
Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	65.1	0.233	0.0121	2
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	15.0	0.50	0.50	1
	"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.					

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	X111011AA	04/11/2011 21:23	Emily R Styer	0.79

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-40_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259432 BH-10-40

LLI Sample # SW 6250836
LLI Group # 1240830
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/05/2011 11:10 by SS

Submitted: 04/06/2011 16:15
Reported: 04/15/2011 13:54

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

10A40

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201109724044	04/05/2011 11:10	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201109724044	04/05/2011 11:10	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201109724044	04/05/2011 11:10	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11102SLE026	04/14/2011 08:49	Brian K Graham	5
10814	BNA Soil Microwave PAH	SW-846 3546	1	11102SLE026	04/13/2011 06:00	Joseph S Feister	1
06135	Lead	SW-846 6020	1	111011026001A	04/12/2011 21:59	David K Beck	2
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111011026001	04/11/2011 20:48	Annamaria Stipkovits	1
00111	Moisture	SM20 2540 G	1	11098820002B	04/08/2011 16:55	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-39_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259432 BH-10-39

LLI Sample # SW 6250837
LLI Group # 1240830
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/05/2011 11:30 by SS

Submitted: 04/06/2011 16:15
Reported: 04/15/2011 13:54

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

10A39

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	< 800	800	80	121.6
10950	1,2-Dibromoethane	106-93-4	< 800	800	160	121.6
10950	1,2-Dichloroethane	107-06-2	< 800	800	160	121.6
10950	Ethylbenzene	100-41-4	< 800	800	160	121.6
10950	Isopropylbenzene	98-82-8	2,500	800	160	121.6
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 800	800	80	121.6
10950	Toluene	108-88-3	< 800	800	160	121.6
10950	1,2,4-Trimethylbenzene	95-63-6	< 800	800	160	121.6
10950	1,3,5-Trimethylbenzene	108-67-8	< 800	800	160	121.6
10950	Xylene (Total)	1330-20-7	< 800	800	160	121.6
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	12,000	11,000	2,200	5
10724	Benzo(a)anthracene	56-55-3	22,000	11,000	2,200	5
10724	Benzo(a)pyrene	50-32-8	16,000	11,000	2,200	5
10724	Benzo(b)fluoranthene	205-99-2	25,000	11,000	2,200	5
10724	Benzo(g,h,i)perylene	191-24-2	< 11,000	11,000	2,200	5
10724	Chrysene	218-01-9	23,000	11,000	2,200	5
10724	Fluorene	86-73-7	< 11,000	11,000	2,200	5
10724	Naphthalene	91-20-3	< 11,000	11,000	2,200	5
10724	Phenanthrene	85-01-8	50,000	11,000	2,200	5
10724	Pyrene	129-00-0	51,000	11,000	2,200	5
	Reporting limits were raised due to interference from the sample matrix.					
Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	415	1.30	0.0677	10
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	23.9	0.50	0.50	1
	"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.					

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	Q111021AA	04/12/2011 13:50	Lauren C Temple	121.6

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-39_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259432 BH-10-39

LLI Sample # SW 6250837
LLI Group # 1240830
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/05/2011 11:30 by SS

Submitted: 04/06/2011 16:15
Reported: 04/15/2011 13:54

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

10A39

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201109724044	04/05/2011 11:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201109724044	04/05/2011 11:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201109724044	04/05/2011 11:30	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11102SLE026	04/14/2011 09:15	Brian K Graham	5
10814	BNA Soil Microwave PAH	SW-846 3546	1	11102SLE026	04/13/2011 06:00	Joseph S Feister	1
06135	Lead	SW-846 6020	1	111011026001A	04/12/2011 22:02	David K Beck	10
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111011026001	04/11/2011 20:48	Annamaria Stipkovits	1
00111	Moisture	SM20 2540 G	1	11098820002B	04/08/2011 16:55	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-71_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259432 BH-10-71

LLI Sample # SW 6250838
LLI Group # 1240830
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/05/2011 13:00 by SS

Submitted: 04/06/2011 16:15
Reported: 04/15/2011 13:54

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

10A71

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	19	6	0.6	0.95
10950	1,2-Dibromoethane	106-93-4	< 6	6	1	0.95
10950	1,2-Dichloroethane	107-06-2	< 6	6	1	0.95
10950	Ethylbenzene	100-41-4	< 6	6	1	0.95
10950	Isopropylbenzene	98-82-8	< 6	6	1	0.95
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 6	6	0.6	0.95
10950	Toluene	108-88-3	14	6	1	0.95
10950	1,2,4-Trimethylbenzene	95-63-6	11	6	1	0.95
10950	1,3,5-Trimethylbenzene	108-67-8	< 6	6	1	0.95
10950	Xylene (Total)	1330-20-7	16	6	1	0.95

The GC/MS volatile internal standard peak areas were outside the QC limits. A re-analysis was performed, and the matrix effect was confirmed.

GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	< 1,000	1,000	210	5
10724	Benzo(a)anthracene	56-55-3	< 1,000	1,000	210	5
10724	Benzo(a)pyrene	50-32-8	< 1,000	1,000	210	5
10724	Benzo(b)fluoranthene	205-99-2	< 1,000	1,000	210	5
10724	Benzo(g,h,i)perylene	191-24-2	1,100	1,000	210	5
10724	Chrysene	218-01-9	< 1,000	1,000	210	5
10724	Fluorene	86-73-7	< 1,000	1,000	210	5
10724	Naphthalene	91-20-3	< 1,000	1,000	210	5
10724	Phenanthrene	85-01-8	< 1,000	1,000	210	5
10724	Pyrene	129-00-0	< 1,000	1,000	210	5

Reporting limits were raised due to interference from the sample matrix.

Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	244	1.25	0.0652	10

Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	20.2	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-71_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259432 BH-10-71

LLI Sample # SW 6250838
LLI Group # 1240830
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/05/2011 13:00 by SS

Submitted: 04/06/2011 16:15
Reported: 04/15/2011 13:54

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

10A71

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	X111011AA	04/11/2011 21:49	Emily R Styer	0.95
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201109724044	04/05/2011 13:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201109724044	04/05/2011 13:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201109724044	04/05/2011 13:00	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11102SLE026	04/14/2011 09:41	Brian K Graham	5
10814	BNA Soil Microwave PAH	SW-846 3546	1	11102SLE026	04/13/2011 06:00	Joseph S Feister	1
06135	Lead	SW-846 6020	1	111011026001A	04/12/2011 22:04	David K Beck	10
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111011026001	04/11/2011 20:48	Annamaria Stipkovits	1
00111	Moisture	SM20 2540 G	1	11098820002B	04/08/2011 16:55	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-72_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259432 BH-10-72

LLI Sample # SW 6250839
LLI Group # 1240830
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/05/2011 13:30 by SS

Submitted: 04/06/2011 16:15
Reported: 04/15/2011 13:54

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

10A72

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	< 620	620	62	79.72
10950	1,2-Dibromoethane	106-93-4	< 620	620	120	79.72
10950	1,2-Dichloroethane	107-06-2	< 620	620	120	79.72
10950	Ethylbenzene	100-41-4	< 620	620	120	79.72
10950	Isopropylbenzene	98-82-8	< 620	620	120	79.72
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 620	620	62	79.72
10950	Toluene	108-88-3	< 620	620	120	79.72
10950	1,2,4-Trimethylbenzene	95-63-6	< 620	620	120	79.72
10950	1,3,5-Trimethylbenzene	108-67-8	< 620	620	120	79.72
10950	Xylene (Total)	1330-20-7	< 620	620	120	79.72
	Reporting limits were raised due to interference from the sample matrix.					
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	< 13,000	13,000	2,600	5
10724	Benzo(a)anthracene	56-55-3	15,000	13,000	2,600	5
10724	Benzo(a)pyrene	50-32-8	49,000	13,000	2,600	5
10724	Benzo(b)fluoranthene	205-99-2	31,000	13,000	2,600	5
10724	Benzo(g,h,i)perylene	191-24-2	47,000	13,000	2,600	5
10724	Chrysene	218-01-9	27,000	13,000	2,600	5
10724	Fluorene	86-73-7	< 13,000	13,000	2,600	5
10724	Naphthalene	91-20-3	< 13,000	13,000	2,600	5
10724	Phenanthrene	85-01-8	< 13,000	13,000	2,600	5
10724	Pyrene	129-00-0	49,000	13,000	2,600	5
	Reporting limits were raised due to interference from the sample matrix.					
Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	946	3.05	0.159	20
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	35.7	0.50	0.50	1
	"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.					

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	Q111032AA	04/14/2011 06:05	Stephanie A Selis	79.72

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-72_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259432 BH-10-72

LLI Sample # SW 6250839
LLI Group # 1240830
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/05/2011 13:30 by SS

Submitted: 04/06/2011 16:15
Reported: 04/15/2011 13:54

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

10A72

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201109724044	04/05/2011 13:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201109724044	04/05/2011 13:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201109724044	04/05/2011 13:30	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11102SLE026	04/14/2011 10:06	Brian K Graham	5
10814	BNA Soil Microwave PAH	SW-846 3546	1	11102SLE026	04/13/2011 06:00	Joseph S Feister	1
06135	Lead	SW-846 6020	1	111011026001A	04/12/2011 22:07	David K Beck	20
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111011026001	04/11/2011 20:48	Annamaria Stipkovits	1
00111	Moisture	SM20 2540 G	1	11098820002B	04/08/2011 16:55	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-73_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259432 BH-10-73

LLI Sample # SW 6250840
LLI Group # 1240830
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/05/2011 14:00 by SS

Submitted: 04/06/2011 16:15
Reported: 04/15/2011 13:54

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

10A73

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	16	9	0.9	1.07
10950	1,2-Dibromoethane	106-93-4	< 9	9	2	1.07
10950	1,2-Dichloroethane	107-06-2	< 9	9	2	1.07
10950	Ethylbenzene	100-41-4	< 9	9	2	1.07
10950	Isopropylbenzene	98-82-8	< 9	9	2	1.07
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 9	9	0.9	1.07
10950	Toluene	108-88-3	18	9	2	1.07
10950	1,2,4-Trimethylbenzene	95-63-6	< 9	9	2	1.07
10950	1,3,5-Trimethylbenzene	108-67-8	< 9	9	2	1.07
10950	Xylene (Total)	1330-20-7	12	9	2	1.07

The GC/MS volatile internal standard peak areas were outside the QC limits. A re-analysis was performed, and the matrix effect was confirmed.

GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	< 14,000	14,000	2,900	5
10724	Benzo(a)anthracene	56-55-3	< 14,000	14,000	2,900	5
10724	Benzo(a)pyrene	50-32-8	< 14,000	14,000	2,900	5
10724	Benzo(b)fluoranthene	205-99-2	< 14,000	14,000	2,900	5
10724	Benzo(g,h,i)perylene	191-24-2	< 14,000	14,000	2,900	5
10724	Chrysene	218-01-9	< 14,000	14,000	2,900	5
10724	Fluorene	86-73-7	< 14,000	14,000	2,900	5
10724	Naphthalene	91-20-3	17,000	14,000	2,900	5
10724	Phenanthrene	85-01-8	< 14,000	14,000	2,900	5
10724	Pyrene	129-00-0	< 14,000	14,000	2,900	5

Reporting limits were raised due to interference from the sample matrix.

Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	4,550	17.1	0.887	100

Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	42.5	0.50	0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: BH-10-73_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259432 BH-10-73

LLI Sample # SW 6250840
LLI Group # 1240830
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/05/2011 14:00 by SS

Submitted: 04/06/2011 16:15
Reported: 04/15/2011 13:54

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

10A73

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TMBs	SW-846 8260B	1	X111021AA	04/12/2011 08:56	Stephanie A Selis	1.07
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201109724044	04/05/2011 14:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201109724044	04/05/2011 14:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201109724044	04/05/2011 14:00	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11102SLE026	04/14/2011 10:32	Brian K Graham	5
10814	BNA Soil Microwave PAH	SW-846 3546	1	11102SLE026	04/13/2011 06:00	Joseph S Feister	1
06135	Lead	SW-846 6020	1	111011026001A	04/12/2011 22:09	David K Beck	100
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111011026001	04/11/2011 20:48	Annamaria Stipkovits	1
00111	Moisture	SM20 2540 G	1	11098820002B	04/08/2011 16:55	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: W-1D_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259432 W-1D

LLI Sample # SW 6250841
LLI Group # 1240830
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/05/2011 10:00 by SS

Submitted: 04/06/2011 16:15
Reported: 04/15/2011 13:54

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

W-1D-

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**	**ug/kg**	**ug/kg**	
10950	Benzene	71-43-2	< 5	5	0.5	0.8
10950	1,2-Dibromoethane	106-93-4	< 5	5	0.9	0.8
10950	1,2-Dichloroethane	107-06-2	< 5	5	0.9	0.8
10950	Ethylbenzene	100-41-4	< 5	5	0.9	0.8
10950	Isopropylbenzene	98-82-8	< 5	5	0.9	0.8
10950	Methyl Tertiary Butyl Ether	1634-04-4	< 5	5	0.5	0.8
10950	Toluene	108-88-3	< 5	5	0.9	0.8
10950	1,2,4-Trimethylbenzene	95-63-6	< 5	5	0.9	0.8
10950	1,3,5-Trimethylbenzene	108-67-8	< 5	5	0.9	0.8
10950	Xylene (Total)	1330-20-7	< 5	5	0.9	0.8
GC/MS Semivolatiles	**SW-846 8270C**		**ug/kg**	**ug/kg**	**ug/kg**	
10724	Anthracene	120-12-7	2,300	960	190	5
10724	Benzo(a)anthracene	56-55-3	3,700	960	190	5
10724	Benzo(a)pyrene	50-32-8	2,700	960	190	5
10724	Benzo(b)fluoranthene	205-99-2	3,700	960	190	5
10724	Benzo(g,h,i)perylene	191-24-2	1,400	960	190	5
10724	Chrysene	218-01-9	3,200	960	190	5
10724	Fluorene	86-73-7	1,000	960	190	5
10724	Naphthalene	91-20-3	< 960	960	190	5
10724	Phenanthrene	85-01-8	7,900	960	190	5
10724	Pyrene	129-00-0	6,900	960	190	5
	Reporting limits were raised due to interference from the sample matrix.					
Metals	**SW-846 6020**		**mg/kg**	**mg/kg**	**mg/kg**	
06135	Lead	7439-92-1	76.5	0.223	0.0116	2
Wet Chemistry	**SM20 2540 G**		**%**	**%**	**%**	
00111	Moisture	n.a.	13.6	0.50	0.50	1
	"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.					

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/12

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10950	BTEX/MTBE/EDB/EDC/Cumene/TM Bs	SW-846 8260B	1	X111022AA	04/13/2011 00:48	Kristen D Pelliccia	0.8

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: W-1D_0-2' Grab Soil
Philadelphia Refinery AOI-10
COC: 259432 W-1D

LLI Sample # SW 6250841
LLI Group # 1240830
Account # 10132

Project Name: SUN: Philadelphia Refinery AOI-10

Collected: 04/05/2011 10:00 by SS

Submitted: 04/06/2011 16:15
Reported: 04/15/2011 13:54

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

W-1D-

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07579	GC/MS-5g Field Preserv.MeOH-NC	SW-846 5035	1	201109724044	04/05/2011 10:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201109724044	04/05/2011 10:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201109724044	04/05/2011 10:00	Client Supplied	1
10724	PAH 8270 (microwave)	SW-846 8270C	1	11102SLE026	04/14/2011 10:58	Brian K Graham	5
10814	BNA Soil Microwave PAH	SW-846 3546	1	11102SLE026	04/13/2011 06:00	Joseph S Feister	1
06135	Lead	SW-846 6020	1	111011026001A	04/12/2011 22:11	David K Beck	2
11026	SW SW846 ICP-MS Digest	SW-846 3050B	1	111011026001	04/11/2011 20:48	Annamaria Stipkovits	1
00111	Moisture	SM20 2540 G	1	11098820002B	04/08/2011 16:55	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1240830
Reported: 04/15/11 at 01:54 PM

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Laboratory Compliance Quality Control

Analysis Name	Blank Result	Blank LOQ**	Blank MDL	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: Q111021AA	Sample number(s): 6250837								
Benzene	< 250	250.	25	ug/kg	97	94	80-120	3	30
1,2-Dibromoethane	< 250	250.	50	ug/kg	95	95	80-120	0	30
1,2-Dichloroethane	< 250	250.	50	ug/kg	95	94	71-129	1	30
Ethylbenzene	< 250	250.	50	ug/kg	93	90	80-120	4	30
Isopropylbenzene	< 250	250.	50	ug/kg	93	90	76-120	4	30
Methyl Tertiary Butyl Ether	< 250	250.	25	ug/kg	90	92	74-121	3	30
Toluene	< 250	250.	50	ug/kg	95	92	80-120	4	30
1,2,4-Trimethylbenzene	< 250	250.	50	ug/kg	89	88	79-120	2	30
1,3,5-Trimethylbenzene	< 250	250.	50	ug/kg	91	90	78-120	2	30
Xylene (Total)	< 250	250.	50	ug/kg	94	92	80-120	3	30
Batch number: Q111032AA	Sample number(s): 6250839								
Benzene	< 250	250.	25	ug/kg	97	98	80-120	1	30
1,2-Dibromoethane	< 250	250.	50	ug/kg	90	95	80-120	6	30
1,2-Dichloroethane	< 250	250.	50	ug/kg	93	95	71-129	3	30
Ethylbenzene	< 250	250.	50	ug/kg	92	94	80-120	3	30
Isopropylbenzene	< 250	250.	50	ug/kg	92	94	76-120	2	30
Methyl Tertiary Butyl Ether	< 250	250.	25	ug/kg	83	91	74-121	9	30
Toluene	< 250	250.	50	ug/kg	94	95	80-120	2	30
1,2,4-Trimethylbenzene	< 250	250.	50	ug/kg	87	91	79-120	5	30
1,3,5-Trimethylbenzene	< 250	250.	50	ug/kg	90	93	78-120	4	30
Xylene (Total)	< 250	250.	50	ug/kg	92	95	80-120	3	30
Batch number: X111011AA	Sample number(s): 6250832-6250836,6250838								
Benzene	< 5	5.	0.5	ug/kg	99	92	80-120	7	30
1,2-Dibromoethane	< 5	5.	1	ug/kg	94	93	80-120	0	30
1,2-Dichloroethane	< 5	5.	1	ug/kg	95	90	71-129	5	30
Ethylbenzene	< 5	5.	1	ug/kg	99	92	80-120	7	30
Isopropylbenzene	< 5	5.	1	ug/kg	96	91	76-120	6	30
Methyl Tertiary Butyl Ether	< 5	5.	0.5	ug/kg	83	83	74-121	0	30
Toluene	< 5	5.	1	ug/kg	100	94	80-120	6	30
1,2,4-Trimethylbenzene	< 5	5.	1	ug/kg	105	99	79-120	5	30
1,3,5-Trimethylbenzene	< 5	5.	1	ug/kg	108	100	78-120	7	30
Xylene (Total)	< 5	5.	1	ug/kg	97	92	80-120	6	30
Batch number: X111021AA	Sample number(s): 6250840								
Benzene	< 5	5.	0.5	ug/kg	100	98	80-120	3	30
1,2-Dibromoethane	< 5	5.	1	ug/kg	89	100	80-120	12	30
1,2-Dichloroethane	< 5	5.	1	ug/kg	92	94	71-129	2	30
Ethylbenzene	< 5	5.	1	ug/kg	99	97	80-120	2	30
Isopropylbenzene	< 5	5.	1	ug/kg	98	96	76-120	3	30
Methyl Tertiary Butyl Ether	< 5	5.	0.5	ug/kg	82	90	74-121	9	30
Toluene	< 5	5.	1	ug/kg	101	99	80-120	2	30
1,2,4-Trimethylbenzene	< 5	5.	1	ug/kg	103	101	79-120	2	30
1,3,5-Trimethylbenzene	< 5	5.	1	ug/kg	105	103	78-120	2	30
Xylene (Total)	< 5	5.	1	ug/kg	98	97	80-120	1	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1240830
Reported: 04/15/11 at 01:54 PM

Analysis Name	Blank Result	Blank LOQ**	Blank MDL	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: X111022AA	Sample number(s): 6250841								
Benzene	< 5	5.	0.5	ug/kg	101	98	80-120	3	30
1,2-Dibromoethane	< 5	5.	1	ug/kg	105	98	80-120	7	30
1,2-Dichloroethane	< 5	5.	1	ug/kg	93	89	71-129	5	30
Ethylbenzene	< 5	5.	1	ug/kg	108	103	80-120	5	30
Isopropylbenzene	< 5	5.	1	ug/kg	106	102	76-120	4	30
Methyl Tertiary Butyl Ether	< 5	5.	0.5	ug/kg	87	82	74-121	6	30
Toluene	< 5	5.	1	ug/kg	110	106	80-120	4	30
1,2,4-Trimethylbenzene	< 5	5.	1	ug/kg	114	109	79-120	5	30
1,3,5-Trimethylbenzene	< 5	5.	1	ug/kg	116	110	78-120	5	30
Xylene (Total)	< 5	5.	1	ug/kg	107	102	80-120	5	30
Batch number: 11102SLE026	Sample number(s): 6250832-6250841								
Anthracene	< 170	170.	33	ug/kg	100		83-111		
Benzo(a)anthracene	< 170	170.	33	ug/kg	91		82-111		
Benzo(a)pyrene	< 170	170.	33	ug/kg	97		63-138		
Benzo(b)fluoranthene	< 170	170.	33	ug/kg	106		61-133		
Benzo(g,h,i)perylene	< 170	170.	33	ug/kg	104		63-130		
Chrysene	< 170	170.	33	ug/kg	94		81-111		
Fluorene	< 170	170.	33	ug/kg	98		81-117		
Naphthalene	< 170	170.	33	ug/kg	91		83-112		
Phenanthrene	< 170	170.	33	ug/kg	98		83-109		
Pyrene	< 170	170.	33	ug/kg	101		80-121		
Batch number: 111011026001A	Sample number(s): 6250832-6250841								
Lead	< 0.200	0.200	0.0104	mg/kg	100		83-110		
Batch number: 11098820002B	Sample number(s): 6250832-6250841								
Moisture					100		99-101		

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: 11102SLE026	Sample number(s): 6250832-6250841 UNSPK: 6250832								
Anthracene	264*	105	40-147	58*	30				
Benzo(a)anthracene	435*	109	32-150	56*	30				
Benzo(a)pyrene	389*	99	57-129	53*	30				
Benzo(b)fluoranthene	342 (2)	114 (2)	53-131	34*	30				
Benzo(g,h,i)perylene	229*	106	60-123	35*	30				
Chrysene	377*	112	76-114	49*	30				
Fluorene	181*	97	46-137	47*	30				
Naphthalene	210*	96	52-132	56*	30				
Phenanthrene	787 (2)	161 (2)	34-147	71*	30				
Pyrene	666 (2)	137 (2)	76-124	59*	30				
Batch number: 111011026001A	Sample number(s): 6250832-6250841 UNSPK: P252458 BKG: P252458								
Lead	108	101	75-125	2	20	4.06	4.30	6	20
Batch number: 11098820002B	Sample number(s): 6250832-6250841 BKG: P252007								

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1240830
Reported: 04/15/11 at 01:54 PM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Moisture						13.0	13.5	4	15

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: TCL(4.3)by 8260(soil)
Batch number: Q111021AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6250837	64*	64*	54*	56*
Blank	90	95	93	90
LCS	85	86	86	85
LCSD	84	88	84	84
Limits:	71-114	70-109	70-123	70-111

Analysis Name: TCL(4.3)by 8260(soil)
Batch number: Q111032AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6250839	54*	53*	41*	37*
Blank	88	92	90	87
LCS	86	88	86	84
LCSD	86	89	86	85
Limits:	71-114	70-109	70-123	70-111

Analysis Name: TCL(4.3)by 8260(soil)
Batch number: X111011AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6250832	99	102	116	86
6250833	104	106	132*	75
6250834	123*	130*	146*	68*
6250835	115*	132*	137*	60*
6250836	95	99	110	88
6250838	101	109	131*	81
Blank	97	99	98	101
LCS	95	99	107	104
LCSD	94	101	108	104
Limits:	71-114	70-109	70-123	70-111

Analysis Name: TCL(4.3)by 8260(soil)
Batch number: X111021AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6250840	108	111*	137*	66*

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1240830
Reported: 04/15/11 at 01:54 PM

Surrogate Quality Control

Blank	96	101	98	101
LCS	92	100	109	103
LCSD	93	102	109	104
Limits:	71-114	70-109	70-123	70-111

Analysis Name: TCL(4.3)by 8260(soil)
Batch number: X111022AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
6250841	95	100	114	83
Blank	93	98	101	99
LCS	90	105	111	104
LCSD	90	100	113	103
Limits:	71-114	70-109	70-123	70-111

Analysis Name: PAH 8270 (microwave)
Batch number: 11102SLE026

	Nitrobenzene-d5	2-Fluorobiphenyl	Terphenyl-d14
6250832	87	91	83
6250833	93	98	91
6250834	84	91	80
6250835	92	102	92
6250836	98	99	97
6250837	118	104	103
6250838	84	88	76
6250839	106	113	107
6250840	95	101	102
6250841	92	97	103
Blank	103	110	108
LCS	101	110	103
MS	97	104	90
MSD	94	100	88
Limits:	55-121	56-121	43-124

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1240830 Sample # 6250832-41

COC # 259432

Please print. Instructions on reverse side correspond with circled numbers.

For Lab Use Only
FSC:
SCR#: 103563

(1) Client: SUN / AQUATERRA Acct. #:

Project Name/#: PHILA REF AOI-10 PWSID #:

Project Manager: T. DOERR P.O.#:

Sampler: S. SYKES Quote #:

Name of state where samples were collected: PA

Preservation Codes
H=HCl T=Thiosulfate
N=HNO_3 B=NaOH
S=H_2SO_4 O=Other

(6) Temperature of samples upon receipt (if requested)

(2) Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil (Potable / NPDES)	Water	Other	Total # of Containers	(5) Analyses Requested: Lead (Total)	1,2-Dichloroethane / 1,2,4-TMB	Benzene, Cumene	Ethylene dibromide	Methyl tert-butyl ether	Toluene	Xylenes (Total)	Chrysene, Fluorene	Naphthalene	Phenanthrene	Pyrene	Anthracene, Benzo(a)anthracene	Benzo(ghi)perylene	Benzo(a)pyrene, Benzo(b)fluoranthene	Remarks
BH-10-37_0-2'	4/5/11	915	X		X			4	X	X	X	X	X	X	X	X	X	X	X	X			1.0-1.8°C
BH-10-36_0-2'	4/5/11	940	X		X			4	X	X	X	X	X	X	X	X	X	X	X	X			
BH-10-38_0-2'	4/5/11	1000	X		X			4	X	X	X	X	X	X	X	X	X	X	X	X			
BH-10-41_0-2'	4/5/11	1025	X		X			4	X	X	X	X	X	X	X	X	X	X	X	X			
BH-10-40_0-2'	4/5/11	1110	X		X			4	X	X	X	X	X	X	X	X	X	X	X	X			
BH-10-39_0-2'	4/5/11	1130	X		X			4	X	X	X	X	X	X	X	X	X	X	X	X			
BH-10-71_0-2'	4/5/11	1300	X		X			4	X	X	X	X	X	X	X	X	X	X	X	X			
BH-10-72_0-2'	4/5/11	1330	X		X			4	X	X	X	X	X	X	X	X	X	X	X	X			
BH-10-73_0-2'	4/5/11	1400	X		X			4	X	X	X	X	X	X	X	X	X	X	X	X			
W-10_0-2'	4/5/11	1000	X		X			4	X	X	X	X	X	X	X	X	X	X	X	X			

(7) **Turnaround Time Requested** (TAT) (please circle): Normal Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax E-mail
Phone #: Fax #:
E-mail address:

(8) **Data Package Options** (please circle if required)
Type I (validation/NJ Reg)
Type II (Tier II)
Type III (Reduced NJ)
Type IV (CLP SOW)
Type VI (Raw Data Only)
TX TRRP-13
MA MCP CT RCP
SDG Complete? Yes No
Site-specific QC (MS/MSD/Dup)? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Internal COC Required? Yes / No

(9)

Relinquished by:	Date	Time	Received by:	Date	Time
Bottle Storage					
AQUATERRA	4/6/11	700	Sample Fridge	4/6/11	700
AQUATERRA	4/6/11	1415		4/6/11	1415
	4/6/11	1615			
				4/6/11	1615

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
ug	microgram(s)	**mg**	milligram(s)
ml	milliliter(s)	**l**	liter(s)
m3	cubic meter(s)	**ul**	microliter(s)

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

J estimated value – The result is ≥ the Method Detection Limit (MDL) and < the Limit of Quantitation (LOQ).

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

U.S. EPA CLP Data Qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
N	Presumptive evidence of a compound (TICs only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Analytical test results meet all requirements of NELAC unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL LANCASTER LABORATORIES BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF LANCASTER LABORATORIES AND (B) WHETHER LANCASTER LABORATORIES HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Lancaster Laboratories which includes any conditions that vary from the Standard Terms and Conditions, and Lancaster hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

ANALYTICAL RESULTS

Prepared by:

Lancaster Laboratories
2425 New Holland Pike
Lancaster, PA 17605-2425

Prepared for:

Sunoco c/o Stantec
1060 Andrew Drive
Suite 140
West Chester PA 19380

April 28, 2010

Project: West Yard Surface Sampling

Submittal Date: 04/15/2010
Group Number: 1190562
PO Number: WEST YARD SURFACE
State of Sample Origin: PA

Client Sample Description	Lancaster Labs (LLI) #
SS-1 Grab Soil Sample	5955218
SS-2 Grab Soil Sample	5955219
SS-3 Grab Soil Sample	5955220
SS-4 Grab Soil Sample	5955221
SS-5 Grab Soil Sample	5955222
SS-6 Grab Soil Sample	5955223
SS-7 Grab Soil Sample	5955224
SS-8 Grab Soil Sample	5955225
SS-9 Grab Soil Sample	5955226
SS-10 Grab Soil Sample	5955227

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

ELECTRONIC COPY TO Sunoco c/o Stantec Attn: Jennifer Menges

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Questions? Contact your Client Services Representative
Loran A Carter at (717) 656-2300 Ext. 1375

Respectfully Submitted,

Max E. Snavely
Senior Specialist

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SS-1 Grab Soil Sample
West Yard Surface Sampling

LLI Sample # SW 5955218
LLI Group # 1190562
Account # 11183

Project Name: West Yard Surface Sampling

Collected: 04/15/2010 09:15 by TC

Submitted: 04/15/2010 16:00
Reported: 04/28/2010 12:55
Discard: 06/28/2010

Sunoco c/o Stantec
1060 Andrew Drive
Suite 140
West Chester PA 19380

WY-01

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	
10102	Benzene	71-43-2	10		0.6	1.11
10102	1,2-Dibromoethane	106-93-4	N.D.		1	1.11
10102	1,2-Dichloroethane	107-06-2	N.D.		1	1.11
10102	Ethylbenzene	100-41-4	2	J	1	1.11
10102	Isopropylbenzene	98-82-8	N.D.		1	1.11
10102	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.6	1.11
10102	Naphthalene	91-20-3	60		1	1.11
10102	Toluene	108-88-3	13		1	1.11
10102	1,2,4-Trimethylbenzene	95-63-6	230		1	1.11
10102	1,3,5-Trimethylbenzene	108-67-8	450		52	48.36
10102	Xylene (Total)	1330-20-7	11		1	1.11

The GC/MS volatile internal standard peak areas were outside the QC limits for both the initial analysis and the re-analysis. The values reported here are from the initial analysis of the sample.

The value reported for naphthalene is an estimated maximum possible concentration due to interference from a non-target compound.

GC/MS Semivolatiles	**SW-846 8310**		**ug/kg**		**ug/kg**	
00941	Anthracene	120-12-7	750		7.2	10
00941	Benzo(a)anthracene	56-55-3	750		3.6	10
00941	Benzo(a)pyrene	50-32-8	580		3.6	10
00941	Benzo(b)fluoranthene	205-99-2	760		2.9	10
00941	Benzo(g,h,i)perylene	191-24-2	1,100		22	10
00941	Chrysene	218-01-9	3,100		22	10
00941	Fluorene	86-73-7	1,400		36	10
00941	Phenanthrene	85-01-8	3,900		14	10
00941	Pyrene	129-00-0	N.D.		7,300	10

Phenanthrene was detected in the method blank at a concentration of 1.46 ug/kg. The blank value was not subtracted from the analytical result.

The surrogate data is outside the QC limits due to unresolvable matrix problems evident in the sample chromatogram.

Due to the presence of an interferent near its retention time, the normal reporting limit was not attained for Pyrene. The reporting limit for this compound was raised accordingly.

Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	
06955	Lead	7439-92-1	169		0.622	1

Wet Chemistry	**SM20 2540 G**		**%**		**%**	
00111	Moisture	n.a.	7.3		0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SS-1 Grab Soil Sample
West Yard Surface Sampling

LLI Sample # SW 5955218
LLI Group # 1190562
Account # 11183

Project Name: West Yard Surface Sampling

Collected: 04/15/2010 09:15 by TC

Submitted: 04/15/2010 16:00
Reported: 04/28/2010 12:55
Discard: 06/28/2010

Sunoco c/o Stantec
1060 Andrew Drive
Suite 140
West Chester PA 19380

WY-01

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/11

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07579	GC/MS-Field PreservedMeOH-NC	SW-846 5035	1	201010620842	04/15/2010 09:15	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201010620842	04/15/2010 09:15	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201010620842	04/15/2010 09:15	Client Supplied	1
10102	UST - Soils by 8260B	SW-846 8260B	1	X101081AA	04/18/2010 21:38	Nicholas P Riehl	1.11
10102	UST - Soils by 8260B	SW-846 8260B	1	R101091AA	04/19/2010 15:03	Kerri E Koch	48.36
00941	PAH's in Solids by HPLC	SW-846 8310	1	10116SLE026	04/27/2010 14:16	Mark A Clark	10
03338	PAH Solid Extraction	SW-846 3550B	2	10116SLE026	04/26/2010 17:15	Sally L Appleyard	1
06955	Lead	SW-846 6010B	1	101065708003	04/20/2010 01:37	Tara L Snyder	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	101065708003	04/19/2010 08:55	Denise K Conners	1
00111	Moisture	SM20 2540 G	1	10106820003B	04/16/2010 15:45	Scott W Freisher	1

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SS-2 Grab Soil Sample
West Yard Surface Sampling

LLI Sample # SW 5955219
LLI Group # 1190562
Account # 11183

Project Name: West Yard Surface Sampling

Collected: 04/15/2010 09:30 by TC

Submitted: 04/15/2010 16:00
Reported: 04/28/2010 12:55
Discard: 06/28/2010

Sunoco c/o Stantec
1060 Andrew Drive
Suite 140
West Chester PA 19380

WY-02

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	
10102	Benzene	71-43-2	8		0.6	1.01
10102	1,2-Dibromoethane	106-93-4	N.D.		1	1.01
10102	1,2-Dichloroethane	107-06-2	N.D.		1	1.01
10102	Ethylbenzene	100-41-4	N.D.		1	1.01
10102	Isopropylbenzene	98-82-8	N.D.		1	1.01
10102	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.6	1.01
10102	Naphthalene	91-20-3	16		1	1.01
10102	Toluene	108-88-3	6		1	1.01
10102	1,2,4-Trimethylbenzene	95-63-6	5	J	1	1.01
10102	1,3,5-Trimethylbenzene	108-67-8	5	J	1	1.01
10102	Xylene (Total)	1330-20-7	3	J	1	1.01

The GC/MS volatile internal standard peak areas were outside the QC limits for both the initial analysis and the re-analysis. The values reported here are from the initial analysis of the sample.

GC/MS Semivolatiles	**SW-846 8310**		**ug/kg**		**ug/kg**	
00941	Anthracene	120-12-7	240		7.5	10
00941	Benzo(a)anthracene	56-55-3	530		3.7	10
00941	Benzo(a)pyrene	50-32-8	480		3.7	10
00941	Benzo(b)fluoranthene	205-99-2	590		3.0	10
00941	Benzo(g,h,i)perylene	191-24-2	1,000		22	10
00941	Chrysene	218-01-9	1,700		22	10
00941	Fluorene	86-73-7	200		37	10
00941	Phenanthrene	85-01-8	830		15	10
00941	Pyrene	129-00-0	N.D.		1,200	10

The following compounds were detected in the method blank at the respective concentrations of:
Phenanthrene (1.54 ug/kg)
Benzo(b)fluoranthene (0.36 ug/kg)

These blank values were not subtracted from the analytical results.

Due to the presence of an interferent near its retention time, the normal reporting limit was not attained for Pyrene. The reporting limit for this compound was raised accordingly.

Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	
06955	Lead	7439-92-1	209		0.664	1

Wet Chemistry	**SM20 2540 G**		**%**		**%**	
00111	Moisture	n.a.	10.6		0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SS-2 Grab Soil Sample
West Yard Surface Sampling

LLI Sample # SW 5955219
LLI Group # 1190562
Account # 11183

Project Name: West Yard Surface Sampling

Collected: 04/15/2010 09:30 by TC

Submitted: 04/15/2010 16:00
Reported: 04/28/2010 12:55
Discard: 06/28/2010

Sunoco c/o Stantec
1060 Andrew Drive
Suite 140
West Chester PA 19380

WY-02

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/11

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07579	GC/MS-Field PreservedMeOH-NC	SW-846 5035	1	201010620842	04/15/2010 09:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201010620842	04/15/2010 09:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201010620842	04/15/2010 09:30	Client Supplied	1
10102	UST - Soils by 8260B	SW-846 8260B	1	X101081AA	04/18/2010 22:01	Nicholas P Riehl	1.01
00941	PAH's in Solids by HPLC	SW-846 8310	1	10109SLB026	04/23/2010 10:18	Mark A Clark	10
03338	PAH Solid Extraction	SW-846 3550B	1	10109SLB026	04/19/2010 15:00	Doreen K Robles	1
06955	Lead	SW-846 6010B	1	101065708003	04/20/2010 01:40	Tara L Snyder	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	101065708003	04/19/2010 08:55	Denise K Conners	1
00111	Moisture	SM20 2540 G	1	10106820003B	04/16/2010 15:45	Scott W Freisher	1

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SS-3 Grab Soil Sample
West Yard Surface Sampling

LLI Sample # SW 5955220
LLI Group # 1190562
Account # 11183

Project Name: West Yard Surface Sampling

Collected: 04/15/2010 09:45 by TC

Submitted: 04/15/2010 16:00
Reported: 04/28/2010 12:55
Discard: 06/28/2010

Sunoco c/o Stantec
1060 Andrew Drive
Suite 140
West Chester PA 19380

WY-03

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	
10102	Benzene	71-43-2	10		0.6	1.06
10102	1,2-Dibromoethane	106-93-4	N.D.		1	1.06
10102	1,2-Dichloroethane	107-06-2	N.D.		1	1.06
10102	Ethylbenzene	100-41-4	3	J	1	1.06
10102	Isopropylbenzene	98-82-8	N.D.		1	1.06
10102	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.6	1.06
10102	Naphthalene	91-20-3	42		1	1.06
10102	Toluene	108-88-3	23		1	1.06
10102	1,2,4-Trimethylbenzene	95-63-6	29		1	1.06
10102	1,3,5-Trimethylbenzene	108-67-8	25		1	1.06
10102	Xylene (Total)	1330-20-7	14		1	1.06

The GC/MS volatile internal standard peak areas were outside the QC limits for both the initial analysis and the re-analysis. The values reported here are from the initial analysis of the sample.

GC/MS Semivolatiles	**SW-846 8310**		**ug/kg**		**ug/kg**	
00941	Anthracene	120-12-7	760		7.2	10
00941	Benzo(a)anthracene	56-55-3	1,800		18	50
00941	Benzo(a)pyrene	50-32-8	1,400		18	50
00941	Benzo(b)fluoranthene	205-99-2	1,700		14	50
00941	Benzo(g,h,i)perylene	191-24-2	2,300		22	10
00941	Chrysene	218-01-9	5,500		22	10
00941	Fluorene	86-73-7	750		36	10
00941	Phenanthrene	85-01-8	3,600		14	10
00941	Pyrene	129-00-0	5,600		36	10

Phenanthrene was detected in the method blank at a concentration of 1.46 ug/kg. The blank value was not subtracted from the analytical result.

The surrogate data is outside the QC limits due to unresolvable matrix problems evident in the sample chromatogram.

Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	
06955	Lead	7439-92-1	270		0.648	1
Wet Chemistry	**SM20 2540 G**		**%**		**%**	
00111	Moisture	n.a.	7.4		0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/11

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SS-3 Grab Soil Sample
West Yard Surface Sampling

LLI Sample # SW 5955220
LLI Group # 1190562
Account # 11183

Project Name: West Yard Surface Sampling

Collected: 04/15/2010 09:45 by TC

Submitted: 04/15/2010 16:00
Reported: 04/28/2010 12:55
Discard: 06/28/2010

Sunoco c/o Stantec
1060 Andrew Drive
Suite 140
West Chester PA 19380

WY-03

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07579	GC/MS-Field PreservedMeOH-NC	SW-846 5035	1	201010620842	04/15/2010 09:45	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201010620842	04/15/2010 09:45	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201010620842	04/15/2010 09:45	Client Supplied	1
10102	UST - Soils by 8260B	SW-846 8260B	1	X101081AA	04/18/2010 22:23	Nicholas P Riehl	1.06
00941	PAH's in Solids by HPLC	SW-846 8310	1	10116SLE026	04/27/2010 18:00	Mark A Clark	10
00941	PAH's in Solids by HPLC	SW-846 8310	1	10116SLE026	04/28/2010 08:41	Mark A Clark	50
03338	PAH Solid Extraction	SW-846 3550B	2	10116SLE026	04/26/2010 17:15	Sally L Appleyard	1
06955	Lead	SW-846 6010B	1	101065708003	04/20/2010 01:50	Tara L Snyder	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	101065708003	04/19/2010 08:55	Denise K Conners	1
00111	Moisture	SM20 2540 G	1	10106820003B	04/16/2010 15:45	Scott W Freisher	1

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SS-4 Grab Soil Sample
West Yard Surface Sampling

LLI Sample # SW 5955221
LLI Group # 1190562
Account # 11183

Project Name: West Yard Surface Sampling

Collected: 04/15/2010 10:00 by TC

Submitted: 04/15/2010 16:00
Reported: 04/28/2010 12:55
Discard: 06/28/2010

Sunoco c/o Stantec
1060 Andrew Drive
Suite 140
West Chester PA 19380

WY-04

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	
10102	Benzene	71-43-2	10		0.5	0.86
10102	1,2-Dibromoethane	106-93-4	N.D.		1	0.86
10102	1,2-Dichloroethane	107-06-2	N.D.		1	0.86
10102	Ethylbenzene	100-41-4	23		1	0.86
10102	Isopropylbenzene	98-82-8	5		1	0.86
10102	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.5	0.86
10102	Naphthalene	91-20-3	770		59	52.45
10102	Toluene	108-88-3	33		1	0.86
10102	1,2,4-Trimethylbenzene	95-63-6	650		59	52.45
10102	1,3,5-Trimethylbenzene	108-67-8	190	J	59	52.45
10102	Xylene (Total)	1330-20-7	180		1	0.86

The GC/MS volatile internal standard peak areas were outside the QC limits for both the initial analysis and the re-analysis. The values reported here are from the initial analysis of the sample.

The concentration reported for 1,3,5-trimethylbenzene is estimated since it exceeded the calibration range of the instrument when determined by the low level method, but was less than the quantitation limit when determined by the high level method. The result reported is from the high level determination.

GC/MS Semivolatiles	**SW-846 8310**		**ug/kg**		**ug/kg**	
00941	Anthracene	120-12-7	550		7.5	10
00941	Benzo(a)anthracene	56-55-3	970		3.7	10
00941	Benzo(a)pyrene	50-32-8	880		3.7	10
00941	Benzo(b)fluoranthene	205-99-2	960		3.0	10
00941	Benzo(g,h,i)perylene	191-24-2	1,400		22	10
00941	Chrysene	218-01-9	3,000		22	10
00941	Fluorene	86-73-7	640		37	10
00941	Phenanthrene	85-01-8	2,600		15	10
00941	Pyrene	129-00-0	N.D.		5,100	10

Phenanthrene was detected in the method blank at a concentration of 1.46 ug/kg. The blank value was not subtracted from the analytical result.

The surrogate data is outside the QC limits due to unresolvable matrix problems evident in the sample chromatogram.

Due to the presence of an interferent near its retention time, the normal reporting limit was not attained for Pyrene. The reporting limit for this compound was raised accordingly.

Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	
06955	Lead	7439-92-1	190		0.667	1

Wet Chemistry	**SM20 2540 G**		**%**		**%**	
00111	Moisture	n.a.	10.9		0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SS-4 Grab Soil Sample
West Yard Surface Sampling

LLI Sample # SW 5955221
LLI Group # 1190562
Account # 11183

Project Name: West Yard Surface Sampling

Collected: 04/15/2010 10:00 by TC

Submitted: 04/15/2010 16:00
Reported: 04/28/2010 12:55
Discard: 06/28/2010

Sunoco c/o Stantec
1060 Andrew Drive
Suite 140
West Chester PA 19380

WY-04

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/11

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07579	GC/MS-Field PreservedMeOH-NC	SW-846 5035	1	201010620842	04/15/2010 10:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201010620842	04/15/2010 10:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201010620842	04/15/2010 10:00	Client Supplied	1
10102	UST - Soils by 8260B	SW-846 8260B	1	R101091AA	04/19/2010 16:59	Kerri E Koch	52.45
10102	UST - Soils by 8260B	SW-846 8260B	1	X101092AA	04/20/2010 04:07	Angela D Sneeringer	0.86
00941	PAH's in Solids by HPLC	SW-846 8310	1	10116SLE026	04/27/2010 18:47	Mark A Clark	10
03338	PAH Solid Extraction	SW-846 3550B	2	10116SLE026	04/26/2010 17:15	Sally L Appleyard	1
06955	Lead	SW-846 6010B	1	101065708003	04/20/2010 01:53	Tara L Snyder	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	101065708003	04/19/2010 08:55	Denise K Conners	1
00111	Moisture	SM20 2540 G	1	10106820003B	04/16/2010 15:45	Scott W Freisher	1

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SS-5 Grab Soil Sample
West Yard Surface Sampling

LLI Sample # SW 5955222
LLI Group # 1190562
Account # 11183

Project Name: West Yard Surface Sampling

Collected: 04/15/2010 10:15 by TC

Submitted: 04/15/2010 16:00
Reported: 04/28/2010 12:55
Discard: 06/28/2010

Sunoco c/o Stantec
1060 Andrew Drive
Suite 140
West Chester PA 19380

WY-05

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	
10102	Benzene	71-43-2	5		0.4	0.83
10102	1,2-Dibromoethane	106-93-4	N.D.		0.9	0.83
10102	1,2-Dichloroethane	107-06-2	N.D.		0.9	0.83
10102	Ethylbenzene	100-41-4	N.D.		0.9	0.83
10102	Isopropylbenzene	98-82-8	N.D.		0.9	0.83
10102	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.4	0.83
10102	Naphthalene	91-20-3	21		0.9	0.83
10102	Toluene	108-88-3	5		0.9	0.83
10102	1,2,4-Trimethylbenzene	95-63-6	12		0.9	0.83
10102	1,3,5-Trimethylbenzene	108-67-8	5		0.9	0.83
10102	Xylene (Total)	1330-20-7	4	J	0.9	0.83

The GC/MS volatile internal standard peak areas were outside the QC limits for both the initial analysis and the re-analysis. The values reported here are from the initial analysis of the sample.

GC/MS Semivolatiles	**SW-846 8310**		**ug/kg**		**ug/kg**	
00941	Anthracene	120-12-7	840		7.2	10
00941	Benzo(a)anthracene	56-55-3	1,400		3.6	10
00941	Benzo(a)pyrene	50-32-8	1,000		3.6	10
00941	Benzo(b)fluoranthene	205-99-2	1,400		5.7	20
00941	Benzo(g,h,i)perylene	191-24-2	1,800		21	10
00941	Chrysene	218-01-9	4,800		21	10
00941	Fluorene	86-73-7	1,000		36	10
00941	Phenanthrene	85-01-8	4,100		14	10
00941	Pyrene	129-00-0	4,500		36	10

Phenanthrene was detected in the method blank at a concentration of 1.46 ug/kg. The blank value was not subtracted from the analytical result.

The surrogate data is outside the QC limits due to unresolvable matrix problems evident in the sample chromatogram.

Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	
06955	Lead	7439-92-1	233		0.638	1
Wet Chemistry	**SM20 2540 G**		**%**		**%**	
00111	Moisture	n.a.	6.9		0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/11

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SS-5 Grab Soil Sample
West Yard Surface Sampling

LLI Sample # SW 5955222
LLI Group # 1190562
Account # 11183

Project Name: West Yard Surface Sampling

Collected: 04/15/2010 10:15 by TC

Submitted: 04/15/2010 16:00
Reported: 04/28/2010 12:55
Discard: 06/28/2010

Sunoco c/o Stantec
1060 Andrew Drive
Suite 140
West Chester PA 19380

WY-05

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07579	GC/MS-Field PreservedMeOH-NC	SW-846 5035	1	201010620842	04/15/2010 10:15	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201010620842	04/15/2010 10:15	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201010620842	04/15/2010 10:15	Client Supplied	1
10102	UST - Soils by 8260B	SW-846 8260B	1	X101092AA	04/20/2010 04:29	Angela D Sneeringer	0.83
00941	PAH's in Solids by HPLC	SW-846 8310	1	10116SLE026	04/27/2010 19:33	Mark A Clark	10
00941	PAH's in Solids by HPLC	SW-846 8310	1	10116SLE026	04/28/2010 09:27	Mark A Clark	20
03338	PAH Solid Extraction	SW-846 3550B	2	10116SLE026	04/26/2010 17:15	Sally L Appleyard	1
06955	Lead	SW-846 6010B	1	101065708003	04/20/2010 01:57	Tara L Snyder	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	101065708003	04/19/2010 08:55	Denise K Conners	1
00111	Moisture	SM20 2540 G	1	10106820003B	04/16/2010 15:45	Scott W Freisher	1

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SS-6 Grab Soil Sample
West Yard Surface Sampling

LLI Sample # SW 5955223
LLI Group # 1190562
Account # 11183

Project Name: West Yard Surface Sampling

Collected: 04/15/2010 10:30 by TC

Submitted: 04/15/2010 16:00
Reported: 04/28/2010 12:55
Discard: 06/28/2010

Sunoco c/o Stantec
1060 Andrew Drive
Suite 140
West Chester PA 19380

WY-06

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	
10102	Benzene	71-43-2	28		0.5	0.84
10102	1,2-Dibromoethane	106-93-4	N.D.		0.9	0.84
10102	1,2-Dichloroethane	107-06-2	N.D.		0.9	0.84
10102	Ethylbenzene	100-41-4	2	J	0.9	0.84
10102	Isopropylbenzene	98-82-8	N.D.		0.9	0.84
10102	Methyl Tertiary Butyl Ether	1634-04-4	2	J	0.5	0.84
10102	Naphthalene	91-20-3	18		0.9	0.84
10102	Toluene	108-88-3	7		0.9	0.84
10102	1,2,4-Trimethylbenzene	95-63-6	16		0.9	0.84
10102	1,3,5-Trimethylbenzene	108-67-8	11		0.9	0.84
10102	Xylene (Total)	1330-20-7	9		0.9	0.84

The GC/MS volatile internal standard peak areas were outside the QC limits for both the initial analysis and the re-analysis. The values reported here are from the initial analysis of the sample.

GC/MS Semivolatiles	**SW-846 8310**		**ug/kg**		**ug/kg**	
00941	Anthracene	120-12-7	420		15	20
00941	Benzo(a)anthracene	56-55-3	690		7.3	20
00941	Benzo(a)pyrene	50-32-8	540		7.3	20
00941	Benzo(b)fluoranthene	205-99-2	800		5.8	20
00941	Benzo(g,h,i)perylene	191-24-2	940		44	20
00941	Chrysene	218-01-9	2,500		44	20
00941	Fluorene	86-73-7	460		73	20
00941	Phenanthrene	85-01-8	1,500		29	20
00941	Pyrene	129-00-0	N.D.		2,300	20

The following compounds were detected in the method blank at the respective concentrations of:
Phenanthrene (1.54 ug/kg)
Benzo(b)fluoranthene (0.36 ug/kg)

These blank values were not subtracted from the analytical results.

Due to the presence of an interferent near its retention time, the normal reporting limit was not attained for Pyrene. The reporting limit for this compound was raised accordingly.

Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	
06955	Lead	7439-92-1	169		0.651	1

Wet Chemistry	**SM20 2540 G**		**%**		**%**	
00111	Moisture	n.a.	8.8		0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SS-6 Grab Soil Sample
West Yard Surface Sampling

LLI Sample # SW 5955223
LLI Group # 1190562
Account # 11183

Project Name: West Yard Surface Sampling

Collected: 04/15/2010 10:30 by TC

Submitted: 04/15/2010 16:00
Reported: 04/28/2010 12:55
Discard: 06/28/2010

Sunoco c/o Stantec
1060 Andrew Drive
Suite 140
West Chester PA 19380

WY-06

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/11

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07579	GC/MS-Field PreservedMeOH-NC	SW-846 5035	1	201010620842	04/15/2010 10:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201010620842	04/15/2010 10:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201010620842	04/15/2010 10:30	Client Supplied	1
10102	UST - Soils by 8260B	SW-846 8260B	1	X101092AA	04/20/2010 04:52	Angela D Sneeringer	0.84
00941	PAH's in Solids by HPLC	SW-846 8310	1	10109SLB026	04/23/2010 14:40	Mark A Clark	20
03338	PAH Solid Extraction	SW-846 3550B	1	10109SLB026	04/19/2010 15:00	Doreen K Robles	1
06955	Lead	SW-846 6010B	1	101065708003	04/20/2010 02:00	Tara L Snyder	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	101065708003	04/19/2010 08:55	Denise K Conners	1
00111	Moisture	SM20 2540 G	1	10106820003B	04/16/2010 15:45	Scott W Freisher	1

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SS-7 Grab Soil Sample
West Yard Surface Sampling

LLI Sample # SW 5955224
LLI Group # 1190562
Account # 11183

Project Name: West Yard Surface Sampling

Collected: 04/15/2010 10:45 by TC

Submitted: 04/15/2010 16:00
Reported: 04/28/2010 12:55
Discard: 06/28/2010

Sunoco c/o Stantec
1060 Andrew Drive
Suite 140
West Chester PA 19380

WY-07

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	
10102	Benzene	71-43-2	7		0.6	1.05
10102	1,2-Dibromoethane	106-93-4	N.D.		1	1.05
10102	1,2-Dichloroethane	107-06-2	N.D.		1	1.05
10102	Ethylbenzene	100-41-4	2	J	1	1.05
10102	Isopropylbenzene	98-82-8	3	J	1	1.05
10102	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.6	1.05
10102	Naphthalene	91-20-3	48		1	1.05
10102	Toluene	108-88-3	1	J	1	1.05
10102	1,2,4-Trimethylbenzene	95-63-6	220		1	1.05
10102	1,3,5-Trimethylbenzene	108-67-8	86		1	1.05
10102	Xylene (Total)	1330-20-7	24		1	1.05

The GC/MS volatile internal standard peak areas were outside the QC limits for both the initial analysis and the re-analysis. The values reported here are from the initial analysis of the sample. A surrogate recovery was also outside of QC limits for the re-analysis.

GC/MS Semivolatiles	**SW-846 8310**		**ug/kg**		**ug/kg**	
00941	Anthracene	120-12-7	160		7.8	10
00941	Benzo(a)anthracene	56-55-3	300		3.9	10
00941	Benzo(a)pyrene	50-32-8	300		3.9	10
00941	Benzo(b)fluoranthene	205-99-2	390		3.1	10
00941	Benzo(g,h,i)perylene	191-24-2	790		23	10
00941	Chrysene	218-01-9	790		23	10
00941	Fluorene	86-73-7	230		39	10
00941	Phenanthrene	85-01-8	790		16	10
00941	Pyrene	129-00-0	740		39	10

Phenanthrene was detected in the method blank at a concentration of 1.46 ug/kg. The blank value was not subtracted from the analytical result.

Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	
06955	Lead	7439-92-1	440		0.671	1

Wet Chemistry	**SM20 2540 G**		**%**		**%**	
00111	Moisture	n.a.	14.0		0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/11

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SS-7 Grab Soil Sample
West Yard Surface Sampling

LLI Sample # SW 5955224
LLI Group # 1190562
Account # 11183

Project Name: West Yard Surface Sampling

Collected: 04/15/2010 10:45 by TC

Submitted: 04/15/2010 16:00
Reported: 04/28/2010 12:55
Discard: 06/28/2010

Sunoco c/o Stantec
1060 Andrew Drive
Suite 140
West Chester PA 19380

WY-07

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07579	GC/MS-Field PreservedMeOH-NC	SW-846 5035	1	201010620842	04/15/2010 10:45	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201010620842	04/15/2010 10:45	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201010620842	04/15/2010 10:45	Client Supplied	1
10102	UST - Soils by 8260B	SW-846 8260B	1	X101092AA	04/20/2010 05:14	Angela D Sneeringer	1.05
00941	PAH's in Solids by HPLC	SW-846 8310	1	10116SLE026	04/27/2010 20:58	Mark A Clark	10
03338	PAH Solid Extraction	SW-846 3550B	2	10116SLE026	04/26/2010 17:15	Sally L Appleyard	1
06955	Lead	SW-846 6010B	1	101065708003	04/20/2010 02:03	Tara L Snyder	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	101065708003	04/19/2010 08:55	Denise K Conners	1
00111	Moisture	SM20 2540 G	1	10106820003B	04/16/2010 15:45	Scott W Freisher	1

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SS-8 Grab Soil Sample
West Yard Surface Sampling

LLI Sample # SW 5955225
LLI Group # 1190562
Account # 11183

Project Name: West Yard Surface Sampling

Collected: 04/15/2010 11:00 by TC

Submitted: 04/15/2010 16:00
Reported: 04/28/2010 12:55
Discard: 06/28/2010

Sunoco c/o Stantec
1060 Andrew Drive
Suite 140
West Chester PA 19380

WY-08

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	
10102	Benzene	71-43-2	1	J	0.5	0.99
10102	1,2-Dibromoethane	106-93-4	N.D.		1	0.99
10102	1,2-Dichloroethane	107-06-2	N.D.		1	0.99
10102	Ethylbenzene	100-41-4	N.D.		1	0.99
10102	Isopropylbenzene	98-82-8	N.D.		1	0.99
10102	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.5	0.99
10102	Naphthalene	91-20-3	2	J	1	0.99
10102	Toluene	108-88-3	N.D.		1	0.99
10102	1,2,4-Trimethylbenzene	95-63-6	N.D.		1	0.99
10102	1,3,5-Trimethylbenzene	108-67-8	N.D.		1	0.99
10102	Xylene (Total)	1330-20-7	N.D.		1	0.99
GC/MS Semivolatiles	**SW-846 8310**		**ug/kg**		**ug/kg**	
00941	Anthracene	120-12-7	200		6.8	10
00941	Benzo(a)anthracene	56-55-3	270		3.4	10
00941	Benzo(a)pyrene	50-32-8	270		3.4	10
00941	Benzo(b)fluoranthene	205-99-2	340		2.7	10
00941	Benzo(g,h,i)perylene	191-24-2	550		20	10
00941	Chrysene	218-01-9	900		20	10
00941	Fluorene	86-73-7	290		34	10
00941	Phenanthrene	85-01-8	1,300		14	10
00941	Pyrene	129-00-0	N.D.		550	10

The following compounds were detected in the method blank at the respective concentrations of:
Phenanthrene (1.54 ug/kg)
Benzo(b)fluoranthene (0.36 ug/kg)

These blank values were not subtracted from the analytical results.

Due to the presence of an interferent near its retention time, the normal reporting limit was not attained for Pyrene. The reporting limit for this compound was raised accordingly.

Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	
06955	Lead	7439-92-1	96.8		0.610	1
Wet Chemistry	**SM20 2540 G**		**%**		**%**	
00111	Moisture	n.a.	1.7		0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/11

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SS-8 Grab Soil Sample
West Yard Surface Sampling

LLI Sample # SW 5955225
LLI Group # 1190562
Account # 11183

Project Name: West Yard Surface Sampling

Collected: 04/15/2010 11:00 by TC

Submitted: 04/15/2010 16:00
Reported: 04/28/2010 12:55
Discard: 06/28/2010

Sunoco c/o Stantec
1060 Andrew Drive
Suite 140
West Chester PA 19380

WY-08

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07579	GC/MS-Field PreservedMeOH-NC	SW-846 5035	1	201010620842	04/15/2010 11:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201010620842	04/15/2010 11:00	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201010620842	04/15/2010 11:00	Client Supplied	1
10102	UST - Soils by 8260B	SW-846 8260B	1	X101081AA	04/19/2010 00:16	Nicholas P Riehl	0.99
00941	PAH's in Solids by HPLC	SW-846 8310	1	10109SLB026	04/23/2010 16:52	Mark A Clark	10
03338	PAH Solid Extraction	SW-846 3550B	1	10109SLB026	04/19/2010 15:00	Doreen K Robles	1
06955	Lead	SW-846 6010B	1	101065708003	04/20/2010 02:07	Tara L Snyder	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	101065708003	04/19/2010 08:55	Denise K Conners	1
00111	Moisture	SM20 2540 G	1	10106820003B	04/16/2010 15:45	Scott W Freisher	1

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SS-9 Grab Soil Sample
West Yard Surface Sampling

LLI Sample # SW 5955226
LLI Group # 1190562
Account # 11183

Project Name: West Yard Surface Sampling

Collected: 04/15/2010 11:15 by TC

Submitted: 04/15/2010 16:00
Reported: 04/28/2010 12:55
Discard: 06/28/2010

Sunoco c/o Stantec
1060 Andrew Drive
Suite 140
West Chester PA 19380

WY-09

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	
10102	Benzene	71-43-2	2	J	0.5	1.02
10102	1,2-Dibromoethane	106-93-4	N.D.		1	1.02
10102	1,2-Dichloroethane	107-06-2	N.D.		1	1.02
10102	Ethylbenzene	100-41-4	N.D.		1	1.02
10102	Isopropylbenzene	98-82-8	N.D.		1	1.02
10102	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.5	1.02
10102	Naphthalene	91-20-3	11		1	1.02
10102	Toluene	108-88-3	1	J	1	1.02
10102	1,2,4-Trimethylbenzene	95-63-6	6		1	1.02
10102	1,3,5-Trimethylbenzene	108-67-8	2	J	1	1.02
10102	Xylene (Total)	1330-20-7	1	J	1	1.02

The GC/MS volatile internal standard peak areas were outside the QC limits for both the initial analysis and the re-analysis. The values reported here are from the initial analysis of the sample.

GC/MS Semivolatiles	**SW-846 8310**		**ug/kg**		**ug/kg**	
00941	Anthracene	120-12-7	150		6.8	10
00941	Benzo(a)anthracene	56-55-3	420		3.4	10
00941	Benzo(a)pyrene	50-32-8	430		3.4	10
00941	Benzo(b)fluoranthene	205-99-2	470		2.7	10
00941	Benzo(g,h,i)perylene	191-24-2	810		20	10
00941	Chrysene	218-01-9	980		20	10
00941	Fluorene	86-73-7	190		34	10
00941	Phenanthrene	85-01-8	1,100		14	10
00941	Pyrene	129-00-0	890		34	10

The following compounds were detected in the method blank at the respective concentrations of:
Phenanthrene (1.54 ug/kg)
Benzo(b)fluoranthene (0.36 ug/kg)

These blank values were not subtracted from the analytical results.

Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	
06955	Lead	7439-92-1	111		0.592	1

Wet Chemistry	**SM20 2540 G**		**%**		**%**	
00111	Moisture	n.a.	1.6		0.50	1

"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/11

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SS-9 Grab Soil Sample
West Yard Surface Sampling

LLI Sample # SW 5955226
LLI Group # 1190562
Account # 11183

Project Name: West Yard Surface Sampling

Collected: 04/15/2010 11:15 by TC

Submitted: 04/15/2010 16:00
Reported: 04/28/2010 12:55
Discard: 06/28/2010

Sunoco c/o Stantec
1060 Andrew Drive
Suite 140
West Chester PA 19380

WY-09

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07579	GC/MS-Field PreservedMeOH-NC	SW-846 5035	1	201010620842	04/15/2010 11:15	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201010620842	04/15/2010 11:15	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201010620842	04/15/2010 11:15	Client Supplied	1
10102	UST - Soils by 8260B	SW-846 8260B	1	X101081AA	04/18/2010 20:53	Nicholas P Riehl	1.02
00941	PAH's in Solids by HPLC	SW-846 8310	1	10109SLB026	04/23/2010 18:17	Mark A Clark	10
03338	PAH Solid Extraction	SW-846 3550B	1	10109SLB026	04/19/2010 15:00	Doreen K Robles	1
06955	Lead	SW-846 6010B	1	101065708003	04/20/2010 02:10	Tara L Snyder	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	101065708003	04/19/2010 08:55	Denise K Conners	1
00111	Moisture	SM20 2540 G	1	10106820003B	04/16/2010 15:45	Scott W Freisher	1

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SS-10 Grab Soil Sample
West Yard Surface Sampling

LLI Sample # SW 5955227
LLI Group # 1190562
Account # 11183

Project Name: West Yard Surface Sampling

Collected: 04/15/2010 11:30 by TC

Submitted: 04/15/2010 16:00
Reported: 04/28/2010 12:55
Discard: 06/28/2010

Sunoco c/o Stantec
1060 Andrew Drive
Suite 140
West Chester PA 19380

WY-10

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	
10102	Benzene	71-43-2	3	J	0.5	0.95
10102	1,2-Dibromoethane	106-93-4	N.D.		1	0.95
10102	1,2-Dichloroethane	107-06-2	N.D.		1	0.95
10102	Ethylbenzene	100-41-4	N.D.		1	0.95
10102	Isopropylbenzene	98-82-8	N.D.		1	0.95
10102	Methyl Tertiary Butyl Ether	1634-04-4	N.D.		0.5	0.95
10102	Naphthalene	91-20-3	2	J	1	0.95
10102	Toluene	108-88-3	N.D.		1	0.95
10102	1,2,4-Trimethylbenzene	95-63-6	N.D.		1	0.95
10102	1,3,5-Trimethylbenzene	108-67-8	N.D.		1	0.95
10102	Xylene (Total)	1330-20-7	N.D.		1	0.95
GC/MS Semivolatiles	**SW-846 8310**		**ug/kg**		**ug/kg**	
00941	Anthracene	120-12-7	170		6.7	10
00941	Benzo(a)anthracene	56-55-3	350		3.4	10
00941	Benzo(a)pyrene	50-32-8	410		3.4	10
00941	Benzo(b)fluoranthene	205-99-2	430		2.7	10
00941	Benzo(g,h,i)perylene	191-24-2	820		20	10
00941	Chrysene	218-01-9	1,000		20	10
00941	Fluorene	86-73-7	260		34	10
00941	Phenanthrene	85-01-8	1,200		13	10
00941	Pyrene	129-00-0	800		34	10
	Phenanthrene was detected in the method blank at a concentration of 1.46 ug/kg. The blank value was not subtracted from the analytical result.					
Metals	**SW-846 6010B**		**mg/kg**		**mg/kg**	
06955	Lead	7439-92-1	116		0.601	1
Wet Chemistry	**SM20 2540 G**		**%**		**%**	
00111	Moisture	n.a.	1.2		0.50	1
	"Moisture" represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported above is on an as-received basis.					

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/11

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07579	GC/MS-Field PreservedMeOH-NC	SW-846 5035	1	201010620842	04/15/2010 11:30	Client Supplied	1

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Sample Description: SS-10 Grab Soil Sample
West Yard Surface Sampling

LLI Sample # SW 5955227
LLI Group # 1190562
Account # 11183

Project Name: West Yard Surface Sampling

Collected: 04/15/2010 11:30 by TC

Submitted: 04/15/2010 16:00
Reported: 04/28/2010 12:55
Discard: 06/28/2010

Sunoco c/o Stantec
1060 Andrew Drive
Suite 140
West Chester PA 19380

WY-10

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02392	L/H Field Preserved Bisulfate	SW-846 5035	1	201010620842	04/15/2010 11:30	Client Supplied	1
02392	L/H Field Preserved Bisulfate	SW-846 5035	2	201010620842	04/15/2010 11:30	Client Supplied	1
10102	UST - Soils by 8260B	SW-846 8260B	1	X101081AA	04/18/2010 21:16	Nicholas P Riehl	0.95
00941	PAH's in Solids by HPLC	SW-846 8310	1	10116SLE026	04/27/2010 21:44	Mark A Clark	10
03338	PAH Solid Extraction	SW-846 3550B	2	10116SLE026	04/26/2010 17:15	Sally L Appleyard	1
06955	Lead	SW-846 6010B	1	101065708003	04/20/2010 02:13	Tara L Snyder	1
05708	SW SW846 ICP Digest	SW-846 3050B	1	101065708003	04/19/2010 08:55	Denise K Conners	1
00111	Moisture	SM20 2540 G	1	10106820003B	04/16/2010 15:45	Scott W Freisher	1

Quality Control Summary

Client Name: Sunoco c/o Stantec Group Number: 1190562
Reported: 04/28/10 at 12:55 PM

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Laboratory Compliance Quality Control

Analysis Name	Blank Result		Blank MDL	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: R101091AA	Sample number(s): 5955218,5955221								
Naphthalene	N.D.		50.	ug/kg	80	80	59-123	0	30
1,2,4-Trimethylbenzene	N.D.		50.	ug/kg	98	93	79-120	5	30
1,3,5-Trimethylbenzene	N.D.		50.	ug/kg	94	89	78-120	6	30
Batch number: X101081AA	Sample number(s): 5955218-5955220,5955225-5955227								
Benzene	N.D.		0.5	ug/kg	99	99	80-120	0	30
1,2-Dibromoethane	N.D.		1.	ug/kg	90	87	80-120	4	30
1,2-Dichloroethane	N.D.		1.	ug/kg	93	91	71-129	2	30
Ethylbenzene	N.D.		1.	ug/kg	100	100	80-120	0	30
Isopropylbenzene	N.D.		1.	ug/kg	99	101	76-120	1	30
Methyl Tertiary Butyl Ether	N.D.		0.5	ug/kg	109	108	74-121	1	30
Naphthalene	N.D.		1.	ug/kg	82	81	59-123	1	30
Toluene	N.D.		1.	ug/kg	102	102	80-120	0	30
1,2,4-Trimethylbenzene	N.D.		1.	ug/kg	100	101	79-120	1	30
1,3,5-Trimethylbenzene	N.D.		1.	ug/kg	99	98	78-120	0	30
Xylene (Total)	N.D.		1.	ug/kg	94	95	80-120	0	30
Batch number: X101092AA	Sample number(s): 5955221-5955224								
Benzene	N.D.		0.5	ug/kg	95	94	80-120	1	30
1,2-Dibromoethane	N.D.		1.	ug/kg	84	86	80-120	2	30
1,2-Dichloroethane	N.D.		1.	ug/kg	90	90	71-129	0	30
Ethylbenzene	N.D.		1.	ug/kg	94	93	80-120	0	30
Isopropylbenzene	N.D.		1.	ug/kg	95	94	76-120	1	30
Methyl Tertiary Butyl Ether	N.D.		0.5	ug/kg	105	108	74-121	3	30
Naphthalene	N.D.		1.	ug/kg	78	78	59-123	0	30
Toluene	N.D.		1.	ug/kg	95	96	80-120	2	30
1,2,4-Trimethylbenzene	N.D.		1.	ug/kg	96	95	79-120	1	30
1,3,5-Trimethylbenzene	N.D.		1.	ug/kg	94	92	78-120	3	30
Xylene (Total)	N.D.		1.	ug/kg	90	89	80-120	1	30
Batch number: 10109SLB026	Sample number(s): 5955219,5955223,5955225-5955226								
Anthracene	N.D.		0.67	ug/kg	88		71-105		
Benzo(a)anthracene	N.D.		0.33	ug/kg	91		74-111		
Benzo(a)pyrene	N.D.		0.33	ug/kg	87		65-106		
Benzo(b)fluoranthene	0.36	J	0.27	ug/kg	95		75-113		
Benzo(g,h,i)perylene	N.D.		2.0	ug/kg	104		75-112		
Chrysene	N.D.		2.0	ug/kg	102		74-112		
Fluorene	N.D.		3.3	ug/kg	101		75-111		
Phenanthrene	1.5	J	1.3	ug/kg	103		77-111		
Pyrene	N.D.		3.3	ug/kg	102		71-109		
Batch number: 10116SLE026	Sample number(s): 5955218,5955220-5955222,5955224,5955227								
Anthracene	N.D.		0.67	ug/kg	86		71-105		
Benzo(a)anthracene	N.D.		0.33	ug/kg	88		74-111		
Benzo(a)pyrene	N.D.		0.33	ug/kg	83		65-106		
Benzo(b)fluoranthene	N.D.		0.27	ug/kg	91		75-113		

*- Outside of specification
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Sunoco c/o Stantec Group Number: 1190562
Reported: 04/28/10 at 12:55 PM

Laboratory Compliance Quality Control

Analysis Name	Blank Result		Blank MDL	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Benzo(g,h,i)perylene	N.D.		2.0	ug/kg	96		75-112		
Chrysene	N.D.		2.0	ug/kg	96		74-112		
Fluorene	N.D.		3.3	ug/kg	96		75-111		
Phenanthrene	1.5	J	1.3	ug/kg	98		77-111		
Pyrene	N.D.		3.3	ug/kg	97		71-109		
Batch number: 101065708003	Sample number(s): 5955218-5955227								
Lead	N.D.		0.600	mg/kg	96		80-120		
Batch number: 10106820003B	Sample number(s): 5955218-5955227								
Moisture					100		99-101		

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: X101081AA	Sample number(s): 5955218-5955220,5955225-5955227 UNSPK: 5955227								
Benzene	92		55-143						
1,2-Dibromoethane	79		54-129						
1,2-Dichloroethane	83		53-143						
Ethylbenzene	95		44-141						
Isopropylbenzene	88		38-144						
Methyl Tertiary Butyl Ether	129		55-129						
Naphthalene	61		10-138						
Toluene	113		50-146						
1,2,4-Trimethylbenzene	132		37-149						
1,3,5-Trimethylbenzene	127		38-150						
Xylene (Total)	90		44-136						
Batch number: X101092AA	Sample number(s): 5955221-5955224 UNSPK: P956799								
Benzene	91		55-143						
1,2-Dibromoethane	94		54-129						
1,2-Dichloroethane	95		53-143						
Ethylbenzene	88		44-141						
Isopropylbenzene	88		38-144						
Methyl Tertiary Butyl Ether	116		55-129						
Naphthalene	84		10-138						
Toluene	91		50-146						
1,2,4-Trimethylbenzene	90		37-149						
1,3,5-Trimethylbenzene	90		38-150						
Xylene (Total)	86		44-136						
Batch number: 10109SLB026	Sample number(s): 5955219,5955223,5955225-5955226 UNSPK: P09LBUS								
Anthracene	134*	478*	71-107	50	50				
Benzo(a)anthracene	56	287*	22-67	48	50				
Benzo(a)pyrene	92 (2)	393 (2)	60-122	42	50				
Benzo(b)fluoranthene	185 (2)	770 (2)	23-157	45	50				
Benzo(g,h,i)perylene	51	153*	46-138	47	50				
Chrysene	177 (2)	647 (2)	64-108	42	50				

*- Outside of specification
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Sunoco c/o Stantec Group Number: 1190562
Reported: 04/28/10 at 12:55 PM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Fluorene	76	184*	71-117	47	50				
Phenanthrene	347 (2)	1202 (2)	61-127	48	50				
Pyrene	126 (2)	495 (2)	67-119	47	50				
Batch number: 10116SLE026	Sample number(s): 5955218,5955220-5955222,5955224,5955227 UNSPK: 5955218								
Anthracene	625 (2)	-197 (2)	71-107	91*	50				
Benzo(a)anthracene	999 (2)	-267 (2)	22-67	120*	50				
Benzo(a)pyrene	1581 (2)	-439 (2)	60-122	122*	50				
Benzo(b)fluoranthene	1470 (2)	-715 (2)	23-157	103*	50				
Benzo(g,h,i)perylene	224*	-68*	46-138	89*	50				
Chrysene	392 (2)	-405 (2)	64-108	55*	50				
Fluorene	123*	-6*	71-117	51*	50				
Phenanthrene	1325 (2)	-564 (2)	61-127	86*	50				
Pyrene	-274 (2)	-283 (2)	67-119	1	50				
Batch number: 101065708003	Sample number(s): 5955218-5955227 UNSPK: P955451 BKG: P955451								
Lead	116	88	75-125	6	20	51.7	52.2	1	20
Batch number: 10106820003B	Sample number(s): 5955218-5955227 BKG: P955121								
Moisture						10.8	10.9	1	15

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: 8260 Master Scan (soil)
Batch number: R101091AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
Blank	95	98	87	84
LCS	95	101	88	87
LCSD	94	96	87	86
Limits:	71-114	70-109	70-123	70-111

Analysis Name: UST - Soils by 8260B
Batch number: X101081AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
5955218	110	122*	112	50*
5955219	99	104	106	62*

*- Outside of specification
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Sunoco c/o Stantec Group Number: 1190562
Reported: 04/28/10 at 12:55 PM

Surrogate Quality Control

5955220	106	111*	119	47*
5955225	91	97	89	81
5955226	93	95	109	68*
5955227	90	97	88	85
Blank	89	86	86	84
LCS	88	89	93	88
LCSD	88	88	93	88
MS	93	98	108	72
Limits:	71-114	70-109	70-123	70-111

Analysis Name: UST - Soils by 8260B
Batch number: X101092AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
5955221	106	113*	113	55*
5955222	95	101	96	64*
5955223	96	104	100	56*
5955224	92	96	90	74
Blank	88	88	85	86
LCS	87	88	93	88
LCSD	87	88	93	88
MS	89	94	93	89
Limits:	71-114	70-109	70-123	70-111

Analysis Name: PAH's in Solids by HPLC
Batch number: 10109SLB026

	Nitrobenzene	Triphenylene
5955219	65	88
5955223	61	113
5955225	68	78
5955226	76	93
Blank	91	104
LCS	97	113
MS	57*	113
MSD	82	197*
Limits:	59-118	58-142

Analysis Name: PAH's in Solids by HPLC
Batch number: 10116SLE026

	Nitrobenzene	Triphenylene
5955218	72	289*
5955220	90	294*
5955221	83	146*
5955222	98	202*
5955224	83	60
5955227	91	83
Blank	93	104
LCS	94	107
MS	84	279*
MSD	65	210*
Limits:	59-118	58-142

*- Outside of specification
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Sunoco c/o Stantec Group Number: 1190562
Reported: 04/28/10 at 12:55 PM

Surrogate Quality Control

*- Outside of specification
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 11183 Group# 1190562 Sample # 5955218-27

COC # 232544

Please print. Instructions on reverse side correspond with circled numbers. 2.8°C

(1) Client: Stantec Acct. #:

Project Name/#: West Yard surface Sampling PWSID #:

Project Manager: J. Mengis / A. Carter P.O.#:

Sampler: T. Charrington Quote #:

Name of state where samples were collected:

For Lab Use Only
FSC:
SCR#:

(2) Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	(4) Matrix: Soil	Water	Other	Total # of Containers	(5) Analyses Requested / Preservation Codes: PADEP Leaded gasoline	Fuel oil, (2,4,5,6)							Remarks	(6) Temperature of samples upon receipt (if requested)
SS-1	4/15/10	0915	X		X			4	X	X								
SS-2		0930	X		X			4	X	X								
SS-3		0945	X		X			4	X	X								
SS-4		1000	X		X			4	X	X								
SS-5		1015	X		X			4	X	X								
SS-6		1030	X		X			4	X	X								
SS-7		1045	X		X			4	X	X								
SS-8		1100	X		X			4	X	X								
SS-9		1115	X		X			4	X	X								
SS-10		1130	X		X			4	X	X								

Preservation Codes: H=HCl T=Thiosulfate N=HNO_3 B=NaOH S=H_2SO_4 O=Other

(7) **Turnaround Time Requested** (TAT) (please circle): Normal Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax E-mail
Phone #: Fax #:
E-mail address:

(8) **Data Package Options** (please circle if required)
Type I (validation/NJ Reg)
Type II (Tier II)
Type III (Reduced NJ)
Type IV (CLP SOW)
Type VI (Raw Data Only)
TX TRRP-13
MA MCP CT RCP
SDG Complete? Yes No
Site-specific QC (MS/MSD/Dup)? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Internal COC Required? Yes / No

(9)

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]	4/15/10	1915	[signature]	4/15/10	1915
[signature]	4/15/10	1600			
			Katie Hartline	4/15/10	1610

Lancaster Laboratories, Inc., 2425 New Holland Pike, Lancaster, PA 17601 (717) 656-2300 Fax: (717) 656-8766
Copies: White and yellow should accompany samples to Lancaster Laboratories. The pink copy should be retained by the client.

2102.03

Lancaster Laboratories
Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib >5 um/ml**	fibers greater than 5 microns in length per ml

< less than – The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million – One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quatitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
J	Estimated value
N	Presumptive evidence of a compound (TICs only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike amount not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Analytical test results for methods listed on the laboratories' accreditation scope meet all requirements of NELAC unless otherwise noted under the individual analysis.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

WARRANTY AND LIMITS OF LIABILITY – In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL LANCASTER LABORATORIES BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF LANCASTER LABORATORIES AND (B) WHETHER LANCASTER LABORATORIES HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Lancaster Laboratories which includes any conditions that vary from the Standard Terms and Conditions of Lancaster Laboratories and we hereby object to any conflicting terms contained in any acceptance or order submitted by client.

APPENDIX E

Groundwater Sampling Field Summary Report

Appendix E
May 2011 Groundwater Sampling Field Summary
AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

WELL INFO					FIELD READINGS (pre-purge)						FIELD READINGS (post-purge)								FIELD READINGS (sampling)		Field Notes
Location ID	Depth to Bottom (ft bgs)	Depth to Water (ft btic)[1]	Depth to Product (ft btic)	Product Thickness (ft)	Purge Start	Temp. (°C)	DO (mg/L)	ORP (mv)	pH	Conductivity (mS/cm)	Purge Complete	Approx. Purge Rate (gpm)[2]	Volume Purged (gal)	Temp. (°C)	DO (mg/L)	ORP (mv)	pH	Conductivity (mS/cm)	Date Sampled	Sample Time	Field Notes
W-1	17.00	6.21	-	-	-	13.31	3.82	67.90	6.20	0.58	14:30	Hand bailed	-	13.01	2.68	42.80	6.40	0.59	4/27/2011	14:30	
W-2	20.50	15.16	-	-	11:20	13.33	4.71	56.80	5.81	0.44	11:25	1.00	2.50	12.98	1.88	30.60	6.17	0.46	4/26/2011	11:25	
W-5	13.00	3.11	-	-	11:40	11.32	4.97	-96.70	6.86	0.62	11:50	2.00	19.00	11.07	1.20	-78.20	6.55	0.63	4/26/2011	11:50	
W-6	10.00	2.52	-	-	12:30	11.17	6.44	82.80	5.73	0.38	12:45	1.00	4.00	10.47	1.45	87.40	5.13	0.35	4/26/2011	12:45	
* W-8	13.00	-	-[3]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4/27/2011	14:06	Product sample collected 4/27/11 @ 1406. Product to thick to collect gauging data.
W-9	63.00	9.39	-	-	10:25	12.46	2.16	-28.90	6.61	0.51	10:40	2.00	26.00	13.83	23.47	-19.40	6.70	0.52	4/26/2011	10:40	
W-10	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	-	-	-	-	-	-	-	Well location damaged.
W-11	5.70	3.69	-	-	13:00	13.02	2.50	90.60	5.36	0.32	13:20	1.00	1.00	11.42	1.71	39.80	6.06	0.30	4/26/2011	13:20	
W-12	13.00	2.97	-	-	13:40	11.17	6.87	76.60	5.60	0.28	13:55	2.50	19.00	11.64	2.63	63.20	5.67	0.35	4/26/2011	13:55	
W-13	74.00	7.57	-	-	14:00	13.55	1.29	-3.40	7.01	0.28	14:15	2.50	32.00	14.06	1.05	4.20	6.19	0.63	4/26/2011	14:15	
*W-14	10.00	2.12	2.01	0.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4/27/2011	14:00	Product sample collected 4/27/11 @ 1400. Product gauging data was collected.
W-15	10.00	2.15	-	-	12:20	9.17	10.15	-20.90	7.32	1.04	12:25	2.00	4.00	9.77	6.43	-32.80	7.59	0.93	4/26/2011	12:25	
W-16	12.00	2.42	-	-	-	11.71	0.78	-247.70	7.39	0.76	12:20	Hand bailed	-	10.68	1.05	-271.60	7.24	0.28	4/27/2011	12:20	
W-17	10.00	2.89	-	-	-	10.14	2.46	-171.30	7.33	0.82	12:10	Hand bailed	-	12.04	0.90	-256.90	7.05	0.89	4/27/2011	12:10	
*W-18	15.00	-	-[3]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4/27/2011	13:30	Product sample collected 4/27/11 @ 1330. Product to thick to collect gauging data.
W-19	83.00	10.87	-	-	9:15	12.55	2.41	108.00	7.77	0.66	9:35	2.00	35.00	13.01	4.63	-68.90	7.30	0.74	4.27/11	9:35	
W-20	12.00	4.75	-	-	9:00	11.01	3.13	57.80	7.44	1.06	9:10	2.00	14.00	11.58	11.30	154.80	6.82	0.03	4/27/2011	9:10	
W-22	8.00	0.99	-	-	10:35	11.40	3.40	-41.90	7.09	0.69	10:40	Hand bailed	3.00	-	-	-	-	-	4/27/2011	10:40	
W-23	10.00	2.10	-	-	10:45	12.53	1.15	-99.30	6.85	1.73	10:50	Hand bailed	4.00	-	-	-	-	-	4/27/2011	10:50	
W-24	15.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Well location under water unable to collect water samples.
W-25	17.00	5.71	-	-	13:55	11.64	6.01	-41.40	6.96	1.24	13:55	2.00	22.00	11.28	2.84	-137.60	7.18	0.89	4/26/2011	13:55	
W-26	37.00	11.68	-	-	14:00	14.43	2.51	-94.10	6.46	0.53	14:10	2.00	12.00	14.49	2.56	-134.30	6.54	0.53	4/26/2011	14:10	
W-27	20.00	6.18	-	-	14:10	11.34	2.88	22.50	7.04	0.62	13:10	2.00	7.00	11.33	6.98	20.50	7.15	0.59	4/26/2011	13:10	
W-1D	76.50	9.19	-	-	9:50	15.72	6.37	40.10	7.03	0.50	10:45	2.50	128.00	15.40	1.22	6.30	5.87	0.56	4/26/2011	10:45	
W-28	14.00	3.22	-	-	11:55	11.89	5.41	44.70	6.21	0.43	12:10	2.50	20.00	12.25	12.04	127.00	6.51	0.03	4/26/2011	12:10	
W-29	14.00	7.36	-	-	10:55	11.78	9.22	13.40	6.58	0.44	11:05	2.50	13.00	11.45	2.02	40.70	5.87	0.44	4/26/2011	11:05	
W-30	13.00	3.40	-	-	11:15	10.20	17.55	-57.00	7.82	1.31	11:25	2.00	19.00	9.88	2.13	-123.70	7.60	1.29	4/26/2011	11:25	
W-31	15.00	3.13	-	-	15:00	11.73	3.96	72.60	5.71	0.45	15:15	2.50	23.00	10.72	2.86	54.10	5.59	0.46	4/26/2011	15:15	
W-32	13.00	9.09	-	-	-	11.26	2.27	-182.50	7.34	1.97	13:00	-	-	-	-	-	-	-	4/27/2011	13:00	
W-32D	53.00	11.43	-	-	-	13.34	0.70	-173.50	6.78	0.71	13:20	-	-	-	-	-	-	-	4/27/2011	13:20	
W-33	16.00	11.35	-	-	10:55	10.74	2.06	-51.60	7.01	2.83	11:00	Hand bailed	9.00	-	-	-	-	-	4/27/2011	11:00	
W-34	14.00	8.27	-	-	10:10	10.15	8.80	52.40	6.71	0.45	10:20	2.50	11.00	9.92	2.64	78.30	5.74	0.46	4/27/2011	10:20	

Notes:
(1) - Measured prior to purging
(2) - Wells purged with whale pump unless otherwise noted
(3) - LNAPL thickess values obtained from June 2010 gauging event. Product in well was to viscous to collect accurate product thickness in April 2011.
Groundwater quality readings collected using a YSI meter
A minimum of 3 well volumes were purged at each well location, unless well went dry during purging
All wells were sampled using poly bailers
Hand - Well purged using bailer
* - LNAPL Sample Collected
ft btic - Feet below top of inner casing
ft bgs - Feet below ground surface
mg/L - Milligrams per Liter
^{0}C - Degrees Celsius
mV - Millivolts
mS/cm - Millisiemens per centimeter
NM - Not measured
gpm - Gallons per minute
NM - Total depth of well not measured due to the presence of light non aqueous phase liquid (LNAPL)
(-) - No Data Available

APPENDIX F

LNAPL Characterization Data

Torkelson Geochemistry, Inc.

2526 S. Columbia Place
Tulsa, OK 74114-3233
Phone: 918-749-8441
Fax: 918-749-6005
e-mail: BTorkelson@torkelsongeochemistry.com

CHAIN-OF-CUSTODY RECORD

Project: Philadelphia Refinery - AOI-10
Location: Philadlephia, Pa

Proj. No.:
P.O.:
Sampled By: Shaun Sykes

Report/Bill To: Aquaterra Technologies, inc
Address: PO Box 744
West Chester, Pa 19381

Phone: 610-431-5733 x.109
Fax: 610-431-5734
e-mail: td@aquaterra-tech.com

Additional Instructions
Please include a brief interpretation of product type consistant with other samples from the refinery

Requested Turn-Around Time: normal

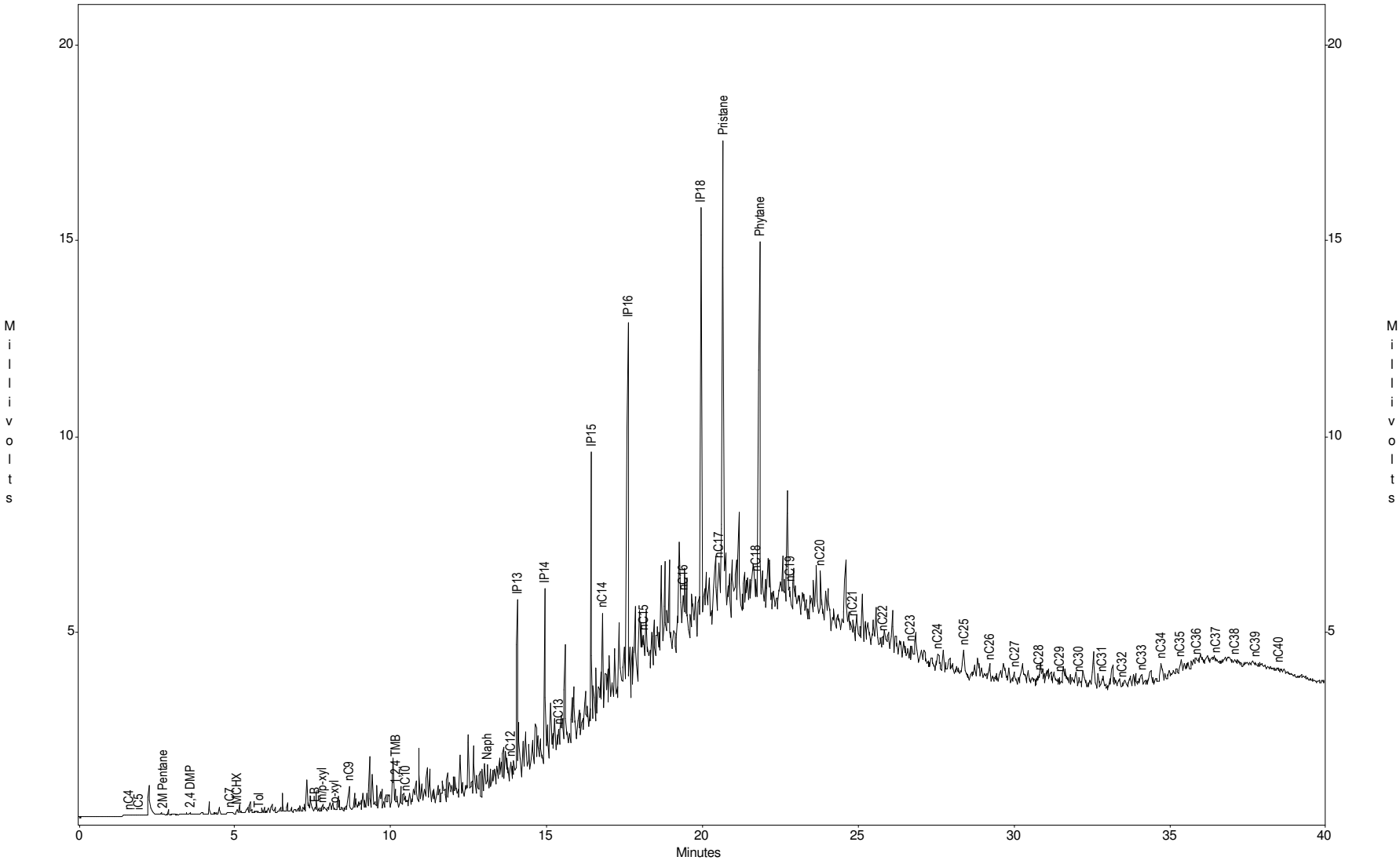
ITEM NO.	SAMPLE DESCRIPTION	DATE	MATRIX	LAB NO.	Total # OF Vials	PRESERVATIVES: None	ANALYSES REQUESTED: GC Characterization	Density	Viscosity	Water Surface Tension	NAPL Surface Tension	NAPL/Water Interfac. Tens.	Lead	Sulfur	REMARKS
1	W-8	4/27/11			1		X	X					X		
2	W-14	4/27/11			1		X	X					X		
3	W-18	4/27/11			1		X	X					X		
4															
5															
6															
7															
8															
9															
10															

	RELINQUISHED BY	ACCEPTED BY	DATE	TIME
		Fed Ex	5/5/11	1200
			5-10-11	0910

Torkelson Geochemistry, Inc.

Philadelphia Refinery - AOI-10, Philadelphia, PA
Sample ID : W-8
Acquired : May 11, 2011 09:37:00

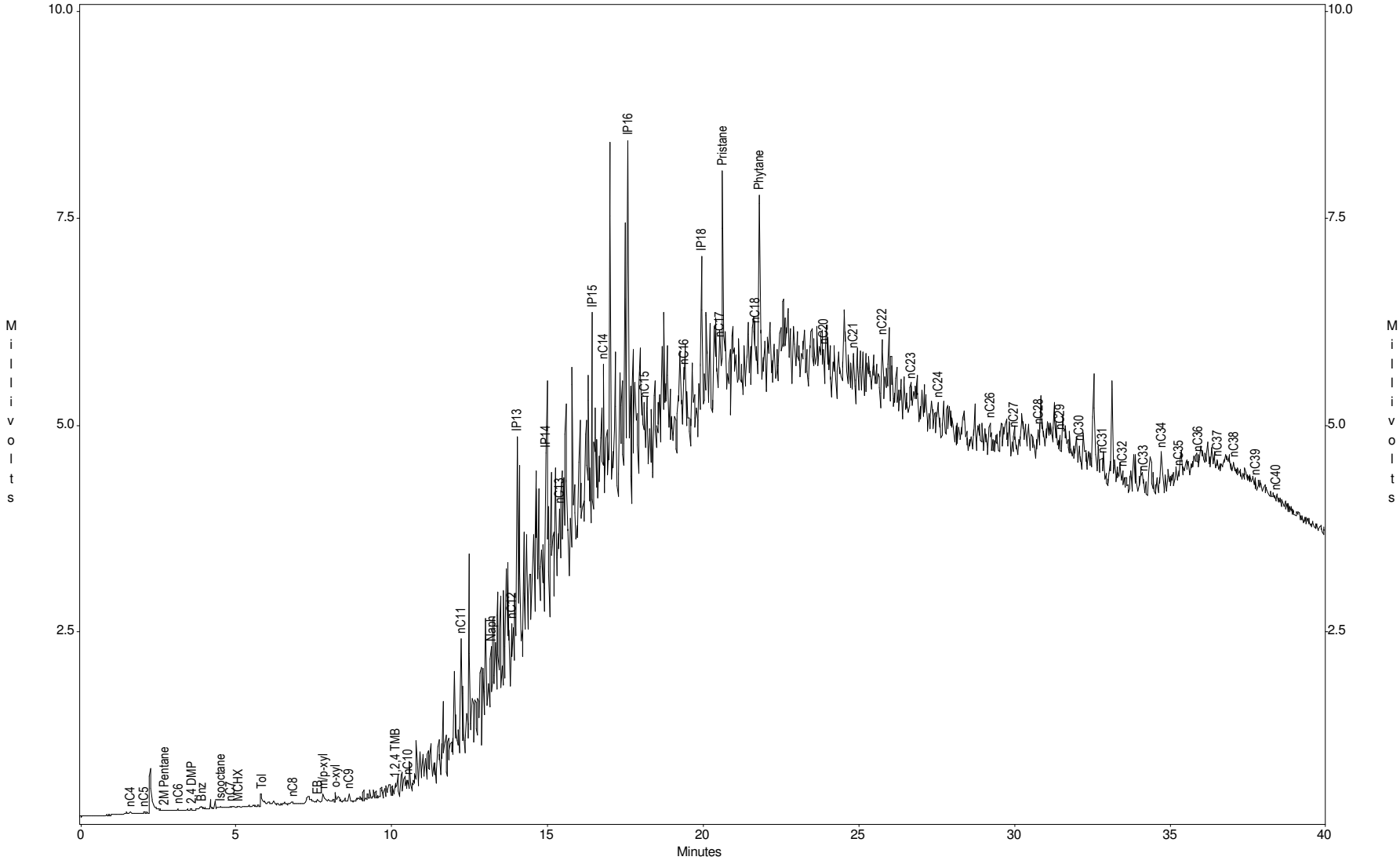
c:\ezchrom\chrom\11076\w-8 -- Channel A



Torkelson Geochemistry, Inc.

Philadelphia Refinery - AOI-10, Philadelphia, PA
Sample ID : W-14
Acquired : May 11, 2011 12:10:20

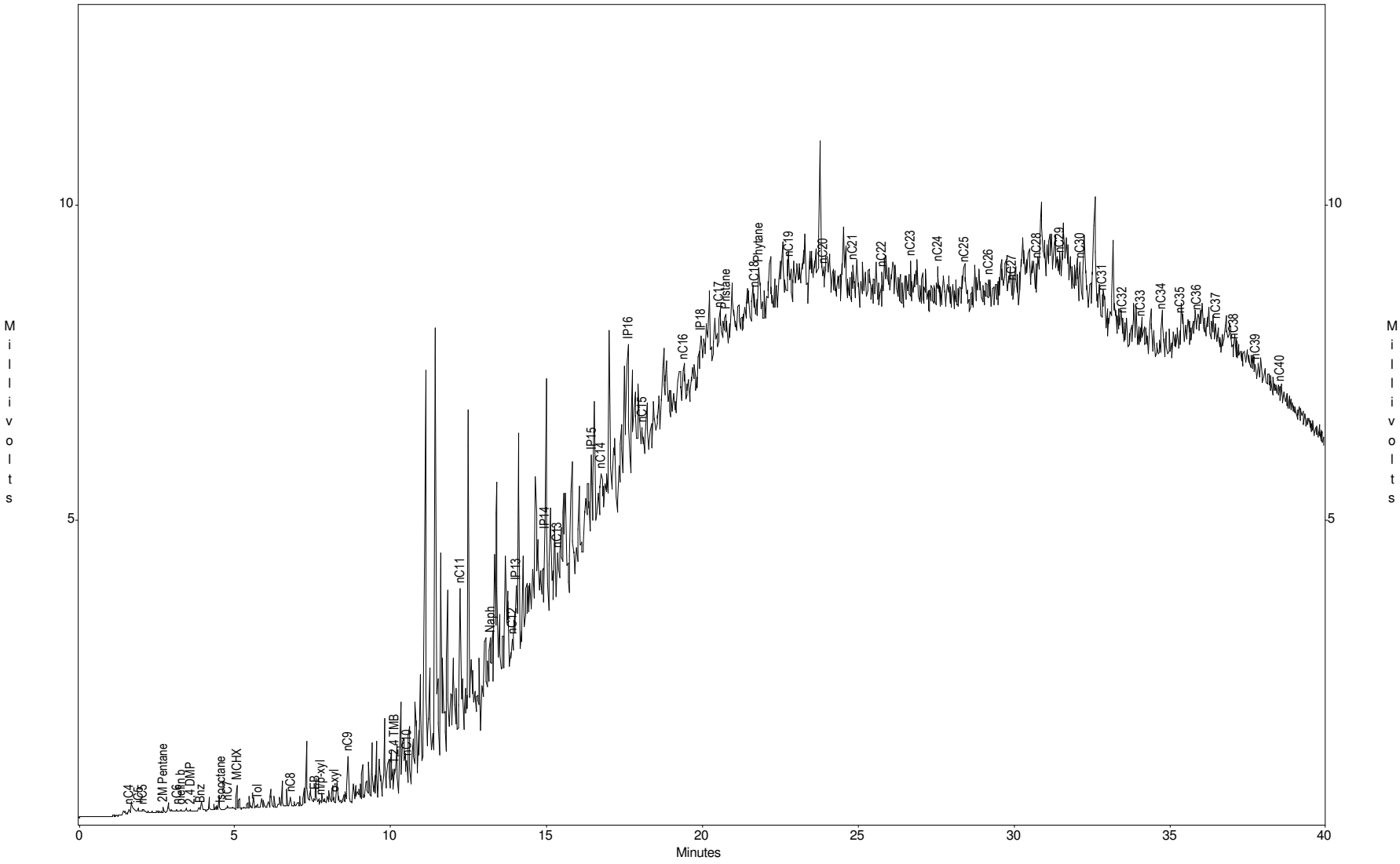
c:\ezchrom\chrom\11076\w-14 -- Channel A



Torkelson Geochemistry, Inc.

Philadelphia Refinery - AOI-10, Philadelphia, PA
Sample ID : W-18
Acquired : May 11, 2011 14:41:20

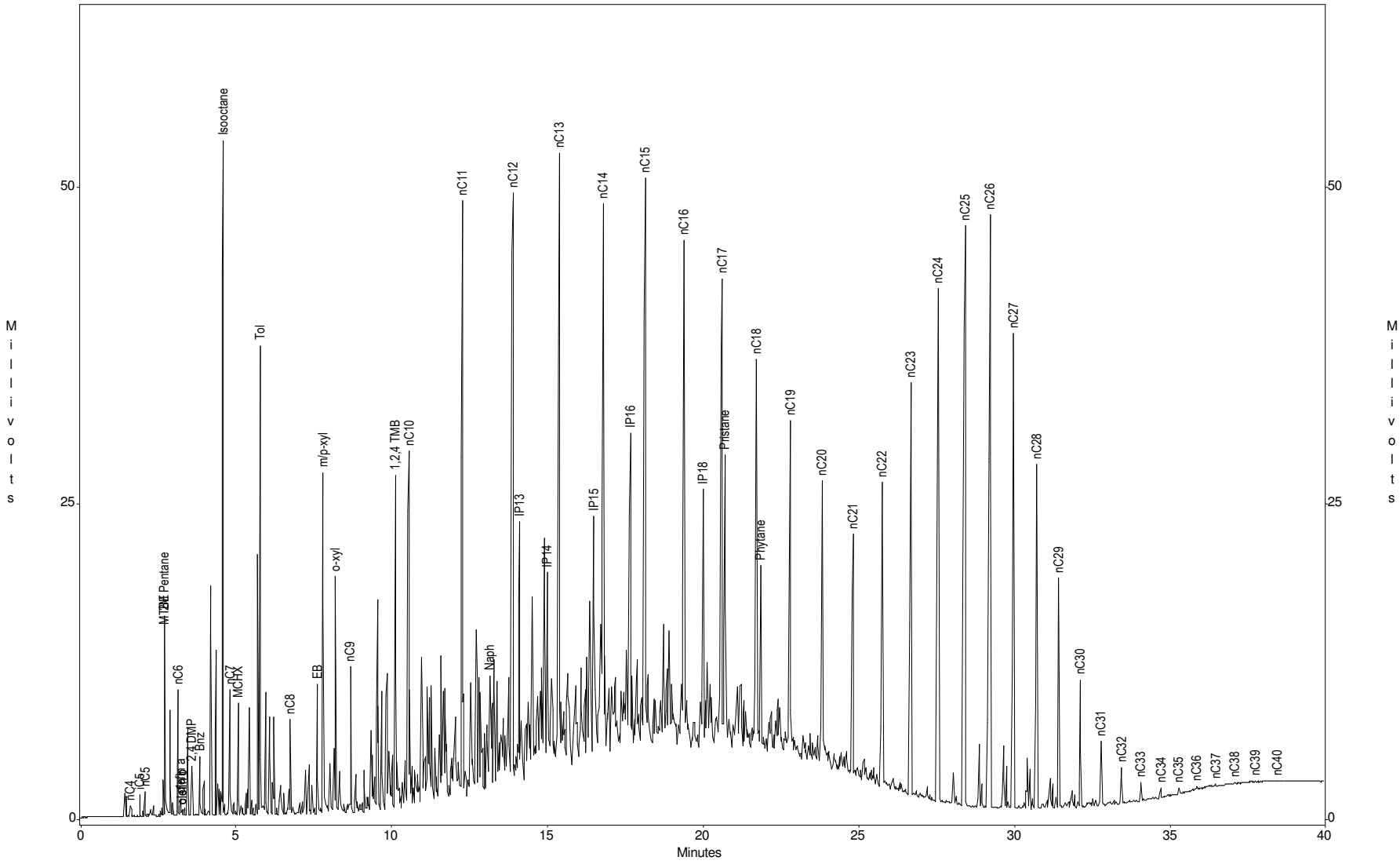
c:\ezchrom\chrom\11076\w-18 -- Channel A



Torkelson Geochemistry, Inc.

Philadelphia Refinery - AOI-10, Philadelphia, PA
Sample ID : Gas/Dies/Wax std
Acquired : May 11, 2011 08:45:38

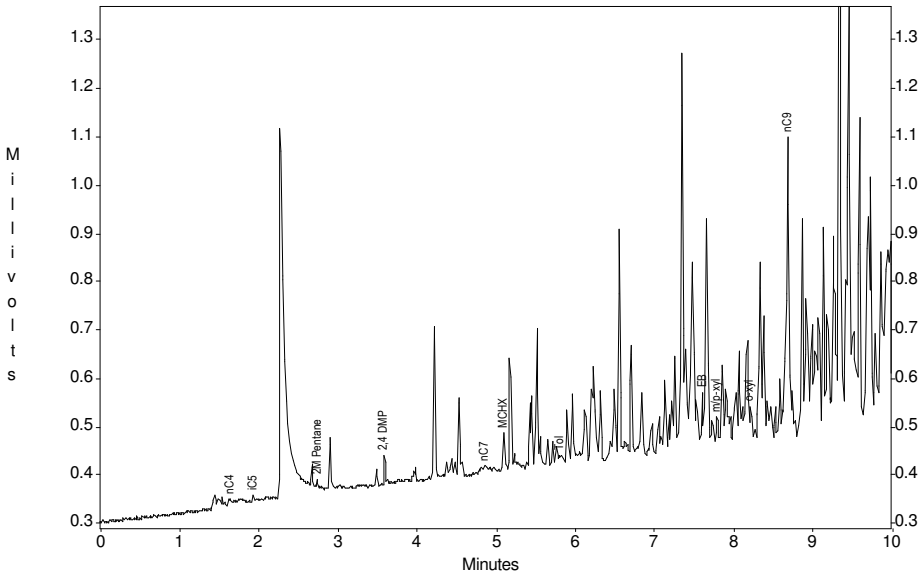
c:\ezchrom\chrom\11076\gadiwax2 -- Channel A



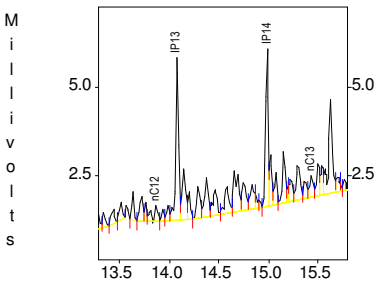
Torkelson Geochemistry, Inc.

Philadelphia Refinery - AOI-10, Philadelphia, PA
Sample ID : W-8
Acquired : May 11, 2011 09:37:00

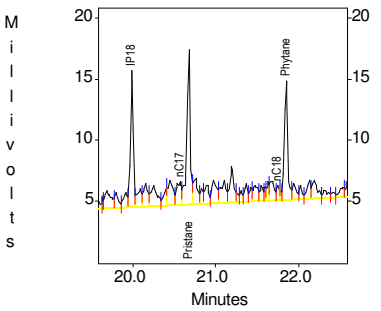
c:\ezchrom\chrom\11076\w-8 -- Channel A



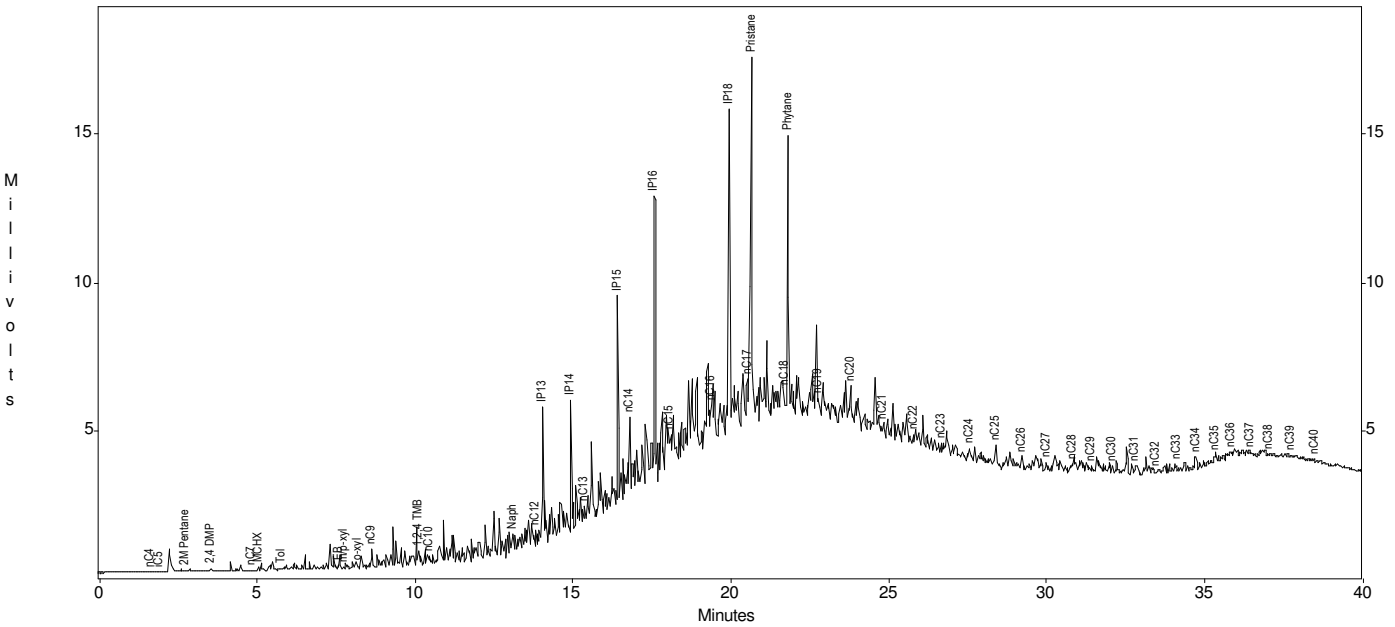
c:\ezchrom\chrom\11076\w-8 -- Channel A



c:\ezchrom\chrom\11076\w-8 -- Channel A



c:\ezchrom\chrom\11076\w-8 -- Channel A



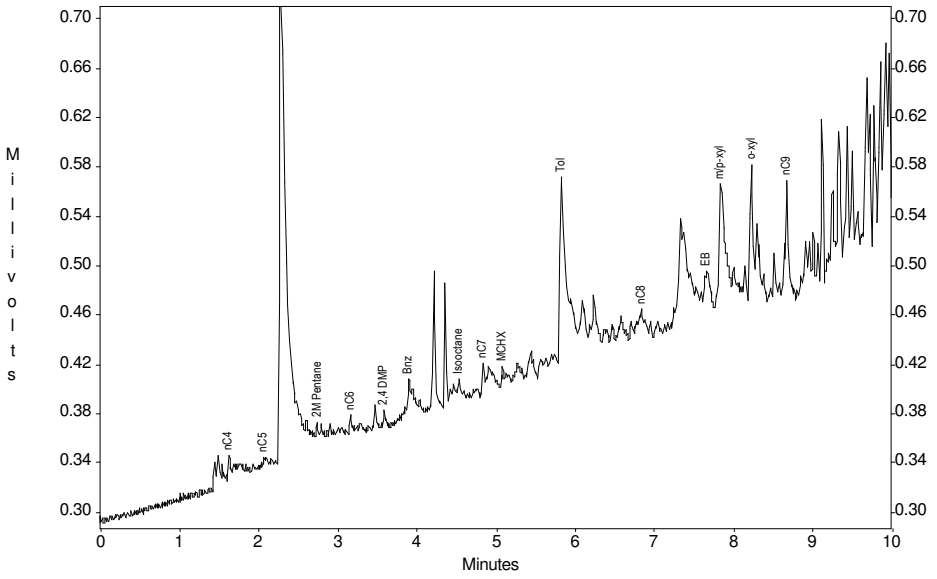
Channel A Results

Peak	Area	Height
nC4	26	9
iC5	13	14
nC5	0	0
MTBE	0	0
2M Pentane	26	18
nC6	0	0
olefin a	0	0
olefin b	0	0
olefin c	0	0
2,4 DMP	71	61
Bnz	0	0
Isooctane	0	0
nC7	12	6
MCHX	137	80
Tol	60	18
nC8	0	0
EB	184	116
m/p-xyl	122	61
o-xyl	192	73
nC9	1278	623
1,2,4 TMB	1428	463
nC10	625	271
nC11	0	0
Naph	1924	690
nC12	1373	426
IP13	8332	4543
IP14	6898	4436
nC13	1666	583
IP15	10866	6887
nC14	5080	2616
IP16	21224	9646
nC15	1338	380
nC16	2931	1460
IP18	27062	11195
nC17	8600	1948
Pristane	35844	12690
nC18	2310	1203
Phytane	26486	9732
nC19	1722	579
nC20	4027	1396
nC21	1280	471
nC22	1111	362
nC23	792	339
nC24	2373	429
nC25	4148	691
nC26	1682	434
nC27	838	287
nC28	1048	250
nC29	333	189
nC30	298	154
nC31	131	91
nC32	86	78
nC33	241	133
nC34	667	194
nC35	121	34
nC36	62	20
nC37	99	75
nC38	164	45
nC39	39	62
nC40	92	57

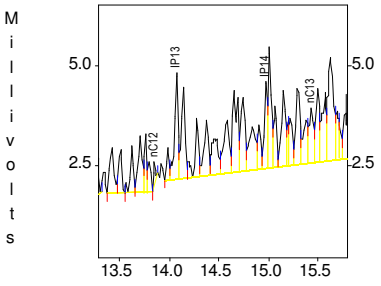
Torkelson Geochemistry, Inc.

Philadelphia Refinery - AOI-10, Philadelphia, PA
Sample ID : W-14
Acquired : May 11, 2011 12:10:20

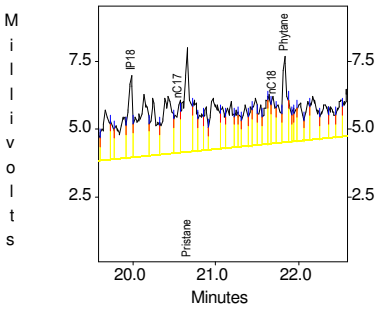
c:\ezchrom\chrom\11076\w-14 -- Channel A



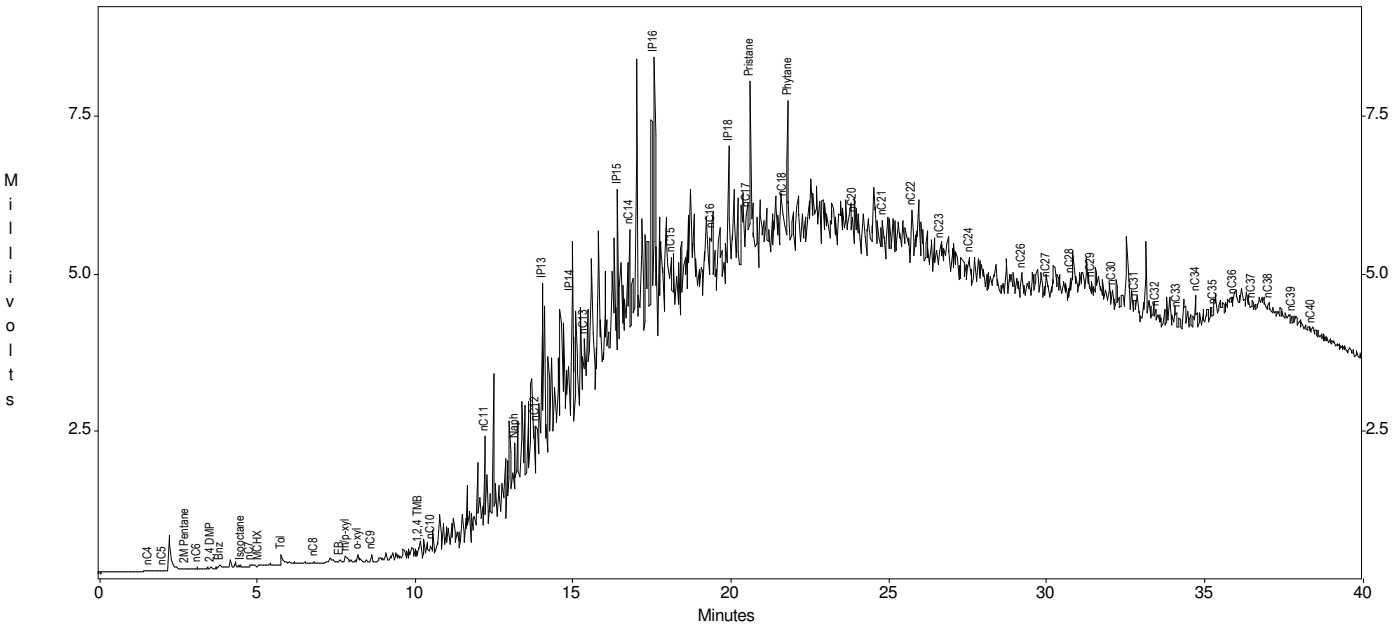
c:\ezchrom\chrom\11076\w-14 -- Channel A



c:\ezchrom\chrom\11076\w-14 -- Channel A



c:\ezchrom\chrom\11076\w-14 -- Channel A



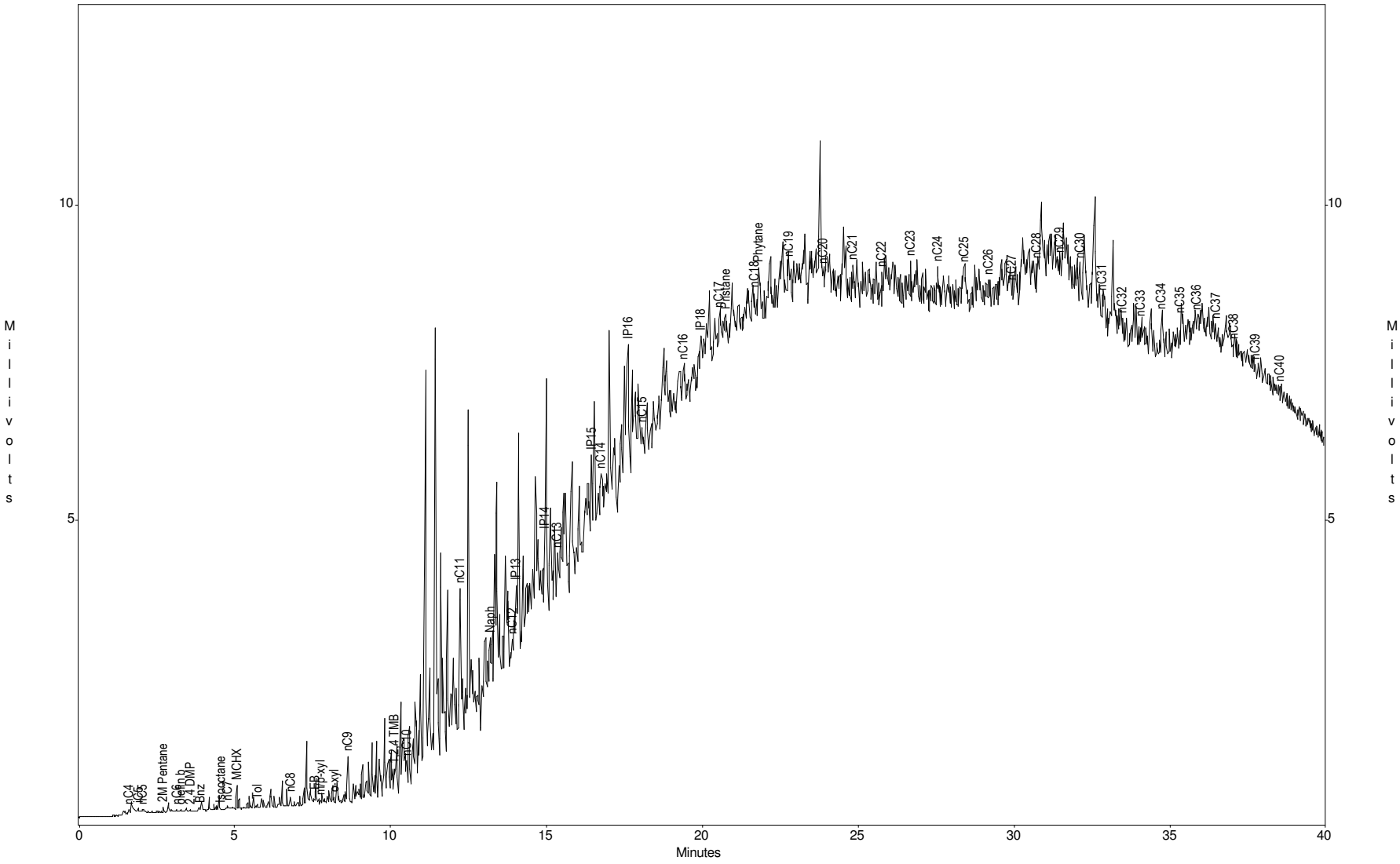
Channel A Results

Peak	Area	Height
nC4	30	18
iC5	0	0
nC5	16	6
MTBE	0	0
2M Pentane	15	11
nC6	26	13
olefin a	0	0
olefin b	0	0
olefin c	0	0
2,4 DMP	19	13
Bnz	60	24
Isooctane	31	15
nC7	37	22
MCHX	18	12
Tol	696	150
nC8	122	26
EB	219	41
m/p-xyl	666	108
o-xyl	310	117
nC9	235	99
1,2,4 TMB	365	168
nC10	255	161
nC11	2662	1386
Naph	1804	664
nC12	596	515
IP13	6689	2668
IP14	4029	2196
nC13	3982	1383
IP15	7913	3433
nC14	6859	2697
IP16	18715	5161
nC15	6080	1832
nC16	7165	1833
IP18	11154	3036
nC17	8304	1828
Pristane	17353	3866
nC18	5348	1639
Phytane	10753	3207
nC19	0	0
nC20	2476	721
nC21	966	475
nC22	2746	912
nC23	1084	511
nC24	1885	428
nC25	0	0
nC26	1608	389
nC27	1420	262
nC28	1183	308
nC29	314	191
nC30	559	212
nC31	127	126
nC32	218	130
nC33	102	129
nC34	483	202
nC35	82	75
nC36	144	84
nC37	52	26
nC38	143	88
nC39	123	97
nC40	270	63

Torkelson Geochemistry, Inc.

Philadelphia Refinery - AOI-10, Philadelphia, PA
Sample ID : W-18
Acquired : May 11, 2011 14:41:20

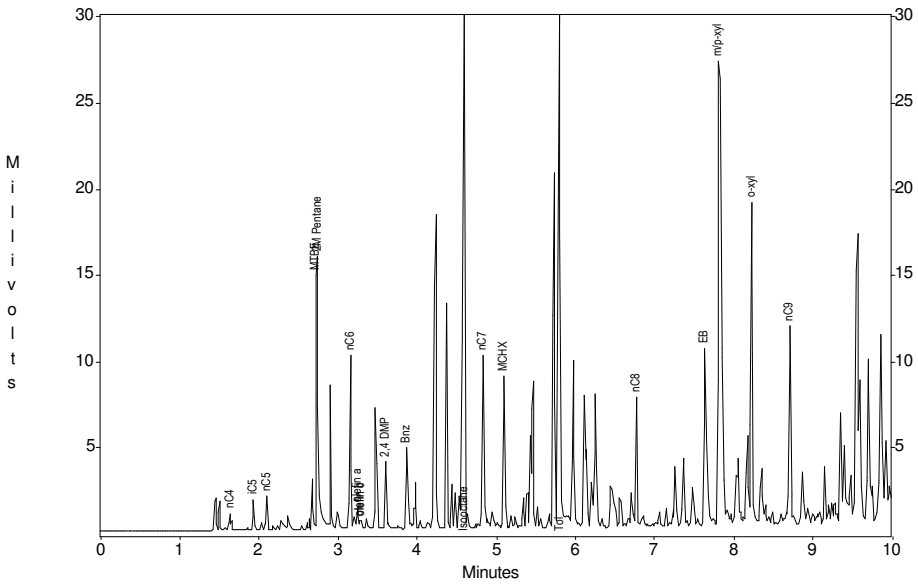
c:\ezchrom\chrom\11076\w-18 -- Channel A



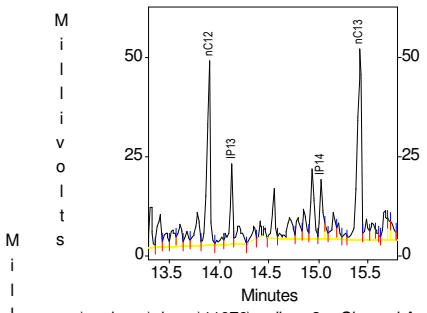
Torkelson Geochemistry, Inc.

Philadelphia Refinery - AOI-10, Philadelphia, PA
Sample ID : Gas/Dies/Wax std
Acquired : May 11, 2011 08:45:38

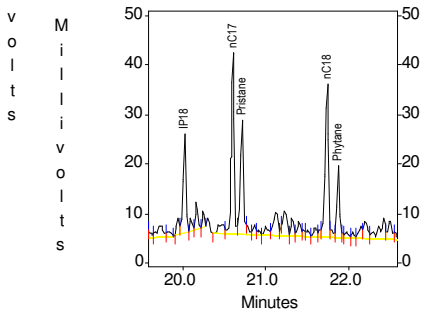
c:\ezchrom\chrom\11076\gadiwax2 -- Channel A



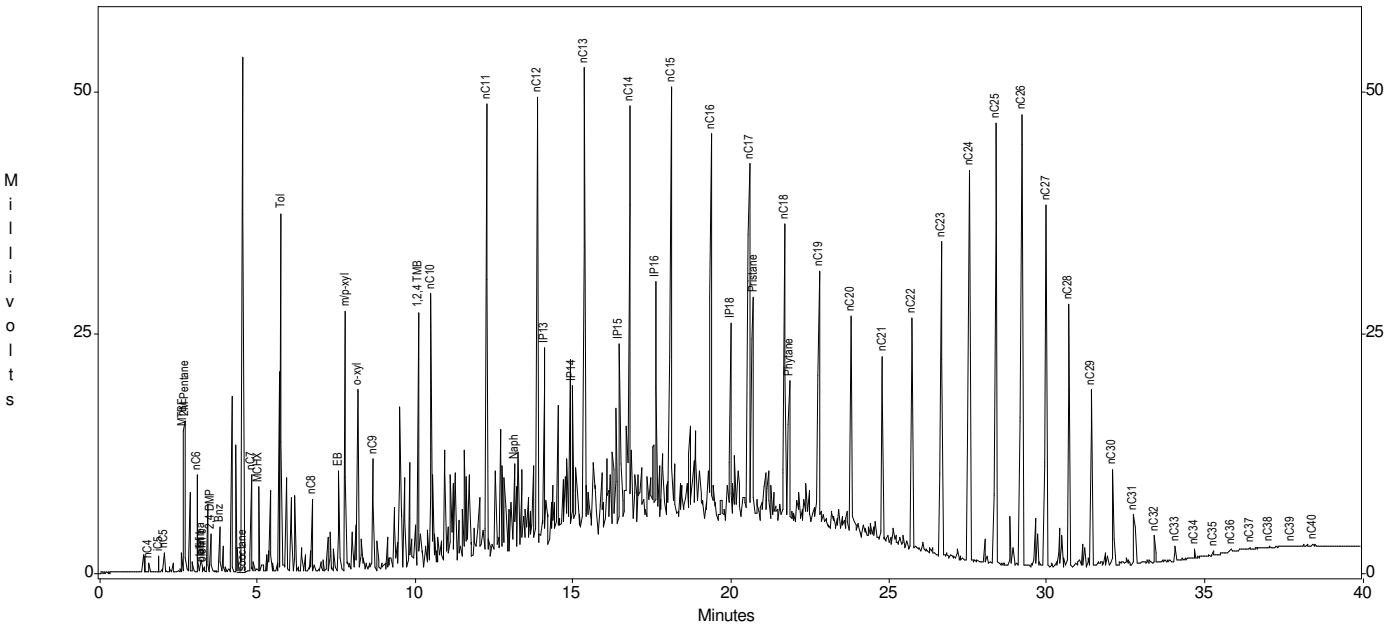
c:\ezchrom\chrom\11076\gadiwax2 -- Channel A



c:\ezchrom\chrom\11076\gadiwax2 -- Channel A



c:\ezchrom\chrom\11076\gadiwax2 -- Channel A



Channel A Results

Peak	Area	Height
nC4	882	909
iC5	1633	1749
nC5	1940	1953
MTBE	8850	14569
2M Pentane	18459	15652
nC6	10279	9981
olefin a	1514	1289
olefin b	601	484
olefin c	615	477
2,4 DMP	4152	3895
Bnz	6800	4664
Isooctane	72556	53339
nC7	13271	9974
MCHX	11206	8826
Tol	57982	37077
nC8	9634	7484
EB	18905	10280
m/p-xyl	61342	26945
o-xyl	29293	18689
nC9	18569	11567
1,2,4 TMB	51680	26364
nC10	47623	28216
nC11	122201	47154
Naph	23589	9025
nC12	106065	46620
IP13	44181	20448
IP14	27510	14987
nC13	136271	48220
IP15	40217	19413
nC14	127674	44012
IP16	58532	25574
nC15	127948	45568
nC16	109771	40258
IP18	46900	19832
nC17	97658	36773
Pristane	58335	22987
nC18	78896	31071
Phytane	35304	14857
nC19	79141	26845
nC20	54013	22611
nC21	41857	19064
nC22	54172	24047
nC23	86519	32680
nC24	132481	40589
nC25	156315	45816
nC26	157441	46917
nC27	118660	37602
nC28	74059	27225
nC29	40797	18246
nC30	19773	9898
nC31	9574	4849
nC32	5379	2820
nC33	2901	1511
nC34	1690	857
nC35	1012	480
nC36	527	254
nC37	561	177
nC38	191	86
nC39	196	88
nC40	101	49

Torkelson Geochemistry, Inc.							
Physical Properties Measurements							
Sample	TGI Job Number	Density of NAPL (gm/ml)	Viscosity of NAPL (centipoise)	Surface Tension Air/Water (dynes/cm)	Interfacial Tension NAPL/Water (dynes/cm)	Surface Tension Air/NAPL (dynes/cm)	Temperature of Measurements
W-8	11047	0.9515	NA	NA	NA	NA	60F
W-14	11047	0.9478	NA	NA	NA	NA	60F
W-18	11047	QNS	NA	NA	NA	NA	60F

QNS = Quantity of sample Not Sufficient for analysis
NA = Not Analyzed

6825 East 38th Street
Tulsa, Oklahoma 74145-1105
www.greencountrytesting.com

Green Country TESTING

Telephone 918.828.9977
Telephone 800.324.5757
Facsimile 918.828.7750

Bruce Torkelson
Torkelson Geochemistry
2528 South Columbia Place
Tulsa, OK 74114
TEL: (918) 749-8441
FAX (918) 749-6005

May 27, 2011
Order No.: T11050348

RE: Samples

Dear Bruce Torkelson:

Green Country Testing, Inc. received 2 samples on 5/20/2011 for the analyses presented in the following report.

In accordance with your instructions, Green Country Testing conducted the analysis shown on the following pages on samples submitted by your company. The results related only to the items tested. Unless otherwise noted, all analysis was conducted using EPA approved methodologies. Test reports meet all the NELAC requirements. All relevant sampling information is on the attached chain-of-custody form. The initials SUB as the analyst designate any testing sub-contracted by Green Country Testing.

Certifications/Accreditation: OK - 7604
AR - ADEQ
KS - E-10232
LA - 4002

A scope of Certified/Accredited parameters is available upon request. If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Approved By: _____

Brian Duzan, Director
Environmental Services

6825 East 38th Street
Tulsa, Oklahoma 74145-1105
www.greencountrytesting.com

Green Country TESTING

Telephone 918.828.9977
Telephone 800.324.5757
Facsimile 918.828.7750

CLIENT: Torkelson Geochemistry
Lab Order: T11050348 **Date Received:** 5/20/2011
Project: Samples **Date Reported:** *27-May-11*

Lab ID: T11050348-01 **Collection Date: 4/27/2011** **Sample ID: W-8 11076**

Matrix: OIL

Analyses	Result	Detection Limit	Qual	Units	Date Analyzed	Analyst
METALS IN SOIL OR SLUDGE BY ICP	**SW6010B**					**KR**
Lead	< 0.500	0.500		mg/Kg	5/26/2011	

Lab ID: T11050348-02 **Collection Date: 4/27/2011** **Sample ID: W-14 11076**

Matrix: OIL

Analyses	Result	Detection Limit	Qual	Units	Date Analyzed	Analyst
METALS IN SOIL OR SLUDGE BY ICP	**SW6010B**					**KR**
Lead	1.89	0.500		mg/Kg	5/26/2011	

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds MCL or Permit Limitation
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
MI+ - Matrix Interference
H - Exceeds Holding Time

This document shall not be reproduced, except in full, without the written approval of Green Country Testing, Inc.

6825 East 38th Street
Tulsa, Oklahoma 74145-1105
www.greencountrytesting.com

Green Country TESTING

Telephone 918.828.9977
Telephone 800.324.5757
Facsimile 918.828.7750

CLIENT: Torkelson Geochemistry
Work Order: T11050348
Project: Samples

QC SUMMARY REPORT

TestCode	Analyte	BatchID	QCType	Result	PQL	Units	%Rec	%RPD
MET_S_ICP	Lead	5654	MBLK	< 0.12	0.125	mg/Kg		
	Lead	5654	LCS	48	0.125	mg/Kg	96.2	
	Lead	5654	LCS	47.36	0.125	mg/Kg	94.9	1.34
	Lead	5654	MS	191.1	0.5	mg/Kg	97.1	
	Lead	5654	MSD	191.7	0.5	mg/Kg	97.4	0.303

Green Country Testing . Chain of Custody Record

Laboratory Number: T1050348

Page 1 of 1

	Client Information:	Billing Information:	PO Number:	Project Name/Number:
Company Name:	Torkelson Geochemistry			
Contact Name:	Bruce Torkelson		Quote Number:	Sampler's Signature
Address:			Required QC Level	
City, State, Zip:				
Phone Number:	749-8441 Ext:	Ext:	Bill Monthly ☐ Yes ☒ No	Shipping Method: UPS / FedEx / Airborne DHL / GCT / Hand / Mail
Fax Number:				
Email Address:				

Turn Time
- ☒ Standard
- ☐ 1 Day
- ☐ 2 Day
- ☐ Other

(Rush turn times will incur a surcharge and must be pre-approved by lab.)

Which Regulations Apply:
- ☐ RCRA
- ☐ POTW
- ☐ NPDES
- ☐ USDA/FDA
- ☐ RECAP/RISC
- ☐ Drinking Water
- ☐ Distribution
- ☐ Special
- ☐ State
- ☐ Other

Matrix Code: AQ = Aqueous, DW = Drinking, WW = Waste, MW = Monit. Well, LQ = Liquid, SO = Soil, O = Oil, SL = Sludge, F = Food, SW = Swab, SOL = Solid

Sample ID/Description	Date	Time	Grab / Composite	Matrix	Container Quantity	Container Type P=Plastic, G=Glass, V=Vail	Pres. HCl, HNO_3, H_2SO_4, NaOH, $Na_2S_2O_3$	Requested Tests: Lead	Comments
W-8 11076	4-7-11	—	G	O	1	G	none	✓	
W-14 11076	4-7-11	—	G	O	1	G	none	✓	

	Relinquished by	Date/Time	Received by	Date/Time	Field Notes:
1	Bruce Torkelson	5/20/11 1535	John Fitzgerald	5/20/11 1535	
2					
3					Received on ice? ☒ Yes ☒ No
4					Temp: 23c

All samples submitted to Green Country Testing for analysis are accepted on a custodial basis only. Ownership of the material remains with the client submitting the samples.
Green Country Testing reserves the right to return unused sample protions.

Green Country Testing
6825 East 38th Street • Tulsa, OK 74145
918-828-9977 • Fax (918) 828-7756

Part 1 - Laboratory Copy Part 2 - Report Copy Part 3 - Client's Temporary Copy

Torkelson Geochemistry, Inc.

2528 S. Columbia Place
Tulsa, OK 74114-3233
Phone: 918-749-8441
Fax: 918-749-6005
e-mail: BTorkelson@aol.com

CHAIN-OF-CUSTODY RECORD

Project: Sun- Philadelphia Refinery COA
Location: Philadelphia, PA

Proj. No.:
P.O.:
Sampled By: M. Brad Spancake & Tim Delk

Report/Bill To: Colleen Costello
Address: 30 South 17th St, Suite 1500
Philadelphia, PA 19103

Phone: 215.864.0640
Fax: 215.864.0671
e-mail:

Additional Instructions

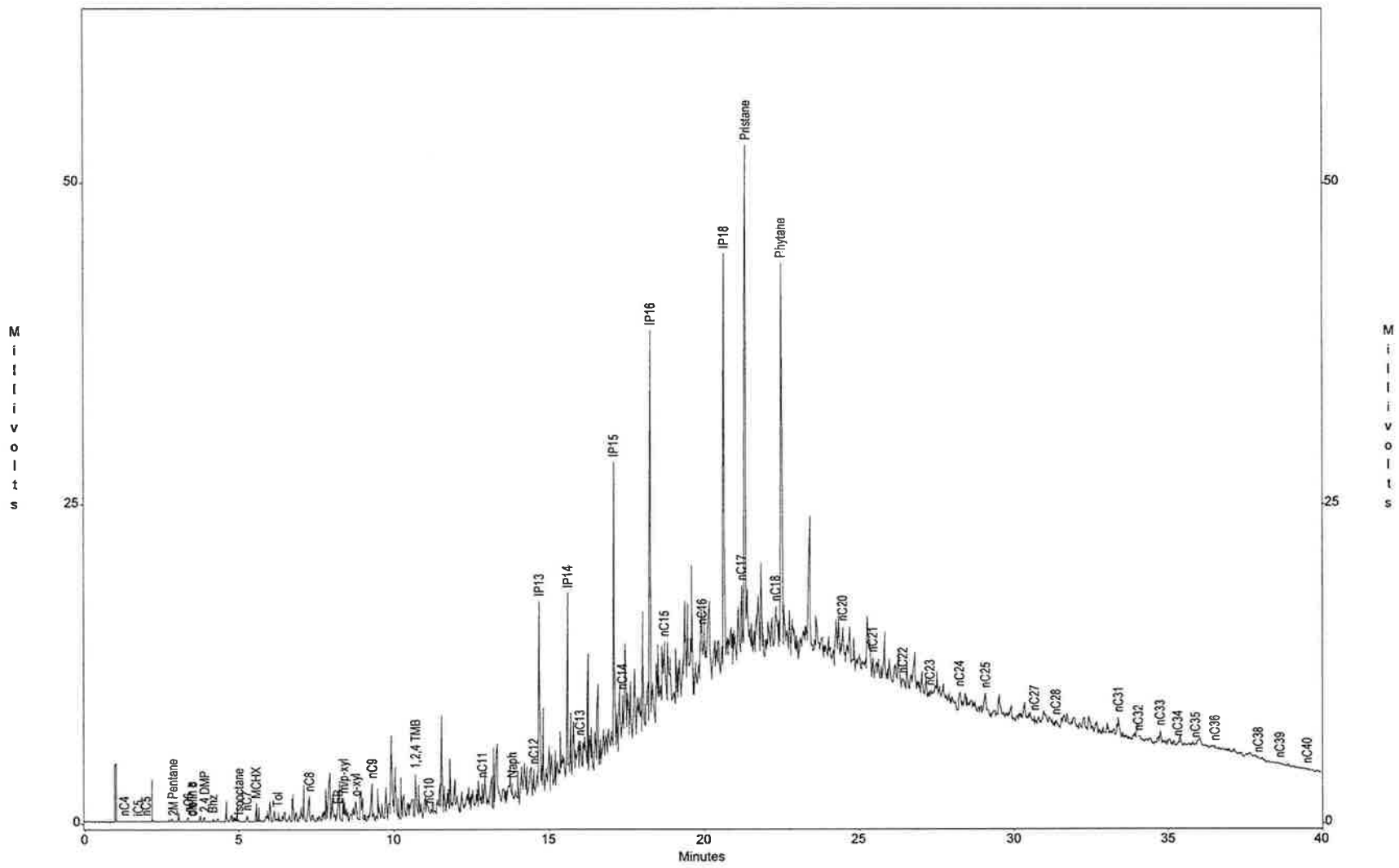
Requested Turn-Around Time:

ITEM NO.	SAMPLE DESCRIPTION	DATE	MATRIX	LAB NO.	Total # OF Vials	PRESERVATIVES: None	ANALYSES REQUESTED: GC Characterization	ANALYSES REQUESTED: Specific Gravity	REMARKS
1	West Yard W8	2/27/04	Product		1	X	X	X	
2	A-13	"	"		1	X	X	X	
3	B-144				1	X	X	X	
4	C-106				1	X	X	X	
5	A-133				1	X	X	X	
6	C-65				1	X	X	X	
7	B-43				1	X	X	X	
8	B-39				1	X	X	X	
9	A-136	↓	↓		1	X	X	X	Sorbent Pad Sample
10	C-107				1	X	X	X	

RELINQUISHED BY	ACCEPTED BY	DATE	TIME
M. Brad Spancake	FED EX	3/1/04	
	Bruce Torkelson	3-2-04	1705

Sun - Philadelphia Refinery COA
Sample ID : West Yard W8
Acquired : Mar 07, 2004 08:54:39

c:\lezchrom\chrom\04046\wyw8 – Channel A



APPENDIX G

Fate and Transport Analysis

APPENDIX G

FATE AND TRANSPORT MODELING PROCEDURES

AOI 10: SUNOCO PHILADELPHIA REFINERY

PHILADELPHIA, PENNSYLVNIA

QUICK DOMENICO MODELING

G.1 INTRODUCTION

Fate and transport calculations were completed for groundwater in Area of Interest (AOI) 10 to evaluate potential migration pathways/potential impacts to receptors. Eight wells (W-1, W-12, W-23, W-28, W-31, W-32, W-33, and W-34) in AOI 10 exhibited concentrations of groundwater compounds of concern (COCs) above their respective MSCs. The COCs that were above the MSCs in these wells were modeled using the analytical results from the April 2011 groundwater sampling event, and the Quick Domenico Version 2 (QD) spreadsheet model developed by Pennsylvania Department of Environmental Protection (PADEP). Site-specific data was used to complete the fate and transport calculations, when available.

G.2 MODEL OVERVIEW

The QD Model is a Microsoft Excel spreadsheet application based on the analytical contaminant transport equation developed by P.A. Domenico in *"An Analytical Model For Multidimensional Transport of a Decaying Contaminant Species,"* Journal of Hydrology, 91 (1987), pp. 49-58. The QD model calculates contaminant concentrations at any down-gradient location after a specified interval of time. The model incorporates the processes of advection, first order decay, retardation, and dispersion to describe fate and transport of compounds. In addition, the QD model displays the results as a two dimensional chart to facilitate interpretation of the results.

G.3 MODEL LIMITATIONS

Limitations of the QD model include:

- Groundwater flow is assumed to be steady state, and one-dimensional;
- Aquifer properties are assumed to be reasonably uniform;
- Applicable only to unconsolidated aquifers;
- Intended for use primarily with dissolved organic compounds;

- Does not account for the transformation of parent compounds into daughter products as the result of biodegradation;
- Compounds are considered individually, and are assumed to not react with each other; and
- The contaminant source is limited to a single and continuous source concentration.

G.4 MODEL INPUT PARAMTERS

In preparation of this report, input values for the QD model were compiled from available site-specific data. When no site-specific data was available, estimated input values from the PADEP spreadsheet "Number Please! 2011" which is based on PA Code, Chapter 250, Appendix A, Table 5, or other acceptable literature sources, were utilized. The input parameters are discussed in detail in the following sections and are summarized in the input/output tables G.1 through G.4 in this appendix. An Excel spreadsheet interface was used to construct the QD simulations. This interface allowed the simulation of all relevant compounds at each well location to be constructed and saved in a single electronic file.

G.4.1 Source Concentration

Results of the April 2011 groundwater sampling indicated that three organic compounds (benzene, chrysene and naphthalene) and one metal (lead) were detected above their respective groundwater MSCs in shallow wells (W-1, W-12, W-23, W-28, W-31, W-32, W-33, and W-34). The potential for these compounds to migrate offsite (beyond property boundary or discharge to the Schuylkill River) was evaluated through the use of the QD model.

G.4.2 Distance to Location of Concern (x)

Distance to the Location of Concern (distance) for the current simulations is the distance required for each COCs concentration to fall below its respective MSC under steady-state plume conditions. The distance is iteratively entered using the Excel "Solver" Add-on in the QD model until the location where the COC concentration falls below the MSC is identified. This step is performed using a large simulation time of 1×10^{99} days to ensure that the plume has reached steady-state.

G.4.3 Dispersivity

Dispersivity is the tendency of a dissolved plume to "spread out" as it moves down-gradient.

- Longitudinal dispersivity (A_X) occurs in the direction parallel to groundwater flow;
- Transverse dispersivity (A_Y) occurs in the same plane as longitudinal dispersivity but perpendicular to the direction of groundwater flow; and
- Vertical dispersivity (A_Z) occurs in the upward direction, normal to the plane in which longitudinal and transverse dispersivity occur (Vertical dispersivity is usually negligible and is typically omitted from most QD analyses).

Dispersivity estimates are difficult to quantify and are commonly estimated from the following relationships:

1. A_X = X/10 (where, X is the distance a contaminant has traveled by advective transport)
2. $A_Y = A_X/10$
3. $A_Z = A_X/20$ to $A_X/100$ (generally, it is recommended that A_Z be a very small number (0.001) unless vertical monitoring can reliably justify a larger number. Additionally, a value of 0.0001 is suggested for uncalibrated or conceptual applications).

As stated above the value for A_Y was estimated to be 10 percent of A_X. A value of 0.001 was used as a value for A_Z. A longitudinal dispersivity of 200 feet was assumed which is also the longitudianal dispersivity used in the CCR.

G.4.4 Lambda

Lambda is the first order decay constant. It is determined by dividing 0.693 by the half-life of the compound. The value can typically be estimated for shrinking plumes by evaluating at concentrations versus time or distance. Lambda can also sometimes be estimated for stable plumes by evaluating concentration versus time using the methodology outlined in Buscheck and Alcantar (1995). Important considerations to estimating Lambda from site data include:

1. Are the measured concentrations along the centerline of the plume?
2. Are the measured concentrations the result of the single source area?
3. Are there no remedial systems and/or activities that effected the migration of the plume during the time interval of evaluation?

If the answer is yes to these questions, then the methodologies outlined in Buscheck and Alcantar may be utilized to estimate a site-specific lambda from site data.

Based on review of the available site data, the criteria necessary to calculate a site-specific lambda could not be met; therefore, a default value for lambda (when appropriate and available) was obtained from the PADEP spreadsheet "Number Please! 2011" which is based on PA Code, Chapter 250, Appendix A, Table 5.

G.4.5 Source Dimensions

Source width is the maximum width of the area measured perpendicular to the direction of groundwater flow. Source thickness is the thickness of the contaminated soils below the water table that contribute contamination to groundwater. In addition to the saturated zone, fluctuation in groundwater elevation may create a smear zone in the unsaturated portion of an aquifer. As an estimate of the thickness of the smear zone, average fluctuation can be used. Since no plumes have been delineated, a source width of 100 ft was used. The source thicknesses used was 60 feet (ft), which is the average saturated thickness of the upper unconfined aquifer based on cross sections DD-DD' and EE-EE.'

G.4.6 Hydraulic Conductivity (K)

The hydraulic conductivity of a geologic material is a measure of its ability to transmit water. A hydraulic conductivity of 4.64 ft/d was used in the AOI 10 QD simulations. This value was the average hydraulic conductivity of the fill/alluvium at the site, obtained from the CCR. The wells that were modeled are screened in the fill/alluvium.

G.4.7 Hydraulic Gradient

Hydraulic gradient is the change in hydraulic head relative to the distance between head measurement locations. The hydraulic gradient is measured parallel to the direction of ground water flow assuming horizontal flow and a uniform gradient. Using the groundwater elevations collected in April 2011, the hydraulic gradient value was estimated between W-31 and W-16 and is 0.0046. This hydraulic gradient was used in all eight QD simulations due the limited number of wells on AOI 10 that fall on or near the same flow path.

G.4.8 Porosity (n)

Porosity is measured as the ratio of the volume of void space in a geologic material to the total volume of material. A porosity of 0.35 was used in the fate and transport modeling and is based on historical geotechnical analysis of site alluvial sediments.

G.4.9 Soil Bulk Density (ρb)

Soil bulk density is the dry weight of a sample divided by the total volume of the sample in an undisturbed state. Soil bulk density can either be determined by a laboratory or by the equation

$$\rho_b = 2.65 * (1- n).$$

Soil bulk density value used in the fate and transport modeling was 1.72 gm/cm^3 which is based on historical geotechnical analysis.

G.4.10 Organic Carbon Partition Coefficient (KOC)

The organic carbon partition coefficient is chemical specific and was taken from the PADEP EP spreadsheet "Number Please! 2011" which is based on PA Code, Chapter 250, Appendix A, Table 5. Koc is chemical specific and can be found in the QD model input-out tables.

G.4.11 Fraction Organic Carbon (foc)

The fraction of organic carbon is the organic carbon content of a soil. A laboratory using ASTM methods can determine this value. Samples for organic carbon are taken from the same soil horizon in which the contaminant occurs, but outside of the impacted area. Since no site specific fraction of organic carbon data was available for the site, the fate and transport modeling used the model-recommended default concentration of 0.005, which is a conservative value based on the description of site soils.

G.4.12 Time (t)

'Time zero' is the point at which contamination was introduced into the aquifer. Time since 'time zero' is measured in days. The final simulation time of 1×10^{99} days was used to ensure that a steady-state plume was simulated.

G.5 OUTPUT DATA AND RESULTS

A spreadsheet for each well, for which a QD simulation was performed, is included at the end of this appendix (Tables G.1 through G.8). Table G.9 is a summary of the QD modeling results. QD model results indicate a low to negligible potential for impacted groundwater to migrate beyond the AOI 10 property boundary. The benzene concentration at W-33 of 250 ug/l has some potential to migrate slightly (about 100 ft) beyond the AOI 10 property boundary.

Table G.1
Quick Domenico
Fate and Transport Model Input and Output AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Project	2574601 - Sunoco Philadelphia Refinery
Prepared by	Terrance Stanley
Date Prepared	6/23/2011

Generic Input Parameters				Data Source
Source Identification (or Well ID)			**W-01**	
Sample Date			4/27/2011	
Source Width		ft	100	Delineated LNAPL (100' default if no plume is present)
Source Thickness		ft	60	Estimated from cross-sections DD-DD' & EE-EE'
Longitudinal Dispersivity	A_x	ft	200	From CCR QD Simulations
Transverse Dispersivity	A_y	ft	20.0	Quick Domenico User's Manual
Vertical Dispersivity	A_z	ft	0.0001	Quick Domenico User's Manual
Hydraulic Conductivty	k	ft/day	4.64	Alluvium
Hydraulic Gradient		ft/ft	0.0046	W-31/W-16 April 2011
Porosity		decimal fraction	0.35	Site soil analyses
Soil Bulk Density	ρ_b	g/cm3	1.7225	ACT 2 TGM Default
Fraction of Organic Carbon	f_{OC}	decimal fraction	0.005	ACT 2 TGM Default
Time		days	1.00E+99	Steady-State Conditions

Chemical Specific Input Parameters				Data Source
Sim 1				
Contaminant			benzene	
Source Concentration (mg/L)		mg/L	0.0200	4/27/2011
Lambda (per day)		day^{-1}	0.001	PADEP Number Please! 2011
KOC			58	PADEP Number Please! 2011

Output (Distance from Source Where Concentration Equals Respective Ground Water MSC)				
Contaminant	**Starting Concentration (mg/L)**	**GW MSC[1] Non-Residential (mg/L)**	**Predicted Concentration (mg/L)**	**Predicted Distance to Meet Non-Residential GW MSC (Rounded Upward to the Nearest foot)**
Sim 1 - benzene	0.0200	0.005	0.005	**80**

[1] ACT 2 TGM, Appendix A, Table 1 MSC for a Non-residential Used Aquifer with Total Dissolved Solids less than or equal to 2500.

Table G.2
Quick Domenico
Fate and Transport Model Input and Output AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Project	2574601 - Sunoco Philadelphia Refinery
Prepared by	Terrance Stanley
Date Prepared	6/23/2011

Generic Input Parameters				Data Source
Source Identification (or Well ID)			**W-12**	
Sample Date			4/26/2011	
Source Width		ft	100	Delineated LNAPL (100' default if no plume is present)
Source Thickness		ft	60	Estimated from cross-sections DD-DD' & EE-EE'
Longitudinal Dispersivity	A_x	ft	200	From CCR QD Simulations
Transverse Dispersivity	A_y	ft	20.0	Quick Domenico User's Manual
Vertical Dispersivity	A_z	ft	0.0001	Quick Domenico User's Manual
Hydraulic Conductivty	k	ft/day	4.64	Alluvium
Hydraulic Gradient		ft/ft	0.0046	W-31/W-16 April 2011
Porosity		decimal fraction	0.35	Site soil analyses
Soil Bulk Density	p_b	g/cm3	1.7225	ACT 2 TGM Default
Fraction of Organic Carbon	f_{OC}	decimal fraction	0.005	ACT 2 TGM Default
Time		days	1.00E+99	Steady-State Conditions

Chemical Specific Input Parameters				Data Source
Sim 1				
Contaminant			benzene	
Source Concentration (mg/L)		mg/L	0.0080	4/26/2011
Lambda (per day)		day^{-1}	0.001	PADEP Number Please! 2011
KOC			58	PADEP Number Please! 2011

Output (Distance from Source Where Concentration Equals Respective Ground Water MSC)				
Contaminant	**Starting Concentration (mg/L)**	**GW MSC[1] Non-Residential (mg/L)**	**Predicted Concentration (mg/L)**	**Predicted Distance to Meet Non-Residential GW MSC (Rounded Upward to the Nearest foot)**
Sim 1 - benzene	0.0080	0.005	0.005	**28**

[1] ACT 2 TGM, Appendix A, Table 1 MSC for a Non-residential Used Aquifer with Total Dissolved Solids less than or equal to 2500.

Table G.3
Quick Domenico
Fate and Transport Model Input and Output AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Project	2574601 - Sunoco Philadelphia Refinery
Prepared by	Terrance Stanley
Date Prepared	6/23/2011

Generic Input Parameters				Data Source
Source Identification (or Well ID)			**W-23**	
Sample Date			4/27/2011	
Source Width		ft	100	Delineated LNAPL (100' default if no plume is present)
Source Thickness		ft	60	Estimated from cross-sections DD-DD' & EE-EE'
Longitudinal Dispersivity	A_x	ft	200	From CCR QD Simulations
Transverse Dispersivity	A_y	ft	20.0	Quick Domenico User's Manual
Vertical Dispersivity	A_z	ft	0.0001	Quick Domenico User's Manual
Hydraulic Conductivty	k	ft/day	4.64	Alluvium
Hydraulic Gradient		ft/ft	0.0046	W-31/W-16 April 2011
Porosity		decimal fraction	0.35	Site soil analyses
Soil Bulk Density	p_b	g/cm3	1.7225	ACT 2 TGM Default
Fraction of Organic Carbon	f_{OC}	decimal fraction	0.005	ACT 2 TGM Default
Time		days	1.00E+99	Steady-State Conditions

Chemical Specific Input Parameters				Data Source
Sim 1				
Contaminant			benzene	
Source Concentration (mg/L)		mg/L	0.0120	4/27/2011
Lambda (per day)		day^{-1}	0.001	PADEP Number Please! 2011
KOC			58	PADEP Number Please! 2011

Output (Distance from Source Where Concentration Equals Respective Ground Water MSC)				
Contaminant	**Starting Concentration (mg/L)**	**GW MSC[1] Non-Residential (mg/L)**	**Predicted Concentration (mg/L)**	**Predicted Distance to Meet Non-Residential GW MSC (Rounded Upward to the Nearest foot)**
Sim 1 - benzene	0.0120	0.005	0.005	**50**

[1] ACT 2 TGM, Appendix A, Table 1 MSC for a Non-residential Used Aquifer with Total Dissolved Solids less than or equal to 2500.

Table G.4
Quick Domenico
Fate and Transport Model Input and Output AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Project	2574601 - Sunoco Philadelphia Refinery
Prepared by	Terrance Stanley
Date Prepared	6/23/2011

Generic Input Parameters				Data Source
Source Identification (or Well ID)			**W-28**	
Sample Date			4/27/2011	
Source Width		ft	100	Delineated LNAPL (100' default if no plume is present)
Source Thickness		ft	60	Estimated from cross-sections DD-DD' & EE-EE'
Longitudinal Dispersivity	A_x	ft	200	From CCR QD Simulations
Transverse Dispersivity	A_y	ft	20.0	Quick Domenico User's Manual
Vertical Dispersivity	A_z	ft	0.0001	Quick Domenico User's Manual
Hydraulic Conductivty	k	ft/day	4.64	Alluvium
Hydraulic Gradient		ft/ft	0.0046	W-31/W-16 April 2011
Porosity		decimal fraction	0.35	Site soil analyses
Soil Bulk Density	p_b	g/cm3	1.7225	ACT 2 TGM Default
Fraction of Organic Carbon	f_{OC}	decimal fraction	0.005	ACT 2 TGM Default
Time		days	1.00E+99	Steady-State Conditions

Chemical Specific Input Parameters				Data Source
Sim 1				
Contaminant			chrysene	
Source Concentration (mg/L)		mg/L	0.0020	4/27/2011
Lambda (per day)		day^{-1}	0.000	PADEP Number Please! 2011
KOC			490000	PADEP Number Please! 2011

Output (Distance from Source Where Concentration Equals Respective Ground Water MSC)				
Contaminant	**Starting Concentration (mg/L)**	**GW MSC[1] Non-Residential (mg/L)**	**Predicted Concentration (mg/L)**	**Predicted Distance to Meet Non-Residential GW MSC (Rounded Upward to the Nearest foot)**
Sim 1 - chrysene	0.0020	0.002	0.002	**<1**

[1] ACT 2 TGM, Appendix A, Table 1 MSC for a Non-residential Used Aquifer with Total Dissolved Solids less than or equal to 2500.

Table G.5
Quick Domenico
Fate and Transport Model Input and Output AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Project	2574601 - Sunoco Philadelphia Refinery
Prepared by	Terrance Stanley
Date Prepared	6/23/2011

Generic Input Parameters				Data Source
Source Identification (or Well ID)			**W-31**	
Sample Date			4/26/2011	
Source Width		ft	100	Delineated LNAPL (100' default if no plume is present)
Source Thickness		ft	60	Estimated from cross-sections DD-DD' & EE-EE'
Longitudinal Dispersivity	A_x	ft	200	From CCR QD Simulations
Transverse Dispersivity	A_y	ft	20.0	Quick Domenico User's Manual
Vertical Dispersivity	A_z	ft	0.0001	Quick Domenico User's Manual
Hydraulic Conductivty	k	ft/day	4.64	Alluvium based on site-wide slug testing
Hydraulic Gradient		ft/ft	0.0046	W-31/W-16 April 2011
Porosity		decimal fraction	0.35	Site soil analyses
Soil Bulk Density	p_b	g/cm3	1.7225	ACT 2 TGM Default
Fraction of Organic Carbon	f_{OC}	decimal fraction	0.005	ACT 2 TGM Default
Time		days	1.00E+99	Steady-State Conditions

Chemical Specific Input Parameters				Data Source
Sim 1				
Contaminant			benzene	
Source Concentration (mg/L)		mg/L	0.0100	4/26/2011
Lambda (per day)		day^{-1}	0.001	PADEP Number Please! 2011
KOC			58	PADEP Number Please! 2011
Sim 2				
Contaminant			chrysene	
Source Concentration (mg/L)		mg/L	0.0040	4/26/2011
Lambda (per day)		day^{-1}	0.000	PADEP Number Please! 2011
KOC			490000	PADEP Number Please! 2011
Sim 3				
Contaminant			lead	
Source Concentration (mg/L)		mg/L	0.0060	4/26/2011
Lambda (per day)		day^{-1}	0.000	PADEP Number Please! 2011
KOC			0.000	PADEP Number Please! 2011

Output (Distance from Source Where Concentration Equals Respective Ground Water MSC)				
Contaminant	**Starting Concentration (mg/L)**	**GW MSC[1] Non-Residential (mg/L)**	**Predicted Concentration (mg/L)**	**Predicted Distance to Meet Non-Residential GW MSC (Rounded Upward to the Nearest foot)**
Sim 1 - benzene	0.0100	0.005	0.005	**40**
Sim 2 - chrysene	0.0040	0.002	0.002	**1**
Sim 3 - lead	0.0060	0.005	0.005	**32**

[1] ACT 2 TGM, Appendix A, Table 1 MSC for a Non-residential Used Aquifer with Total Dissolved Solids less than or equal to 2500.

Table G.6
Quick Domenico
Fate and Transport Model Input and Output AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Project	2574601 - Sunoco Philadelphia Refinery
Prepared by	Terrance Stanley
Date Prepared	6/23/2011

Generic Input Parameters				Data Source
Source Identification (or Well ID)			**W-32**	
Sample Date			4/27/2011	
Source Width		ft	100	Delineated LNAPL (100' default if no plume is present)
Source Thickness		ft	60	Estimated from cross-sections DD-DD' & EE-EE'
Longitudinal Dispersivity	A_x	ft	200	From CCR QD Simulations
Transverse Dispersivity	A_y	ft	20.0	Quick Domenico User's Manual
Vertical Dispersivity	A_z	ft	0.0001	Quick Domenico User's Manual
Hydraulic Conductivty	k	ft/day	4.64	Alluvium
Hydraulic Gradient		ft/ft	0.0046	W-31/W-16 April 2011
Porosity		decimal fraction	0.35	Site soil analyses
Soil Bulk Density	ρ_b	g/cm3	1.7225	ACT 2 TGM Default
Fraction of Organic Carbon	f_{OC}	decimal fraction	0.005	ACT 2 TGM Default
Time		days	1.00E+99	Steady-State Conditions

Chemical Specific Input Parameters				Data Source
Sim 1				
Contaminant			benzene	
Source Concentration (mg/L)		mg/L	0.0560	4/27/2011
Lambda (per day)		day^{-1}	0.001	PADEP Number Please! 2011
KOC			58	PADEP Number Please! 2011
Sim 2				
Contaminant			chrysene	
Source Concentration (mg/L)		mg/L	0.0040	4/27/2011
Lambda (per day)		day^{-1}	0.000	PADEP Number Please! 2011
KOC			490000	PADEP Number Please! 2011

Output (Distance from Source Where Concentration Equals Respective Ground Water MSC)				
Contaminant	**Starting Concentration (mg/L)**	**GW MSC[1] Non-Residential (mg/L)**	**Predicted Concentration (mg/L)**	**Predicted Distance to Meet Non-Residential GW MSC (Rounded Upward to the Nearest foot)**
Sim 1 - benzene	0.0560	0.005	0.005	**147**
Sim 2 - chrysene	0.0040	0.002	0.002	**1**

[1] ACT 2 TGM, Appendix A, Table 1 MSC for a Non-residential Used Aquifer with Total Dissolved Solids less than or equal to 2500.

Table G.7
Quick Domenico
Fate and Transport Model Input and Output AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Project	2574601 - Sunoco Philadelphia Refinery
Prepared by	Terrance Stanley
Date Prepared	6/23/2011

Generic Input Parameters				Data Source
Source Identification (or Well ID)			**W-33**	
Sample Date			4/27/2011	
Source Width		ft	100	Delineated LNAPL (100' default if no plume is present)
Source Thickness		ft	60	Estimated from cross-sections DD-DD' & EE-EE'
Longitudinal Dispersivity	A_x	ft	200	From CCR QD Simulations
Transverse Dispersivity	A_y	ft	20.0	Quick Domenico User's Manual
Vertical Dispersivity	A_z	ft	0.0001	Quick Domenico User's Manual
Hydraulic Conductivty	k	ft/day	4.64	Alluvium
Hydraulic Gradient		ft/ft	0.0046	W-31/W-16 April 2011
Porosity		decimal fraction	0.35	Site soil analyses
Soil Bulk Density	ρ_b	g/cm3	1.7225	ACT 2 TGM Default
Fraction of Organic Carbon	f_{OC}	decimal fraction	0.005	ACT 2 TGM Default
Time		days	1.00E+99	Steady-State Conditions

Chemical Specific Input Parameters				Data Source
Sim 1				
Contaminant			benzene	
Source Concentration (mg/L)		mg/L	0.2500	4/24/2011
Lambda (per day)		day^{-1}	0.001	PADEP Number Please! 2011
KOC			58	PADEP Number Please! 2011
Sim 2				
Contaminant			chrysene	
Source Concentration (mg/L)		mg/L	0.0060	40657.0000
Lambda (per day)		day^{-1}	0.000	PADEP Number Please! 2011
KOC			490000	PADEP Number Please! 2011
Sim 3				
Contaminant			naphthalene	
Source Concentration (mg/L)		mg/L	0.3300	40657.0000
Lambda (per day)		day^{-1}	0.003	PADEP Number Please! 2011
KOC			950	PADEP Number Please! 2011

Output (Distance from Source Where Concentration Equals Respective Ground Water MSC)				
Contaminant	**Starting Concentration (mg/L)**	**GW MSC[1] Non-Residential (mg/L)**	**Predicted Concentration (mg/L)**	**Predicted Distance to Meet Non-Residential GW MSC (Rounded Upward to the Nearest foot)**
Sim 1 - benzene	0.2500	0.005	0.005	**255**
Sim 2 - chrysene	0.0060	0.002	0.002	**2**
Sim 3 - naphthalene	0.3300	0.100	0.100	**16**

[1] ACT 2 TGM, Appendix A, Table 1 MSC for a Non-residential Used Aquifer with Total Dissolved Solids less than or equal to 2500.

Table G.8
Quick Domenico
Fate and Transport Model Input and Output AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Project	2574601 - Sunoco Philadelphia Refinery
Prepared by	Terrance Stanley
Date Prepared	6/23/2011

Generic Input Parameters				Data Source
Source Identification (or Well ID)			**W-34**	
Sample Date			4/27/2011	
Source Width		ft	100	Delineated LNAPL (100' default if no plume is present)
Source Thickness		ft	60	Estimated from cross-sections DD-DD' & EE-EE'
Longitudinal Dispersivity	A_x	ft	200	From CCR QD Simulations
Transverse Dispersivity	A_y	ft	20.0	Quick Domenico User's Manual
Vertical Dispersivity	A_z	ft	0.0001	Quick Domenico User's Manual
Hydraulic Conductivty	k	ft/day	4.64	Alluvium
Hydraulic Gradient		ft/ft	0.0046	W-31/W-16 April 2011
Porosity		decimal fraction	0.35	Site soil analyses
Soil Bulk Density	ρ_b	g/cm3	1.7225	ACT 2 TGM Default
Fraction of Organic Carbon	f_{OC}	decimal fraction	0.005	ACT 2 TGM Default
Time		days	1.00E+99	Steady-State Conditions

Chemical Specific Input Parameters				Data Source
Sim 1				
Contaminant			benzene	
Source Concentration (mg/L)		mg/L	0.0120	4/27/2011
Lambda (per day)		day^{-1}	0.001	PADEP Number Please! 2011
KOC			58	PADEP Number Please! 2011

Output (Distance from Source Where Concentration Equals Respective Ground Water MSC)				
Contaminant	**Starting Concentration (mg/L)**	**GW MSC[1] Non-Residential (mg/L)**	**Predicted Concentration (mg/L)**	**Predicted Distance to Meet Non-Residential GW MSC (Rounded Upward to the Nearest foot)**
Sim 1 - benzene	0.0120	0.005	0.005	**50**

[1] ACT 2 TGM, Appendix A, Table 1 MSC for a Non-residential Used Aquifer with Total Dissolved Solids less than or equal to 2500.

Table G.9
Fate and Transport Model Input and Output AOI 10
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Well ID	Compound	Starting Concentration	Final Concentration (Screening Value)	Predicted Distance to Achieve Screening Value	Estimated Distance to AOI 10 Boundary
		ug/l	ug/l	ft	ft
W-1	benzene	20	5	80	90
W-12	benzene	8	5	28	105
W-23	benzene	12	5	50	98
W-28	chrysene	2	1.9	<1	180
W-31	benzene	10	5	40	270
	chrysene	4	1.9	1	
	lead	6	5	32	
W-32	benzene	56	5	147	170
	chrysene	4	1.9	1	
W-33	benzene	250	5	**255**	90
	chrysene	6	1.9	2	
	napthalene	330	100	16	
W-34	benzene	12	5	50	130

Note:
= indicates predicted distance is greater than distance to property boundary

APPENDIX H

Development of Site-Specific Standards and

Risk Assessment

APPENDIX H
DEVELOPMENT OF SITE-SPECIFIC STANDARDS
AOI 10: SUNOCO PHILADELPHIA REFINERY
PHILADELPHIA, PENNSYLVANIA

Based on the current and future intended non-residential site use, an exposure assessment was conducted for all compounds in surficial soil (0-2 feet) which exceeded the nonresidential direct contact statewide health standards in AOI 10. Potential human health exposures for the Refinery are evaluated for an industrial worker scenario.

In AOI 10, soil samples were collected from within the EPA designated Corrective Action Management Unit (CAMU) and around the perimeter the of the CAMU and analyzed for the full suite of VOCs, SVOCs, and Metals; and, samples were collected outside the CAMU designated area and analyzed for the site-specific compounds (as specified in the February 2011 AOI 10 Site Characterization Workplan). To determine if any risk to the industrial worker exist due to direct contact, these samples were compared to the non-residential direct contact medium specific concentrations [PA Code Title 25, Chapter 250.305, Appendix A, Tables 3A and 4A]. Within the CAMU designated area concentrations of benzo(a)pyrene and dibenzo(a,h)anthracene were detected above their respective direct contact MSCs. Outside the CAMU designated area concentrations of arsenic, benzo(a)pyrene, and lead were detected above their respective direct contact MSCs. In accordance with Section IV of the PADEP's Technical Guidance Manual (TGM) (dated June 8, 2002), the COCs listed above were further screened against the EPA Region III Risk-Based Concentrations RBCs (aka, EPA Regional Screening Levels) for industrial soil to potentially reduce the list of compounds carried through the risk assessment; however, the above listed compounds also exceeded Region III's RBCs.

For any compounds that exceed both the non-residential statewide health standards and EPA Region III RBCs, site-specific standards were calculated using PADEP default intake parameters for an on-site worker and, where appropriate, a risk level of 10^{-4}. For calculating a site-specific standard for on-site workers exposed to lead, Sunoco used the Society of Environmental Geochemistry and Health (SEGH) model used by PADEP to

develop the non-residential MSC. The input parameters used to develop the site-specific standards for arsenic [non-carcinogenic and carcinogenic], benzo(a)pyrene, dibenzo(a,h)anthracene and lead are provided in Tables H-1 through H-5.

The calculated site-specific standards are as follows:

Compound	Calculated Site-Specific Standard (mg/kg)
Arsenic [non-carcinogenic / carcinogenic]	8,520 / 529*****
Benzo(a)pyrene	109
Dibenzo(a,h)anthracene	109
Lead	1,708

*******Arsenic has both carcinogenic and non-carcinogenic toxicological effects therefore both criteria were calculated. For characterization the lower, more stringent standard, will be used to screen the analytical data.*

The site-specific screening levels for arsenic, benzo(a)pyrene, and dibenzo(a,h)anthracene were calculated for ingestion based on the calculations specified in 25 Pa. Code § 250.306(b). These calculations used the PADEP's default parameters and an updated target risk level of 1E-4, in consideration of the site-specific conditions (PADEP's default target risk level is 1E-5).

The site-specific screening level for lead was also calculated for ingestion. As presented in 25 Pa. Code § 250.306(e), Appendix A, Table 7, the non-residential soil screening value for lead is based on the method presented in the report 'The Society for Environmental Geochemistry and Health (SEGH) Task Force Approach to the Assessment of Lead in Soil' (Wixson, 1991). The model used by the PADEP and developed by SEGH was also used to calculate the site specific criterion for the refinery. Based on the SEGH model and PADEP's default parameters, PADEP's non-residential direct contact MSC default value for lead in surface soil is 1,000 mg/kg. To develop a site-specific criteria for lead, some of the parameters used by the PADEP were updated in consideration of site-specific conditions and updated lead data collected from recent studies. These parameters are discussed in the following paragraphs.

Target blood lead concentration (T) – The default target blood lead concentration used by the PADEP to develop the non-residential MSC is 20 ug/dL; however, the Center for Disease Control (CDC) recommends that worker blood lead levels be maintained below 25 ug/dL (NIOSH, 2008) to prevent adverse health effects for most workers from exposure to lead throughout a working lifetime. Based on conversations between representatives of Sunoco and EPA, the target lead blood level identified by the CDC is the level used in the site-specific calculations in Tables H-5 and H-6.

Geometric mean background blood lead concentration (B) – B is the background blood lead concentration in the target population from sources other than soil and dust. The PADEP's default value for B is 4 ug/dL and, as summarized in PADEPs reference document (Wixson, 1991), is based on data gathered in the United Kingdom from young children. The US Center for Disease Control and Prevention (CDC) in Atlanta, GA has monitored blood lead levels in US children and adults since 1976 and, based on the most recent results published by the National Center for Environmental Health of the CDC (NCEH, 2005), the mean blood lead concentration for an adult 20 years of age or older is 1.56 ug/dL. Based on the more recent study by the US CDC, the value used for B in the site specific calculation has been revised to 1.56 ug/dL.

CONCLUSIONS

To complete the assessment, the samples collected outside the CAMU were screened separate from the samples collected within the CAMU (Tables H-6 and H-7, respectively). Outside the CAMU, results for arsenic, benzo(a)pyrene, and lead were compared to the calculated site-specific standards. No concentrations of arsenic or benzo(a)pyrene were detected above the site-specific standards; however, concentrations of lead were detected above the site-specific standard in six sample locations. Within the CAMU, results for benzo(a)pyrene and dibenzo(a,h)anthracene were compared to site-specific standards. No concentrations of dibenzo(a,h)anthracene were detected above the site-specific standard; however, a concentration of benzo(a)pyrene was detected above the site-specific standard in one sample location.

In addition to comparing the individual results to the site-specific standards the cumulative risk of exposure to arsenic, benzo(a)pyrene, and dibenzo(a,h)anthracene was also calculated for the samples collected outside and within the CAMU (Tables H-6 and H-7, respectively). Based on the PADEPs TGM, the total cumulative risk for exposure to carcinogenic compounds should not exceed 1E-4 and the cumulative hazard index for exposure to non-carcinogenic compounds should not exceed 1. Lead exposure is dependent on the blood/lead concentration and not risk based; therefore, lead could not be incorporated into the cumulative risk calculation.

As presented in Tables H-6 and H-7:

- The total cumulative hazard index for exposure to the non-carcinogenic compound arsenic is less than the PADEP's requirement of 1.0.
- The total cumulative risk for exposure to carcinogens outside the CAMU is 1.61E-04, is greater than the acceptable limits.
- The total cumulative risk for exposure to carcinogens within the CAMU is 1.83e-04, is greater than the acceptable limits.

References

NCEH (2005). Third National Report on Human Exposure to Environmental Chemicals. Centers for Disease Control and Prevention, National Center for Environmental Health, Division of Laboratory Sciences. Atlanta, Georgia. NCEH. Pub. No. 05-0570.

NIOSH (2008). Adult Blood Lead Epidemiology and Surveillance (ABLES). http://www.cdc.gov/niosh/topics/ABLES

Wixson, B.G., (1991). The Society of Environmental Geochemistry and Health (SEGH) Task Force Approach to the Assessment of Lead in Soil. Trace Substances in Environmental Health. 11-20.

Table H-1
Derivation of Site-Specific Soil Value
for Arsenic (Non-Carcinogenic)[1]
AOI 10 Site Characterization/Remedial Investigation Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Parameter	Abbreviation	Assumption	Units	Source
Target Health Quotient	THQ	1		25 Pa. Code § 250.306(d)
Oral Reference Dose	RfD_o	0.003	$mg/kg\text{-}day^{-1}$	25 Pa. Code § 250, Appendix A Table 5
Body Weight	BW	70	kg	25 Pa. Code § 250.306(d)
Averaging Time	AT_{DC}	25	yr	25 Pa. Code § 250.306(d)
Absorption	Abs	1	unitless	25 Pa. Code § 250.306(d)
Exposure Frequency	EF	180	d/yr	25 Pa. Code § 250.306(d)
Exposure Duration	ED	25	yr	25 Pa. Code § 250.306(d)
Conversion Factor	CF	1.00E-06	kg/day	25 Pa. Code § 250.306(d)
Ingestion Rate	IngR	50	mg/day	25 Pa. Code § 250.306(d)

Site-Specific, Non-Residential (Onsite Worker) Screening Value	**8,520**	**mg/kg**

Notes:

1. The site specific screening value was calculated for ingestion based on the calculation specified in 25 Pa. Code 250.306(b)

$$MSC\ (mg/kg) = \frac{THQ \times RFDo \times BW \times AT_{DC} \times 365\ days/year}{Abs \times EF \times ED \times IngR \times CF}$$

Table H-2
Derivation of Site-Specific Soil Value
for Arsenic (Carcinogenic)[1]
AOI 10 Site Characterization/Remedial Investigation Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Parameter	Abbreviation	Assumption	Units	Source
Absorption	ABS	1	unitless	25 Pa. Code § 250.306(d)
Exposure Frequency	EF	180	d/yr	25 Pa. Code § 250.306(d)
Conversion Factor	CF	1.00E-06	kg/day	25 Pa. Code § 250.306(d)
Target Risk[2]	TR	1.00E-04	mg/kg	
Oral Cancer Slope Factor	CSF_o	1.5	$mg/kg\text{-}day^{-1}$	25 Pa. Code § 250, Appendix A Table 5
Averaging Time for Carcinogens	AT_c	70	yr	25 Pa. Code § 250.306(d)
Ingestion Factor	IFadj	17.9	mg-yr/kg-day	25 Pa. Code § 250.306(d)

Site-Specific, Non-Residential (Onsite Worker) Screening Value **529** **mg/kg**

Notes:

1. The site specific screening value was calculated for ingestion based on the calculation specified in 25 Pa. Code 250.306(b)

$$MSC\ (mg/kg) = \frac{TR \times AT_C \times 365\ days/year}{CSF_O \times Abs \times EF \times IF_{ADJ} \times CF}$$

2. The target risk level was modified from PADEP's default (1E-5) to 1E-4.

Table H-3
Derivation of Site-Specific Soil Value
for Benzo(a)pyrene[1]
AOI 10 Site Characterization/Remedial Investigation Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Parameter	Abbreviation	Assumption	Units	Source
Absorption	ABS	1	unitless	25 Pa. Code § 250.306(d)
Exposure Frequency	EF	180	d/yr	25 Pa. Code § 250.306(d)
Conversion Factor	CF	1.00E-06	kg/day	25 Pa. Code § 250.306(d)
Target Risk[2]	TR	1.00E-04	mg/kg	
Oral Cancer Slope Factor	CSF_o	7.3	$mg/kg\text{-}day^{-1}$	25 Pa. Code § 250, Appendix A Table 5
Averaging Time for Carcinogens	AT_c	70	yr	25 Pa. Code § 250.306(d)
Ingestion Factor	IFadj	17.9	mg-yr/kg-day	25 Pa. Code § 250.306(d)

Site-Specific, Non-Residential (Onsite Worker) Screening Value **109** **mg/kg**

Notes:

1. The site specific screening value was calculated for ingestion based on the calculation specified in 25 Pa. Code 250.306(b)

$$MSC\ (mg/kg) = \frac{TR \times AT_C \times 365\ days/year}{CSF_O \times Abs \times EF \times IF_{ADJ} \times CF}$$

2. The target risk level was modified from PADEP's default (1E-5) to 1E-4.

Table H-4
Derivation of Site-Specific Soil Value
for Dibenzo(a,h)anthracene[1]
AOI 10 Site Characterization/Remedial Investigation Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Parameter	Abbreviation	Assumption	Units	Source
Absorption	ABS	1	unitless	25 Pa. Code § 250.306(d)
Exposure Frequency	EF	180	d/yr	25 Pa. Code § 250.306(d)
Conversion Factor	CF	1.00E-06	kg/day	25 Pa. Code § 250.306(d)
Target Risk[2]	TR	1.00E-04	mg/kg	
Oral Cancer Slope Factor	CSF_o	7.3	$mg/kg\text{-}day^{-1}$	25 Pa. Code § 250, Appendix A Table 5
Averaging Time for Carcinogens	AT_c	70	yr	25 Pa. Code § 250.306(d)
Ingestion Factor	IFadj	17.9	mg-yr/kg-day	25 Pa. Code § 250.306(d)

Site-Specific, Non-Residential (Onsite Worker) Screening Value **109** **mg/kg**

Notes:

1. The site specific screening value was calculated for ingestion based on the calculation specified in 25 Pa. Code 250.306(b)

$$MSC\ (mg/kg) = \frac{TR \times AT_C \times 365\ days/year}{CSF_O \times Abs \times EF \times IF_{ADJ} \times CF}$$

2. The target risk level was modified from PADEP's default (1E-5) to 1E-4.

Table H-5
Derivation of Site-Specific Soil Value
for Lead[1]
AOI 10 Site Characterization/Remedial Investigation Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Parameter	Abbreviation	Assumption	Units	Source[2]
Blood lead target concentration	T	25	ug/dL	CDC - ABLES (NIOSH, 2008)
Geometric standard deviation of the blood lead distribution	G	1.4	unitless	25 Pa. Code § 250, Appendix A Table 7
Background blood lead concentration in the population from sources other than soil or dust	B	1.56	ug/dL	NCEH Pub. No. 05-0570 (NCEH, 2005)
Number of standard deviations corresponding to the degree of protection required for the population at risk	n	1.645	unitless	25 Pa. Code § 250, Appendix A Table 7
Response of the blood lead versus soil lead relationship	δ	7.5	ug/dL blood / ug/g soil	25 Pa. Code § 250, Appendix A Table 7

Site-Specific, Non-Residential (Onsite Worker) Screening Value **1,708** **ug/g (mg/kg)**

Notes:

1. The site specific screening value for lead was calculated for ingestion based on the SEGH model as specified by 25 Pa. Code 250.306(e)

$$MSC\ (mg/kg) = \frac{[(T/G^{n}) - B] \times 1000}{\delta}$$

2. Sources for blood lead target level (T) based on conversation between James Oppenheim of Sunoco and Hon Lee of EPA in November 2010.

NIOSH (2008). Adult Blood Lead Epidemiology and Surveillance (ABLES). http://www.cdc.gov/niosh/topics/ABLES

NCEH (2005). Third National Report on Human Exposure to Environmental Chemicals. Centers for Disease Control and Prevention, National Center for Environmental Health, Division of Laboratory Sciences. Atlanta, Georgia. NCEH. Pub. No. 05-0570.

Table H-6
Site Specific Cumulative Risk Evaluation for the Area Outside of the Corrective Action Management Unit (CAMU)
AOI 10 Site Characterization/Remedial Investigaiton Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

				Arsenic (7440-38-2)		Arsenic (7440-38-2)		Benzo(a)pyrene (50-32-8)		Lead (7439-92-1)	
Location ID	Sample ID	Sample Interval	Sample Date	Reported Result (mg/kg)	Calculated Hazard Quotient	Reported Result (mg/kg)	Calculated Risk	Reported Result (mg/kg)	Calculated Risk	Reported Result (mg/kg)	Blood Lead Concentration[5] (ug/dL)
BH-10-36	BH-10-36_0-2'	0-2	4/5/2011	NA	--	NA	--	1.8	1.66E-06	390	8
BH-10-37	BH-10-37_0-2'	0-2	4/5/2011	NA	--	NA	--	6.5	5.98E-06	540	10
BH-10-38	BH-10-38_0-2'	0-2	4/5/2011	NA	--	NA	--	ND	--	11.6	3
BH-10-39	BH-10-39_0-2'	0-2	4/5/2011	NA	--	NA	--	16	1.47E-05	415	8
BH-10-40	BH-10-40_0-2'	0-2	4/5/2011	NA	--	NA	--	9.2	8.47E-06	65.1	4
BH-10-41	BH-10-41_0-2'	0-2	4/5/2011	NA	--	NA	--	ND	--	186	5
BH-10-42	BH-10-42_0-2'	0-2	4/19/2011	NA	--	NA	--	1.3	1.20E-06	249	6
BH-10-47	BH-10-47_0-2'	0-2	4/19/2011	NA	--	NA	--	0.82	7.55E-07	233	6
BH-10-49	BH-10-49_0-2'	0-2	4/19/2011	NA	--	NA	--	0.14	1.29E-07	340	7
BH-10-50	BH-10-50_0-2'	0-2	4/19/2011	NA	--	NA	--	1.3	1.20E-06	84.7	4
BH-10-53	BH-10-53_0-2'	0-2	4/22/2011	NA	--	NA	--	0.39	3.59E-07	3310	**46**
BH-10-54	BH-10-54_0-2'	0-2	4/22/2011	NA	--	NA	--	2.5	2.30E-06	186	5
BH-10-59	BH-10-59_0-2'	0-2	4/22/2011	NA	--	NA	--	1.6	1.47E-06	401	8
BH-10-60	BH-10-60_0-2'	0-2	4/22/2011	NA	--	NA	--	10	9.21E-06	777	13
BH-10-61	BH-10-61_0-2'	0-2	4/22/2011	NA	--	NA	--	0.58	5.34E-07	118	4
BH-10-62	BH-10-62_0-2'	0-2	4/22/2011	NA	--	NA	--	2.4	2.21E-06	2580	**36**
BH-10-66	BH-10-66_0-2'	0-2	4/21/2011	NA	--	NA	--	0.065	5.98E-08	250	6
BH-10-67	BH-10-67_0-2'	0-2	4/21/2011	NA	--	NA	--	0.57	5.25E-07	985	16
BH-10-71	BH-10-71_0-2'	0-2	4/5/2011	NA	--	NA	--	0.51	4.69E-07	244	6
BH-10-72	BH-10-72_0-2'	0-2	4/5/2011	NA	--	NA	--	49	4.51E-05	946	15
BH-10-73	BH-10-73_0-2'	0-2	4/5/2011	NA	--	NA	--	ND	--	4550	**62**
BH-10-76	BH-10-76_0-2'	0-2	4/20/2011	NA	--	NA	--	1.8	1.66E-06	1990	**29**
BH-10-78	BH-10-78_0-2'	0-2	4/21/2011	NA	--	NA	--	0.66	6.08E-07	79.3	4
BH-10-79	BH-10-79_0-2'	0-2	4/21/2011	NA	--	NA	--	0.046	4.23E-08	145	5
BH-10-80	BH-10-80_0-2'	0-2	4/21/2011	NA	--	NA	--	1.4	1.29E-06	234	6
W-1D	W-1D_0-2'	0-2	4/5/2011	NA	--	NA	--	2.7	2.49E-06	76.5	4
W-28	W-28_0-2'	0-2	4/19/2011	NA	--	NA	--	0.39	3.59E-07	181	5
W-29	W-29_0-2'	0-2	4/19/2011	NA	--	NA	--	0.84	7.73E-07	259	6
W-30	W-30@0'-2'	0-2	4/15/2011	NA	--	NA	--	ND	--	1990	**29**
W-31	W-31@0'-2'	0-2	4/15/2011	NA	--	NA	--	0.59	5.43E-07	955	15
W-32D	W-32D_0-2'	0-2	4/7/2011	NA	--	NA	--	0.43	3.96E-07	1200	18
W-33	W-33_0-2'	0-2	4/20/2011	NA	--	NA	--	0.2	1.84E-07	297	7
W-34	W-34_0-2'	0-2	4/20/2011	NA	--	NA	--	0.54	4.97E-07	561	10
BH-10-43	BH-10-43_0-2'	0-2	4/14/2011	14.7	0.002	14.7	2.78E-06	ND	--	167	5
BH-10-48	BH-10-48_0-2'	0-2	4/14/2011	20	0.002	20	3.78E-06	0.42	3.87E-07	278	6
BH-10-51	BH-10-51_0-2'	0-2	4/14/2011	21.3	0.003	21.3	4.03E-06	0.45	4.14E-07	1720	**25**
BH-10-52	BH-10-52_0-2'	0-2	4/14/2011	12.2	0.001	12.2	2.31E-06	0.59	5.43E-07	1480	22
BH-10-57	BH-10-57_0-2'	0-2	4/21/2011	21.1	0.002	21.1	3.99E-06	ND	--	743	12
BH-10-58	BH-10-58_0-2'	0-2	4/14/2011	18.6	0.002	18.6	3.52E-06	ND	--	941	15
BH-10-65	BH-10-65_0-2'	0-2	4/14/2011	8.71	0.001	8.71	1.65E-06	ND	--	307	7
BH-10-68	BH-10-68_0-2'	0-2	4/14/2011	7.99	0.001	7.99	1.51E-06	ND	--	94.2	4
BH-10-75	BH-10-75_0-2'	0-2	4/19/2011	61.3	0.007	61.3	1.16E-05	2.8	2.58E-06	192	5
BH-10-81	BH-10-81_0-2'	0-2	4/21/2011	38.9	0.005	38.9	7.36E-06	2.7	2.49E-06	242	6
BH-10-82	BH-10-82_0-2'	0-2	4/20/2011	17	0.002	17	3.22E-06	0.96	8.84E-07	584	10
BH-10-83	BH-10-83_0-2'	0-2	4/21/2011	13.7	0.002	13.7	2.59E-06	0.68	6.26E-07	402	8
			Cumulative Total:		***0.030***		***4.83E-05***		***1.13E-04***		

Maximum Total Cumulative Risk for Carcinogens: **1.61E-04** *> 1 in 10,000*
Maximum Hazard Index for Non-Carcinogens: **0.03000** *< 1*

Notes:
ND - Not Detected Above Lab Reporting Limit
NA - Arsenic is not a site-specific compound and therefore not analyzed on a site-wide basis.
(1) All soil samples collected and analyzed were unsaturated.
(2) All samples are located outside SWMU/CAMU areas.
(3) Maximum Total Cumulative Risk is the combined risk of exposure to the detected concentrations of carcinogenic compounds arsenic and BaP and should be less than 1 in 10,000.
(4) Maximum Hazard Index is the combined risk of exposure to the detected concentrations of the non-carcinogenic compound arsenic and should be less than 1.
(5) Calculated based on site specific parameters provided in Table F-4. The CDC (NIOSH, 2008) recommends that blood lead levels be maintained below 25 ug/dL.

Table H-7
Site Specific Cumulative Risk Evaluation for the Corrective Action Management Unit (CAMU)
AOI 10 Site Characterization/Remedial Investigaiton Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

				Benzo(a)pyrene (50-32-8)		Dibenzo(a,h)anthracene (53-70-3)	
Location ID	Sample ID	Sample Interval	Sample Date	Reported Result (mg/kg)	Calculated Risk	Reported Result (mg/kg)	Calculated Risk
BH-10-44	BH-10-44-WC_0-2'	0-2	40645	0.18	1.66E-07	ND	--
BH-10-45	BH-10-45-WC_0-2'	0-2	40645	ND	--	ND	--
BH-10-46	BH-10-46-WC_0-2'	0-2	40645	ND	--	ND	--
BH-10-55	BH-10-55-WC_0-2'	0-2	40645	0.82	7.55E-07	0.29	2.67E-07
BH-10-56	BH-10-56-WC_0-2'	0-2	40645	1.6	1.47E-06	0.52	4.79E-07
BH-10-63	BH-10-63-WC_0-2'	0-2	40646	ND	--	ND	--
BH-10-64	BH-10-64-WC_0-2'	0-2	40646	120	**1.10E-04**	73	6.72E-05
BH-10-69	BH-10-69-WC_0-2'	0-2	40645	ND		ND	--
BH-10-70	BH-10-70-WC@0'-2'	0-2	40644	ND	--	ND	--
BH-10-77	BH-10-77-WC_0-2'	0-2	40646	1.9	1.75E-06	0.53	4.88E-07
			Cumulative Total:		***1.15E-04***		***6.84E-05***

Maximum Total Cumulative Risk for Carcinogens: **1.83E-04** *> 1 in 10,000*

Notes:
ND - Not Detected Above Lab Reporting Limit
(1) All soil samples collected and analyzed were unsaturated.
(2) All samples are located inside CAMU areas.
(3) Maximum Total Cumulative Risk is the combined risk of exposure to the detected concentrations of carcinogenic compounds BaP and dibenzo(a,h)anthracene and should be less than 1 in 10,000.

Appendix D
Laboratory Analysis Report

eurofins | Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

ANALYTICAL RESULTS

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

Conestoga-Rovers & Associates
2055 Niagara Falls Blvd.
Suite #3
Niagara Falls NY 14304

November 13, 2015

Project: Philadelphia Refinery A01-10

Submittal Date: 10/21/2015
Group Number: 1603152
SDG: MHF19
PO Number: 11109606
State of Sample Origin: PA

Client Sample Description	Lancaster Labs (LL) #
SD-11109606-101915-CJM-AOI-10-02 Grab Sediment	8100975
SD-11109606-101915-CJM-AOI-10-02 Grab Sediment	8100976
SD-11109606-101915-CJM-AOI-10-01 Grab Sediment	8100977
SD-11109606-101915-CJM-AOI-10-01 Grab Sediment	8100978
SD-11109606-101915-CJM-AOI-10-06 Grab Sediment	8100979
SD-11109606-101915-CJM-AOI-10-06 Grab Sediment	8100980
SD-11109606-101915-CJM-AOI-10-03 Grab Sediment	8100981
SD-11109606-101915-CJM-AOI-10-03 Grab Sediment	8100982
SD-11109606-102015-CJM-AOI-10-04 Grab Sediment	8100983
SD-11109606-102015-CJM-AOI-10-04 Grab Sediment	8100984
SD-11109606-102015-CJM-AOI-10-05 Grab Sediment	8100985
SD-11109606-102015-CJM-AOI-10-05 Grab Sediment	8100986

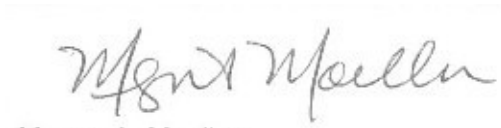
The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

Regulatory agencies do not accredit laboratories for all methods, analytes, and matrices. Our scopes of accreditation can be viewed at http://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/resources/certifications/ .

ELECTRONIC COPY TO	GHD, Inc.	Attn: Arlie Weigley
ELECTRONIC COPY TO	GHD, Inc.	Attn: Dave Steele
1 COPY TO	Conestoga-Rovers & Associates	Attn: Paul McMahon

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Respectfully Submitted,



Megan A. Moeller
Senior Specialist

(717) 556-7261

eurofins | Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 •717-656-2300 Fax:717-656-2681• www.lancasterlabs.com

Analysis Report

Sample Description: SD-11109606-101915-CJM-AOI-10-02 Grab Sediment
Philadelphia Refinery AO1-10

LL Sample # SW 8100975
LL Group # 1603152
Account # 10177

Project Name: Philadelphia Refinery A01-10

Collected: 10/19/2015 13:55 by CM

Submitted: 10/21/2015 16:40
Reported: 11/13/2015 10:46

Conestoga-Rovers & Associates
2055 Niagara Falls Blvd.
Suite #3
Niagara Falls NY 14304

M1901 SDG#: MHF19-01

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
Wet Chemistry	**SW-846 9060A modified**		**mg/kg**	**mg/kg**	**mg/kg**	
02079	TOC Solids/Sludges Combustion	n.a.	106,000	15,200	5,070	10.08
	SW-846 7196A		**mg/kg**	**mg/kg**	**mg/kg**	
00425	Hexavalent Chromium (SOLIDS)	18540-29-9	N.D.	7.5	2.5	1
Wet Chemistry	**SM 2540 G-1997**		**%**	**%**	**%**	
00111	Moisture	n.a.	80.1	0.50	0.50	1

Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/16.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	15303113031A	10/31/2015 13:13	Clinton M Wilson	10.08
00425	Hexavalent Chromium (SOLIDS)	SW-846 7196A	1	15306042501A	11/03/2015 00:00	Daniel S Smith	1
07825	Hexavalent Cr (Extraction)	SW-846 3060A	1	15306042501A	11/02/2015 19:40	Daniel S Smith	1
00111	Moisture	SM 2540 G-1997	1	15301820008B	10/29/2015 09:19	Stephanie A Sanchez	1

*=This limit was used in the evaluation of the final result

Sample Description: SD-11109606-101915-CJM-AOI-10-02 Grab Sediment
Philadelphia Refinery AO1-10

LL Sample # SW 8100976
LL Group # 1603152
Account # 10177

Project Name: Philadelphia Refinery A01-10

Collected: 10/19/2015 13:55 by CM

Submitted: 10/21/2015 16:40
Reported: 11/13/2015 10:46

Conestoga-Rovers & Associates
2055 Niagara Falls Blvd.
Suite #3
Niagara Falls NY 14304

M1902 SDG#: MHF19-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
06949	Cadmium	7440-43-9	3.73	0.605	0.0520	1
06951	Chromium	7440-47-3	27.7	1.81	0.118	1
06953	Copper	7440-50-8	44.0	1.21	0.339	1
06955	Lead	7439-92-1	344	1.81	0.387	1
06961	Nickel	7440-02-0	116	1.21	0.278	1
06972	Zinc	7440-66-6	1,220	4.84	1.86	2
	SW-846 7471A		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	N.D.	0.0725	0.0073	1
Wet Chemistry	**EPA-821-R-91-100**		**umoles/g**	**umoles/g**	**umoles/g**	
01630	Acid Volatile Sulfide	1313-84-4	253	10.1	3.2	1
Wet Chemistry	**SM 2540 G-1997**		**%**	**%**	**%**	
07801	Moisture (Re-Entry)	n.a.	80.1	0.50	0.50	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/16.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06949	Cadmium	SW-846 6010B	1	153084792001	11/04/2015 15:32	Eric L Eby	1
06951	Chromium	SW-846 6010B	1	153084792001	11/04/2015 15:32	Eric L Eby	1
06953	Copper	SW-846 6010B	1	153084792001	11/04/2015 15:32	Eric L Eby	1
06955	Lead	SW-846 6010B	1	153084792001	11/04/2015 15:32	Eric L Eby	1
06961	Nickel	SW-846 6010B	1	153084792001	11/04/2015 15:32	Eric L Eby	1
06972	Zinc	SW-846 6010B	1	153084792001	11/06/2015 17:40	Suzanne M Will	2
00159	Mercury	SW-846 7471A	1	153084792001	11/05/2015 12:03	Damary Valentin	1
04792	All Inst./ Non-digest - U3	SW-846 3050B	1	153084792001	11/04/2015 08:04	Joanne M Gates	1
01630	Acid Volatile Sulfide	EPA-821-R-91-100	1	15306163002A	11/02/2015 09:05	Susan E Hibner	1
07801	Moisture (Re-Entry)	SM 2540 G-1997	1	15301820008B	10/29/2015 09:19	Stephanie A Sanchez	1

*=This limit was used in the evaluation of the final result

Sample Description: SD-11109606-101915-CJM-AOI-10-01 Grab Sediment
Philadelphia Refinery AO1-10

LL Sample # SW 8100977
LL Group # 1603152
Account # 10177

Project Name: Philadelphia Refinery A01-10

Collected: 10/19/2015 14:50 by CM

Submitted: 10/21/2015 16:40
Reported: 11/13/2015 10:46

Conestoga-Rovers & Associates
2055 Niagara Falls Blvd.
Suite #3
Niagara Falls NY 14304

M1903 SDG#: MHF19-03

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
Wet Chemistry	**SW-846 9060A modified**		**mg/kg**	**mg/kg**	**mg/kg**	
02079	TOC Solids/Sludges Combustion	n.a.	183,000	16,400	5,470	26.32
Wet Chemistry	**ASTM D422**		**% Passing**	**% Passing**	**% Passing**	
07103	75 mm	n.a.	100	0.50	0.50	1
07103	37.5 mm	n.a.	100	0.50	0.50	1
07103	19 mm	n.a.	100	0.50	0.50	1
07103	4.75 mm	n.a.	90.7	0.50	0.50	1
07103	3.35 mm	n.a.	87.5	0.50	0.50	1
07103	2.36 mm	n.a.	83.2	0.50	0.50	1
07103	1.18 mm	n.a.	76.2	0.50	0.50	1
07103	0.6 mm	n.a.	68.4	0.50	0.50	1
07103	0.3 mm	n.a.	59.7	0.50	0.50	1
07103	0.15 mm	n.a.	51.8	0.50	0.50	1
07103	0.075 mm	n.a.	43.9	0.50	0.50	1
07103	0.064 mm	n.a.	40.0	0.50	0.50	1
07103	0.05 mm	n.a.	33.0	0.50	0.50	1
07103	0.02 mm	n.a.	19.5	0.50	0.50	1
07103	0.005 mm	n.a.	8.0	0.50	0.50	1
07103	0.002 mm	n.a.	5.0	0.50	0.50	1
07103	0.001 mm	n.a.	2.0	0.50	0.50	1
Wet Chemistry	**SW-846 7196A**		**mg/kg**	**mg/kg**	**mg/kg**	
00425	Hexavalent Chromium (SOLIDS)	18540-29-9	N.D.	3.1	1.0	1
Wet Chemistry	**SM 2540 G-1997**		**%**	**%**	**%**	
00111	Moisture	n.a.	51.9	0.50	0.50	1

Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/16.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	15303113031A	11/01/2015 18:23	Joseph E McKenzie	26.32
07103	Grain Size to 1 um	ASTM D422	1	15297710301A	10/24/2015 09:40	Luz M Groff	1
00425	Hexavalent Chromium (SOLIDS)	SW-846 7196A	1	15306042501A	11/03/2015 00:00	Daniel S Smith	1

*=This limit was used in the evaluation of the final result

Sample Description: SD-11109606-101915-CJM-AOI-10-01 Grab Sediment
Philadelphia Refinery AO1-10

LL Sample # SW 8100977
LL Group # 1603152
Account # 10177

Project Name: Philadelphia Refinery A01-10

Collected: 10/19/2015 14:50 by CM

Submitted: 10/21/2015 16:40
Reported: 11/13/2015 10:46

Conestoga-Rovers & Associates
2055 Niagara Falls Blvd.
Suite #3
Niagara Falls NY 14304

M1903 SDG#: MHF19-03

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07825	Hexavalent Cr (Extraction)	SW-846 3060A	1	15306042501A	11/02/2015 19:40	Daniel S Smith	1
00111	Moisture	SM 2540 G-1997	1	15301820008B	10/29/2015 09:19	Stephanie A Sanchez	1

*=This limit was used in the evaluation of the final result

Sample Description: SD-11109606-101915-CJM-AOI-10-01 Grab Sediment
Philadelphia Refinery AO1-10

LL Sample # SW 8100978
LL Group # 1603152
Account # 10177

Project Name: Philadelphia Refinery A01-10

Collected: 10/19/2015 14:50 by CM

Submitted: 10/21/2015 16:40
Reported: 11/13/2015 10:46

Conestoga-Rovers & Associates
2055 Niagara Falls Blvd.
Suite #3
Niagara Falls NY 14304

M1904 SDG#: MHF19-04

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
06949	Cadmium	7440-43-9	1.64	0.259	0.0222	1
06951	Chromium	7440-47-3	29.8	0.776	0.0507	1
06953	Copper	7440-50-8	370	0.517	0.145	1
06955	Lead	7439-92-1	2,440	7.76	1.65	10
06961	Nickel	7440-02-0	52.1	0.517	0.119	1
06972	Zinc	7440-66-6	531	2.07	0.796	2
	SW-846 7471A		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.0040 J	0.0310	0.0031	1
Wet Chemistry	**EPA-821-R-91-100**		**umoles/g**	**umoles/g**	**umoles/g**	
01630	Acid Volatile Sulfide	1313-84-4	5.1	4.2	1.3	1
Wet Chemistry	**SM 2540 G-1997**		**%**	**%**	**%**	
07801	Moisture (Re-Entry)	n.a.	51.9	0.50	0.50	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/16.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06949	Cadmium	SW-846 6010B	1	153084792001	11/04/2015 15:35	Eric L Eby	1
06951	Chromium	SW-846 6010B	1	153084792001	11/04/2015 15:35	Eric L Eby	1
06953	Copper	SW-846 6010B	1	153084792001	11/04/2015 15:35	Eric L Eby	1
06955	Lead	SW-846 6010B	1	153084792001	11/06/2015 17:45	Suzanne M Will	10
06961	Nickel	SW-846 6010B	1	153084792001	11/04/2015 15:35	Eric L Eby	1
06972	Zinc	SW-846 6010B	1	153084792001	11/06/2015 17:43	Suzanne M Will	2
00159	Mercury	SW-846 7471A	1	153084792001	11/05/2015 12:05	Damary Valentin	1
04792	All Inst./ Non-digest - U3	SW-846 3050B	1	153084792001	11/04/2015 08:04	Joanne M Gates	1
01630	Acid Volatile Sulfide	EPA-821-R-91-100	1	15306163002A	11/02/2015 09:05	Susan E Hibner	1
07801	Moisture (Re-Entry)	SM 2540 G-1997	1	15301820008B	10/29/2015 09:19	Stephanie A Sanchez	1

*=This limit was used in the evaluation of the final result

Sample Description: SD-11109606-101915-CJM-AOI-10-06 Grab Sediment
Philadelphia Refinery AO1-10

LL Sample # SW 8100979
LL Group # 1603152
Account # 10177

Project Name: Philadelphia Refinery A01-10

Collected: 10/19/2015 15:00 by CM

Submitted: 10/21/2015 16:40
Reported: 11/13/2015 10:46

Conestoga-Rovers & Associates
2055 Niagara Falls Blvd.
Suite #3
Niagara Falls NY 14304

M1905 SDG#: MHF19-05

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
Wet Chemistry	**SW-846 9060A modified**		**mg/kg**	**mg/kg**	**mg/kg**	
02079	TOC Solids/Sludges Combustion	n.a.	235,000	14,700	4,910	22.08
	SW-846 7196A		**mg/kg**	**mg/kg**	**mg/kg**	
00425	Hexavalent Chromium (SOLIDS)	18540-29-9	N.D.	3.3	1.1	1
Wet Chemistry	**SM 2540 G-1997**		**%**	**%**	**%**	
00111	Moisture	n.a.	55.0	0.50	0.50	1

Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/16.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	15303113031A	11/01/2015 18:37	Joseph E McKenzie	22.08
00425	Hexavalent Chromium (SOLIDS)	SW-846 7196A	1	15306042501A	11/03/2015 00:00	Daniel S Smith	1
07825	Hexavalent Cr (Extraction)	SW-846 3060A	1	15306042501A	11/02/2015 19:40	Daniel S Smith	1
00111	Moisture	SM 2540 G-1997	1	15301820008B	10/29/2015 09:19	Stephanie A Sanchez	1

*=This limit was used in the evaluation of the final result

Sample Description: SD-11109606-101915-CJM-AOI-10-06 Grab Sediment
Philadelphia Refinery AO1-10

LL Sample # SW 8100980
LL Group # 1603152
Account # 10177

Project Name: Philadelphia Refinery A01-10

Collected: 10/19/2015 15:00 by CM

Submitted: 10/21/2015 16:40
Reported: 11/13/2015 10:46

Conestoga-Rovers & Associates
2055 Niagara Falls Blvd.
Suite #3
Niagara Falls NY 14304

M1906 SDG#: MHF19-06

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
06949	Cadmium	7440-43-9	1.79	0.265	0.0228	1
06951	Chromium	7440-47-3	32.1	0.795	0.0520	1
06953	Copper	7440-50-8	408	0.530	0.148	1
06955	Lead	7439-92-1	2,520	7.95	1.70	10
06961	Nickel	7440-02-0	31.3	0.530	0.122	1
06972	Zinc	7440-66-6	501	2.12	0.816	2
	SW-846 7471A		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	0.0069 J	0.0318	0.0032	1
Wet Chemistry	**EPA-821-R-91-100**		**umoles/g**	**umoles/g**	**umoles/g**	
01630	Acid Volatile Sulfide	1313-84-4	5.2	4.4	1.4	1
Wet Chemistry	**SM 2540 G-1997**		**%**	**%**	**%**	
07801	Moisture (Re-Entry)	n.a.	55.0	0.50	0.50	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/16.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06949	Cadmium	SW-846 6010B	1	153084792001	11/04/2015 15:44	Eric L Eby	1
06951	Chromium	SW-846 6010B	1	153084792001	11/04/2015 15:44	Eric L Eby	1
06953	Copper	SW-846 6010B	1	153084792001	11/04/2015 15:44	Eric L Eby	1
06955	Lead	SW-846 6010B	1	153084792001	11/06/2015 17:51	Suzanne M Will	10
06961	Nickel	SW-846 6010B	1	153084792001	11/04/2015 15:44	Eric L Eby	1
06972	Zinc	SW-846 6010B	1	153084792001	11/06/2015 17:48	Suzanne M Will	2
00159	Mercury	SW-846 7471A	1	153084792001	11/05/2015 12:07	Damary Valentin	1
04792	All Inst./ Non-digest - U3	SW-846 3050B	1	153084792001	11/04/2015 08:04	Joanne M Gates	1
01630	Acid Volatile Sulfide	EPA-821-R-91-100	1	15306163002A	11/02/2015 09:05	Susan E Hibner	1
07801	Moisture (Re-Entry)	SM 2540 G-1997	1	15301820008B	10/29/2015 09:19	Stephanie A Sanchez	1

*=This limit was used in the evaluation of the final result

Sample Description: SD-11109606-101915-CJM-AOI-10-03 Grab Sediment
Philadelphia Refinery AO1-10

LL Sample # SW 8100981
LL Group # 1603152
Account # 10177

Project Name: Philadelphia Refinery A01-10

Collected: 10/19/2015 15:50 by CM

Submitted: 10/21/2015 16:40
Reported: 11/13/2015 10:46

Conestoga-Rovers & Associates
2055 Niagara Falls Blvd.
Suite #3
Niagara Falls NY 14304

M1907 SDG#: MHF19-07

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
Wet Chemistry	**SW-846 9060A modified**		**mg/kg**	**mg/kg**	**mg/kg**	
02079	TOC Solids/Sludges Combustion	n.a.	64,000	5,950	1,980	8.41
	SW-846 7196A		**mg/kg**	**mg/kg**	**mg/kg**	
00425	Hexavalent Chromium (SOLIDS)	18540-29-9	N.D.	3.5	1.2	1
Wet Chemistry	**SM 2540 G-1997**		**%**	**%**	**%**	
00111	Moisture	n.a.	57.6	0.50	0.50	1

Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/16.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	15303113031A	10/31/2015 13:38	Clinton M Wilson	8.41
00425	Hexavalent Chromium (SOLIDS)	SW-846 7196A	1	15306042501A	11/03/2015 00:00	Daniel S Smith	1
07825	Hexavalent Cr (Extraction)	SW-846 3060A	1	15306042501A	11/02/2015 19:40	Daniel S Smith	1
00111	Moisture	SM 2540 G-1997	1	15301820008B	10/29/2015 09:19	Stephanie A Sanchez	1

*=This limit was used in the evaluation of the final result

Sample Description: SD-11109606-101915-CJM-AOI-10-03 Grab Sediment
Philadelphia Refinery AO1-10

LL Sample # SW 8100982
LL Group # 1603152
Account # 10177

Project Name: Philadelphia Refinery A01-10

Collected: 10/19/2015 15:50 by CM

Submitted: 10/21/2015 16:40
Reported: 11/13/2015 10:46

Conestoga-Rovers & Associates
2055 Niagara Falls Blvd.
Suite #3
Niagara Falls NY 14304

M1908 SDG#: MHF19-08

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
06949	Cadmium	7440-43-9	1.56	0.291	0.0251	1
06951	Chromium	7440-47-3	28.7	0.874	0.0571	1
06953	Copper	7440-50-8	62.4	0.583	0.163	1
06955	Lead	7439-92-1	469	0.874	0.186	1
06961	Nickel	7440-02-0	19.0	0.583	0.134	1
06972	Zinc	7440-66-6	379	1.17	0.449	1
	SW-846 7471A		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	N.D.	0.0350	0.0035	1
Wet Chemistry	**EPA-821-R-91-100**		**umoles/g**	**umoles/g**	**umoles/g**	
01630	Acid Volatile Sulfide	1313-84-4	27.2	4.7	1.5	1
Wet Chemistry	**SM 2540 G-1997**		**%**	**%**	**%**	
07801	Moisture (Re-Entry)	n.a.	57.6	0.50	0.50	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/16.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06949	Cadmium	SW-846 6010B	1	153084792001	11/04/2015 15:47	Eric L Eby	1
06951	Chromium	SW-846 6010B	1	153084792001	11/04/2015 15:47	Eric L Eby	1
06953	Copper	SW-846 6010B	1	153084792001	11/04/2015 15:47	Eric L Eby	1
06955	Lead	SW-846 6010B	1	153084792001	11/04/2015 15:47	Eric L Eby	1
06961	Nickel	SW-846 6010B	1	153084792001	11/04/2015 15:47	Eric L Eby	1
06972	Zinc	SW-846 6010B	1	153084792001	11/04/2015 15:47	Eric L Eby	1
00159	Mercury	SW-846 7471A	1	153084792001	11/05/2015 12:13	Damary Valentin	1
04792	All Inst./ Non-digest - U3	SW-846 3050B	1	153084792001	11/04/2015 08:04	Joanne M Gates	1
01630	Acid Volatile Sulfide	EPA-821-R-91-100	1	15306163002A	11/02/2015 09:05	Susan E Hibner	1
07801	Moisture (Re-Entry)	SM 2540 G-1997	1	15301820008B	10/29/2015 09:19	Stephanie A Sanchez	1

*=This limit was used in the evaluation of the final result

Sample Description: SD-11109606-102015-CJM-AOI-10-04 Grab Sediment
Philadelphia Refinery AO1-10

LL Sample # SW 8100983
LL Group # 1603152
Account # 10177

Project Name: Philadelphia Refinery A01-10

Collected: 10/20/2015 12:30 by CM

Submitted: 10/21/2015 16:40
Reported: 11/13/2015 10:46

Conestoga-Rovers & Associates
2055 Niagara Falls Blvd.
Suite #3
Niagara Falls NY 14304

M1909 SDG#: MHF19-09

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
Wet Chemistry	**SW-846 9060A modified**		**mg/kg**	**mg/kg**	**mg/kg**	
02079	TOC Solids/Sludges Combustion	n.a.	47,900	2,990	998	4.42
Wet Chemistry	**ASTM D422**		**% Passing**	**% Passing**	**% Passing**	
07103	75 mm	n.a.	100	0.50	0.50	1
07103	37.5 mm	n.a.	100	0.50	0.50	1
07103	19 mm	n.a.	99.8	0.50	0.50	1
07103	4.75 mm	n.a.	92.4	0.50	0.50	1
07103	3.35 mm	n.a.	87.2	0.50	0.50	1
07103	2.36 mm	n.a.	81.2	0.50	0.50	1
07103	1.18 mm	n.a.	73.4	0.50	0.50	1
07103	0.6 mm	n.a.	65.3	0.50	0.50	1
07103	0.3 mm	n.a.	55.2	0.50	0.50	1
07103	0.15 mm	n.a.	47.4	0.50	0.50	1
07103	0.075 mm	n.a.	42.5	0.50	0.50	1
07103	0.064 mm	n.a.	40.0	0.50	0.50	1
07103	0.05 mm	n.a.	34.0	0.50	0.50	1
07103	0.02 mm	n.a.	23.0	0.50	0.50	1
07103	0.005 mm	n.a.	8.0	0.50	0.50	1
07103	0.002 mm	n.a.	5.0	0.50	0.50	1
07103	0.001 mm	n.a.	2.0	0.50	0.50	1
Wet Chemistry	**SW-846 7196A**		**mg/kg**	**mg/kg**	**mg/kg**	
00425	Hexavalent Chromium (SOLIDS)	18540-29-9	N.D.	3.4	1.1	1
Wet Chemistry	**SM 2540 G-1997**		**%**	**%**	**%**	
00111	Moisture	n.a.	55.7	0.50	0.50	1

Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/16.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	15303113031B	11/01/2015 18:45	Joseph E McKenzie	4.42
07103	Grain Size to 1 um	ASTM D422	1	15297710301A	10/24/2015 09:40	Luz M Groff	1
00425	Hexavalent Chromium (SOLIDS)	SW-846 7196A	1	15306042501A	11/03/2015 00:00	Daniel S Smith	1

*=This limit was used in the evaluation of the final result

Sample Description: SD-11109606-102015-CJM-AOI-10-04 Grab Sediment
Philadelphia Refinery AO1-10

LL Sample # SW 8100983
LL Group # 1603152
Account # 10177

Project Name: Philadelphia Refinery A01-10

Collected: 10/20/2015 12:30 by CM

Submitted: 10/21/2015 16:40
Reported: 11/13/2015 10:46

Conestoga-Rovers & Associates
2055 Niagara Falls Blvd.
Suite #3
Niagara Falls NY 14304

M1909 SDG#: MHF19-09

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07825	Hexavalent Cr (Extraction)	SW-846 3060A	1	15306042501A	11/02/2015 19:40	Daniel S Smith	1
00111	Moisture	SM 2540 G-1997	1	15301820008B	10/29/2015 09:19	Stephanie A Sanchez	1

*=This limit was used in the evaluation of the final result

Sample Description: SD-11109606-102015-CJM-AOI-10-04 Grab Sediment
Philadelphia Refinery AO1-10

LL Sample # SW 8100984
LL Group # 1603152
Account # 10177

Project Name: Philadelphia Refinery A01-10

Collected: 10/20/2015 12:30 by CM

Submitted: 10/21/2015 16:40
Reported: 11/13/2015 10:46

Conestoga-Rovers & Associates
2055 Niagara Falls Blvd.
Suite #3
Niagara Falls NY 14304

M1910 SDG#: MHF19-10

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
06949	Cadmium	7440-43-9	0.469	0.278	0.0239	1
06951	Chromium	7440-47-3	107	0.834	0.0545	1
06953	Copper	7440-50-8	53.8	0.556	0.156	1
06955	Lead	7439-92-1	384	0.834	0.178	1
06961	Nickel	7440-02-0	80.4	0.556	0.128	1
06972	Zinc	7440-66-6	247	1.11	0.428	1
	SW-846 7471A		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	N.D.	0.0334	0.0033	1
Wet Chemistry	**EPA-821-R-91-100**		**umoles/g**	**umoles/g**	**umoles/g**	
01630	Acid Volatile Sulfide	1313-84-4	17.2	4.5	1.4	1
Wet Chemistry	**SM 2540 G-1997**		**%**	**%**	**%**	
07801	Moisture (Re-Entry)	n.a.	55.7	0.50	0.50	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/16.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06949	Cadmium	SW-846 6010B	1	153084792001	11/06/2015 17:28	Suzanne M Will	1
06951	Chromium	SW-846 6010B	1	153084792001	11/04/2015 15:13	Eric L Eby	1
06953	Copper	SW-846 6010B	1	153084792001	11/04/2015 15:13	Eric L Eby	1
06955	Lead	SW-846 6010B	1	153084792001	11/04/2015 15:13	Eric L Eby	1
06961	Nickel	SW-846 6010B	1	153084792001	11/04/2015 15:13	Eric L Eby	1
06972	Zinc	SW-846 6010B	1	153084792001	11/04/2015 15:13	Eric L Eby	1
00159	Mercury	SW-846 7471A	1	153084792001	11/05/2015 11:53	Damary Valentin	1
04792	All Inst./ Non-digest - U3	SW-846 3050B	1	153084792001	11/04/2015 08:04	Joanne M Gates	1
01630	Acid Volatile Sulfide	EPA-821-R-91-100	1	15306163002A	11/02/2015 09:05	Susan E Hibner	1
07801	Moisture (Re-Entry)	SM 2540 G-1997	1	15301820008B	10/29/2015 09:19	Stephanie A Sanchez	1

*=This limit was used in the evaluation of the final result

Sample Description: SD-11109606-102015-CJM-AOI-10-05 Grab Sediment
Philadelphia Refinery AO1-10

LL Sample # SW 8100985
LL Group # 1603152
Account # 10177

Project Name: Philadelphia Refinery A01-10

Collected: 10/20/2015 13:05 by CM

Submitted: 10/21/2015 16:40
Reported: 11/13/2015 10:46

Conestoga-Rovers & Associates
2055 Niagara Falls Blvd.
Suite #3
Niagara Falls NY 14304

M1911 SDG#: MHF19-11

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
Wet Chemistry	**SW-846 9060A modified**		**mg/kg**	**mg/kg**	**mg/kg**	
02079	TOC Solids/Sludges Combustion	n.a.	80,700	4,420	1,470	9.64
	SW-846 7196A		**mg/kg**	**mg/kg**	**mg/kg**	
00425	Hexavalent Chromium (SOLIDS)	18540-29-9	N.D.	2.3	0.76	1
	Reporting limits were raised due to interference from the sample matrix.					
Wet Chemistry	**SM 2540 G-1997**		**%**	**%**	**%**	
00111	Moisture	n.a.	34.6	0.50	0.50	1
	Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.					

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/16.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	15303113031B	10/31/2015 13:53	Clinton M Wilson	9.64
00425	Hexavalent Chromium (SOLIDS)	SW-846 7196A	1	15306042501A	11/03/2015 00:00	Daniel S Smith	1
07825	Hexavalent Cr (Extraction)	SW-846 3060A	1	15306042501A	11/02/2015 19:40	Daniel S Smith	1
00111	Moisture	SM 2540 G-1997	1	15301820008B	10/29/2015 09:19	Stephanie A Sanchez	1

*=This limit was used in the evaluation of the final result

Sample Description: SD-11109606-102015-CJM-AOI-10-05 Grab Sediment
Philadelphia Refinery AO1-10

LL Sample # SW 8100986
LL Group # 1603152
Account # 10177

Project Name: Philadelphia Refinery A01-10

Collected: 10/20/2015 13:05 by CM

Submitted: 10/21/2015 16:40
Reported: 11/13/2015 10:46

Conestoga-Rovers & Associates
2055 Niagara Falls Blvd.
Suite #3
Niagara Falls NY 14304

M1912 SDG#: MHF19-12

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Limit of Quantitation*	Dry Method Detection Limit	Dilution Factor
Metals	**SW-846 6010B**		**mg/kg**	**mg/kg**	**mg/kg**	
06949	Cadmium	7440-43-9	0.279	0.189	0.0163	1
06951	Chromium	7440-47-3	7.86	0.567	0.0371	1
06953	Copper	7440-50-8	25.3	0.378	0.106	1
06955	Lead	7439-92-1	192	0.567	0.121	1
06961	Nickel	7440-02-0	9.66	0.378	0.0870	1
06972	Zinc	7440-66-6	181	0.756	0.291	1
	SW-846 7471A		**mg/kg**	**mg/kg**	**mg/kg**	
00159	Mercury	7439-97-6	N.D.	0.0227	0.0023	1
Wet Chemistry	**EPA-821-R-91-100**		**umoles/g**	**umoles/g**	**umoles/g**	
01630	Acid Volatile Sulfide	1313-84-4	6.9	3.1	0.96	1
Wet Chemistry	**SM 2540 G-1997**		**%**	**%**	**%**	
07801	Moisture (Re-Entry)	n.a.	34.6	0.50	0.50	1

General Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/16.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06949	Cadmium	SW-846 6010B	1	153084792001	11/04/2015 15:50	Eric L Eby	1
06951	Chromium	SW-846 6010B	1	153084792001	11/04/2015 15:50	Eric L Eby	1
06953	Copper	SW-846 6010B	1	153084792001	11/04/2015 15:50	Eric L Eby	1
06955	Lead	SW-846 6010B	1	153084792001	11/04/2015 15:50	Eric L Eby	1
06961	Nickel	SW-846 6010B	1	153084792001	11/04/2015 15:50	Eric L Eby	1
06972	Zinc	SW-846 6010B	1	153084792001	11/04/2015 15:50	Eric L Eby	1
00159	Mercury	SW-846 7471A	1	153084792001	11/05/2015 12:15	Damary Valentin	1
04792	All Inst./ Non-digest - U3	SW-846 3050B	1	153084792001	11/04/2015 08:04	Joanne M Gates	1
01630	Acid Volatile Sulfide	EPA-821-R-91-100	1	15306163002A	11/02/2015 09:05	Susan E Hibner	1
07801	Moisture (Re-Entry)	SM 2540 G-1997	1	15301820008B	10/29/2015 09:19	Stephanie A Sanchez	1

*=This limit was used in the evaluation of the final result

Quality Control Summary

Client Name: Conestoga-Rovers & Associates Group Number: 1603152
Reported: 11/13/2015 10:46

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Laboratory Compliance Quality Control

Analysis Name	Blank Result	Blank LOQ**	Blank MDL	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 153084792001	Sample number(s): 8100976,8100978,8100980,8100982,8100984,8100986								
Cadmium	N.D.	0.125	0.0108	mg/kg	102		80-120		
Chromium	N.D.	0.375	0.0245	mg/kg	97		80-120		
Copper	N.D.	0.250	0.0700	mg/kg	100		80-120		
Lead	N.D.	0.375	0.0800	mg/kg	99		80-120		
Mercury	N.D.	0.0150	0.0015	mg/kg	84		80-120		
Nickel	0.0665 J	0.250	0.0575	mg/kg	103		80-120		
Zinc	0.306 J	0.500	0.193	mg/kg	105		80-120		
Batch number: 15303113031A	Sample number(s): 8100975,8100977,8100979,8100981								
TOC Solids/Sludges Combustion	N.D.	300.	100	mg/kg	59		47-143		
Batch number: 15303113031B	Sample number(s): 8100983,8100985								
TOC Solids/Sludges Combustion	N.D.	300.	100	mg/kg	59		47-143		
Batch number: 15306042501A	Sample number(s): 8100975,8100977,8100979,8100981,8100983,8100985								
Hexavalent Chromium (SOLIDS)	N.D.	1.5	0.50	mg/kg	93		80-120		
Batch number: 15306163002A	Sample number(s): 8100976,8100978,8100980,8100982,8100984,8100986								
Acid Volatile Sulfide	N.D.	2.0	0.63	umoles/g	54		40-95		
Batch number: 15301820008B	Sample number(s): 8100975-8100986								
Moisture					100		99-101		
Moisture (Re-Entry)					100		99-101		

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: 153084792001	Sample number(s): 8100976,8100978,8100980,8100982,8100984,8100986 UNSPK: 8100984 BKG: 8100984								
Cadmium	79	76	75-125	2	20	0.208	0.208	0 (1)	20
Chromium	-24 (2)	-61 (2)	75-125	4	20	47.3	47.3	0	20
Copper	-198*	-224*	75-125	14	20	23.8	18.8	24*	20
Lead	-73 (2)	-677	75-125	14	20	170	168	1	20

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.
P###### is indicative of a Background or Unspiked sample that is batch matrix QC and was not performed using a sample from this submission group.

Quality Control Summary

Client Name: Conestoga-Rovers & Associates Group Number: 1603152
Reported: 11/13/2015 10:46

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC (2)	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Mercury	0*	0*	80-120	0	20	N.D.	N.D.	0 (1)	20
Nickel	44*	9*	75-125	11	20	35.6	31.8	11	20
Zinc	77 (2)	-20 (2)	75-125	10	20	109	109	1	20
Batch number: 15303113031A	Sample number(s): 8100975,8100977,8100979,8100981 UNSPK: P100973 BKG: P100973								
TOC Solids/Sludges Combustion	75		47-143			4,270	1,680	87* (1)	7
Batch number: 15303113031B	Sample number(s): 8100983,8100985 UNSPK: 8100985 BKG: 8100985								
TOC Solids/Sludges Combustion	65		47-143			52,800	29,900	55*	7
Batch number: 15306042501A	Sample number(s): 8100975,8100977,8100979,8100981,8100983,8100985 UNSPK: P090869 BKG: P090869								
Hexavalent Chromium (SOLIDS)	94		75-125			N.D.	N.D.	0 (1)	20
Batch number: 15306163002A	Sample number(s): 8100976,8100978,8100980,8100982,8100984,8100986 UNSPK: 8100984 BKG: 8100984								
Acid Volatile Sulfide	70	20*	40-95	81*	20	7.6	10.6	33* (1)	20
Batch number: 15301820008B	Sample number(s): 8100975-8100986 BKG: P100801								
Moisture						18.9	18.5	2	5
Moisture (Re-Entry)						18.9	18.5	2	15

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.
P###### is indicative of a Background or Unspiked sample that is batch matrix QC and was not performed using a sample from this submission group.

Environmental Analysis Request/Chain of Custody

eurofins | Lancaster Laboratories Environmental

For Eurofins Lancaster Laboratories Environmental use only

Acct. # 10177 Group # 1603152 Sample # 8100975-86

COC # 389693

Client Information

Client: GHD Services Inc	Acct. #: 11109606-001
Project Name/#: Philadelphia Refinery A01-10	PWSID #:
Project Manager: David Steele	P.O. #:
Sampler: C. Miller / C. Andes	Quote #:
State where samples were collected: PA	For Compliance: Yes ☐ No ☐

Sample Identification	Collected Date	Collected Time	Grab	Composite	Matrix: Soil	Sediment	Water: Ground	Potable	Surface	NPDES	Other:	Total # of Containers	AVS-SEM	TOC	Hexavalent Chromium	moisture	Grain Size to 1 µm
SD-11109606-101915-COM-A01-10-02	10/19/15	1355	X		X							2	X	X	X	X	
SD-11109606-101915-COM-A01-10-01	10/19/15	1450	X		X							3	X	X	X	X	X
SD-11109606-101915-COM-A01-10-06	10/19/15	1500	X		X							2	X	X	X	X	
SD-11109606-101915-COM-A01-10-03	10/19/15	1550	X		X							2	X	X	X	X	
SD-11109606-102015-COM-A01-10-04	10/20/15	1230	X		X							3	X	X	X	X	X
SD-11109606-102015-COM-A01-10-05	10/20/15	1305	X		X							2	X	X	X	X	

Analysis Requested

Preservation Codes

For Lab Use Only

FSC:

SCR#:

Preservation Codes

H=HCl T=Thiosulfate
N=HNO_3 B=NaOH
S=H_2SO_4 O=Other

Remarks

Turnaround Time (TAT) Requested (please circle)

Standard Rush

(Rush TAT is subject to laboratory approval and surcharge.)

Date results are needed: 2 week TAT

E-mail address: david.steele@ghd.com

Data Package Options (circle if required)

Type I (EPA Level 3 Equivalent/non-CLP)
Type VI (Raw Data Only)
Type III (Reduced non-CLP)
TX TRRP-13
NYSDEC Category A or B
MA MCP
CT RCP

Relinquished by	Date	Time	Received by	Date	Time
	10/16/15	920		10/16/15	920
	10/16/15			10/16/15	
	10/21/15	0850		10/21/15	0850
	10/21/15	1640			
				10/21/15	1640

EDD Required? Yes No

If yes, format:

Site-Specific QC (MS/MSD/Dup)? Yes No

(If yes, indicate QC sample and submit triplicate sample volume.)

Relinquished by Commercial Carrier:

UPS FedEx Other

Temperature upon receipt 0.7 °C

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
µg	microgram(s)	**mg**	milligram(s)
mL	milliliter(s)	**L**	liter(s)
m3	cubic meter(s)	**µL**	microliter(s)
		pg/L	picogram/liter

<	less than
>	greater than
ppm	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.
ppb	parts per billion
Dry weight basis	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Laboratory Data Qualifiers:

B - Analyte detected in the blank
C - Result confirmed by reanalysis
E - Concentration exceeds the calibration range
J (or G, I, X) - estimated value ≥ the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
P - Concentration difference between the primary and confirmation column >40%. The lower result is reported.
U - Analyte was not detected at the value indicated
V - Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference…

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods. Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as “analyze immediately” are not performed within 15 minutes.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL, LLC BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL AND (B) WHETHER EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.